UNIT
4

Human Population

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Human population:
issues and challenges

AUTHORS

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NOTE: the COVID-19 figures, years 2019–22, referred to throughout this book range through different stages of the pandemic according to data availability and to illustrate different aspects of its spread. Any projections may not include impacts of the COVID-19 virus.

Geographers study population for many reasons:

▶ to develop an understanding of where our fellow humans live and, collectively, how and why they grow and decline in number, how they age and *move*

▶ to help develop policies in response to the *environmental*, economic, social and cultural impacts of *change* in population characteristics

▶ to analyse how *changes* in population characteristics are *interconnected* to levels of development at different *scales*

▶ to bring about more effective planning for the use of the Earth's resources.

The term population dynamics refers to the *changes* that occur in a population and includes how and why these *changes* occur. Population *change* can result from the difference between birth rates and death rates. In turn, *changes* to birth rates and death rates can be the result of many factors *interconnecting* with each other: for instance, *changing* social and cultural factors, economic conditions, government policies, wars and revolution, and disease. These can produce a natural increase or a natural decrease in population. Furthermore, a population can age, or become younger, because of *changes* in birth rates and death rates. Migration into or out of an area can have a further impact on population *distribution*, structure, ethnicity and cultural values as well as further increase or decrease to its size. In turn, these population *changes* can bring about issues related to welfare provision, employment opportunities and *sustainability*. Addressing these issues presents a challenge for government authorities, organisations and individuals.

Population *distribution*

The 7.9 billion global population in April 2022 was very unevenly *distributed*, as Figure 1.1 shows. This *distribution* map includes a number of key population characteristics:

▶ approximately two-thirds of the global population live in Asia, but less than 10 per cent live in the Southern Hemisphere

▼ **Figure 1.1** Global population *distribution*

Persons per square kilometre

Over 500	11–40
101–500	2–10
41–100	Less than 2
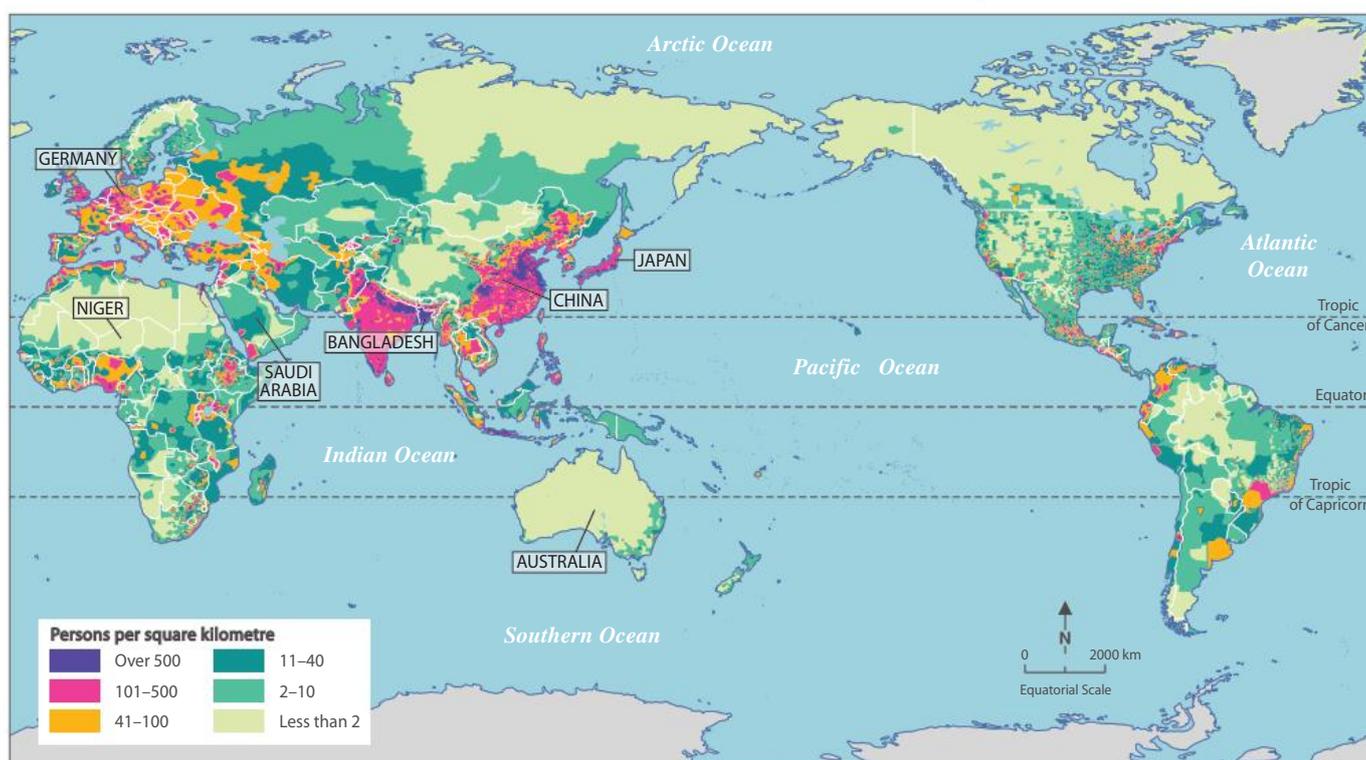
- Java, one of Indonesia's smaller islands, supports about the same number of people as the world's largest country by area, Russia
- close to four billion people live within 200 kilometres of a coastline. For Australians, 85 per cent live within 50 kilometres of a coastline.
- around 56 per cent of the global population live in towns and cities
- approximately 24 per cent of the global population live in urban agglomerations of more than one million people
- there are 45 megacities, each with over 10 million people including Tokyo-Yokohama (Japan), Mumbai (India) and Lagos (Nigeria).

The highest densities of people (that is, the number of people per unit of area, usually per square kilometre) were located in the *regions* of Asia and Europe, especially South and East Asia, Central and Western Europe, as well as north-east North America. Lower population densities occurred over wide areas of Africa, Oceania, Northern Europe, and Western and Northern Asia. Antarctica is the only continent without a permanent population.

Urban *environments*, like the one in Figure 1.2, support some of the highest population densities in the world. For example, Karachi (Pakistan) averages over 24,000 people per square kilometre while parts of Dhaka (Bangladesh) can exceed 45,000 people per square kilometre. These densities seem even more extreme when compared with Melbourne's average of 1500 people per square kilometre. Remember, these densities are only statistical averages. There is likely to be a considerable range in density either side of the average.

Tehran, in Iran (Figure 1.2) with around 15 million people in its wider metropolitan area, has densities exceeding 10,000 per square kilometre in the older centre at the foot of the Alborz Mountains. Tehran's growth has been especially rapid since the 1960s with the population more than tripling in number. Government authorities are planning to *redistribute* key administrative functions to other urban centres as a way of reducing the megacity's growth.

Spatial variations in population *distribution* become very evident at national *scales*. For example, China had an average density of 153 people per square kilometre in 2020. However, the eastern *region* of the country supports densities above 400 people. Shanghai, the *region's* major urban centre, with more than 27 million people, has an average population density of 3854 people per square kilometre. Some parts of inner Shanghai have an average in excess of 40,000. In contrast, the western part of the country has fewer than 10 people per square kilometre.
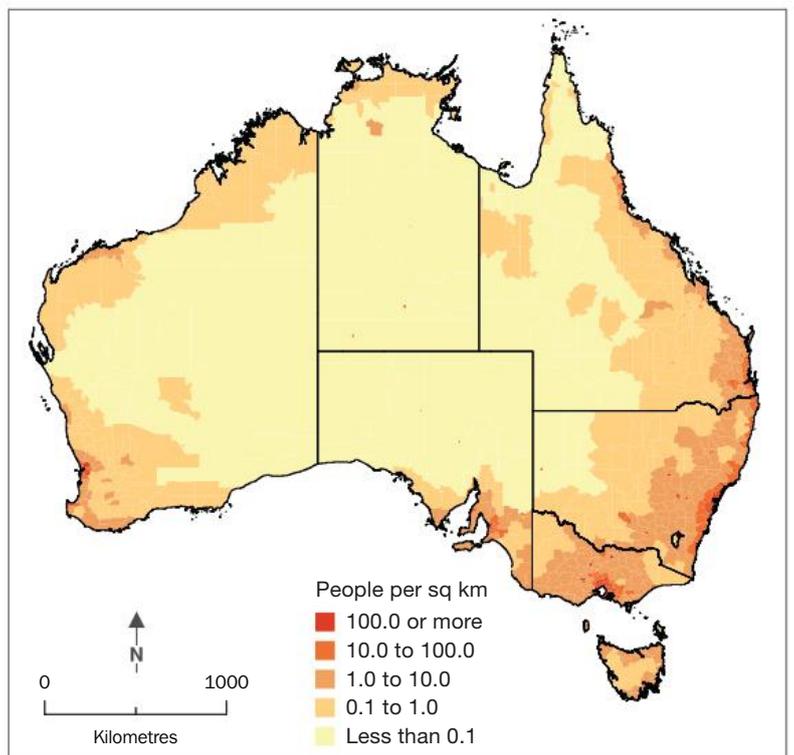
Rural *environments* generally support much lower population densities than urban *regions*. Even some of the world's most intensely farmed areas such as Java's plains (averaging 1121 persons per arable square kilometre) and Egypt's Nile delta and valley (1540) support lower densities than most urban areas. Densities in Australia's suburbs may be more comparable, however.

▲ **Figure 1.2** The Greater Tehran area in Iran has a population of approximately 15 million people

Australia's differences in population *distribution* (see Figures 1.3, 1.4 and 1.5) are the result of a combination of many factors *interconnecting* with each other. Inhospitable *environmental* factors including short growing seasons associated with low and unreliable rainfall, steep topography and/or poor accessibility have led to extensive areas of low rural population density, as shown in Figures 1.3 and 1.5. These situations may be reversed by the use of local water sources such as artesian basins, the discovery of minerals and the need for defence sites in rural *regions*. Urban concentrations at port sites such as Melbourne and Sydney, together with their growth as major administrative and manufacturing centres, account for Australia's highest densities. In between these extremes of low and high population densities, the better watered and gentle sloping lands of the east, south-east and south-west support farming communities and service towns at low and medium population densities.

▼ **Figure 1.3** Australia's population *distribution*, 2015

People per sq km
- 100.0 or more
- 10.0 to 100.0
- 1.0 to 10.0
- 0.1 to 1.0
- Less than 0.1

0   1000
Kilometres

▲ **Figure 1.4** Urban Australia has the nation's highest population densities

▲ **Figure 1.5** The Australian outback supports a very low population density

Global population growth

Until the 1750s, global population growth was slow because both birth rates and death rates were high. Most societies at the time were based on agriculture, and life expectancies were low. With improvements in farming techniques producing food surpluses, and better and more accessible medicine and sanitation, death rates fell and life expectancies increased, especially in Europe. As a result, world population began to grow more rapidly. By the early 19th Century the world's population had reached one billion (see Figure 1.6). Figure 1.7 shows a more detailed pattern of global population growth from 1950 onwards.

It took around 120 years for the world's population to reach its second billion but just 35 years for its third

billion. This exponential growth – that is, growth at an increasing rate – gave rise to the term 'population explosion'. Since 1950, the world's fastest growth rates of 2.1 and 2.2 per cent occurred between 1962 and 1968. Soon after, in 1975, a fourth billion was reached. As Figure 1.6 shows, the global population reached seven billion in 2011 and, at pre-COVID-19 growth rates, is likely to reach eight billion by 2024.

Since the 1970s, world population growth rates (see Figure 1.7) have slowed due to falling birth rates as a result of rising age of marriage, wider use of contraceptives and trends towards smaller families in many countries. Although growth rates have slowed, huge increases in absolute numbers continue to occur

▶ **Figure 1.6** Global population growth, 1700–2100
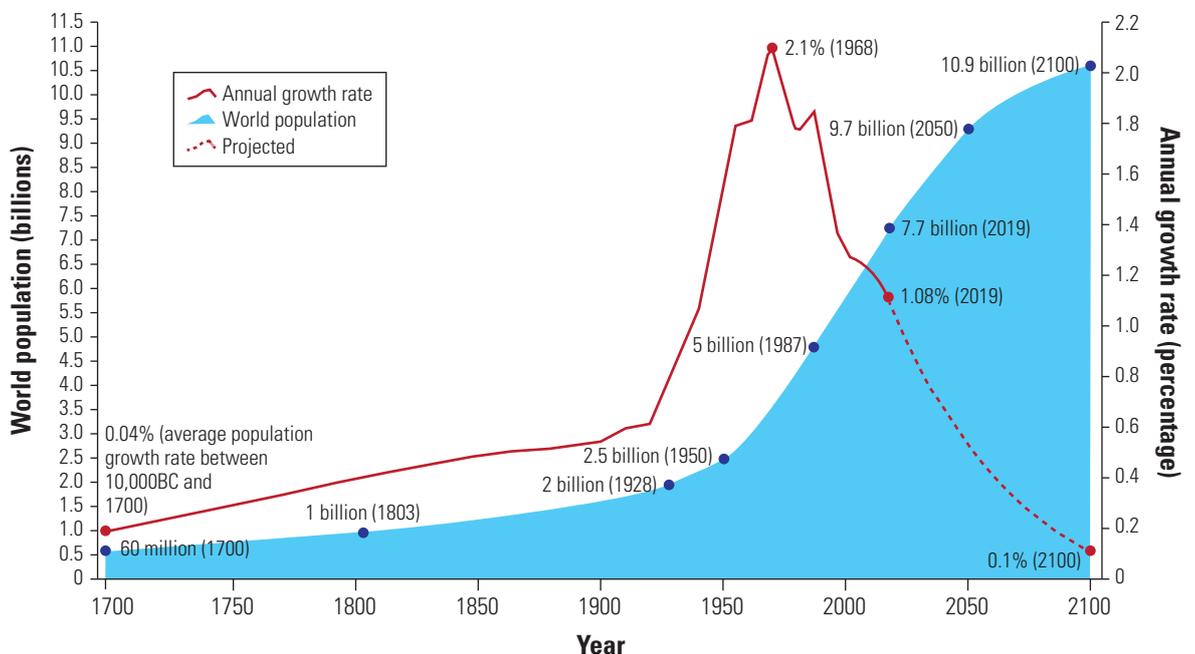
because the base population totals remain so large. For example, there were 140 million births in 2020 (and 58 million deaths) compared to around 53 million births 35 years earlier. By 2020 global population was increasing by around 83 million or 1.1 per cent a year (see Figure 1.7) – or close to over two people for each second. Figure 1.8 summarises these *changes*. The patterns of population *change* over time appear as a theoretical model, the Demographic Transition Model (DTM). This model is examined later in this chapter (page 23).

The populations of China and India play significant roles in world population *change*. Together these two countries account for 35.6 per cent of the global population (China 17.9 per cent, India 17.7 per cent). Significant falls in their birth rates, particularly China's, have made significant impacts on global statistics. Chapter 6 examines China's population dynamics in greater detail.

Future projections of world population size are based on the sum of individual national population growth projections. Over long time periods, *changes* in fertility rates, birth rates and death rates can occur quite rapidly (see pages 7–12 for the role these terms play in population *change*). Nonetheless, the United Nations projects a world population of around 9.7 billion by 2050, with annual new growth slowing to around 40–45 million people and perhaps 11.2 billion by the end of the century (see again Figures 1.6 and 1.8). The nine biggest contributors to this likely growth are (in order) India, Nigeria, Pakistan, the Democratic Republic of Congo, Ethiopia, Tanzania, Indonesia, Egypt and the United States of America. Five of these countries are in Africa where the total projected growth for the continent is from 1.36 billion in 2020 to as much as 4.5 billion by 2100. At that time, half the babies born in the world will be African. Figure 1.9 shows the *changing* proportions of different populations during this century by continent. Nigeria's population growth will be Africa's stand out: from 206 million in 2020 to a projected 400 million by 2050. By then Nigeria could become the world's third most populous country after India and China. Europe's share of the world's population will shrink from 9.6 per cent

▼ **Figure 1.7** Annual global population growth, 1950–2100
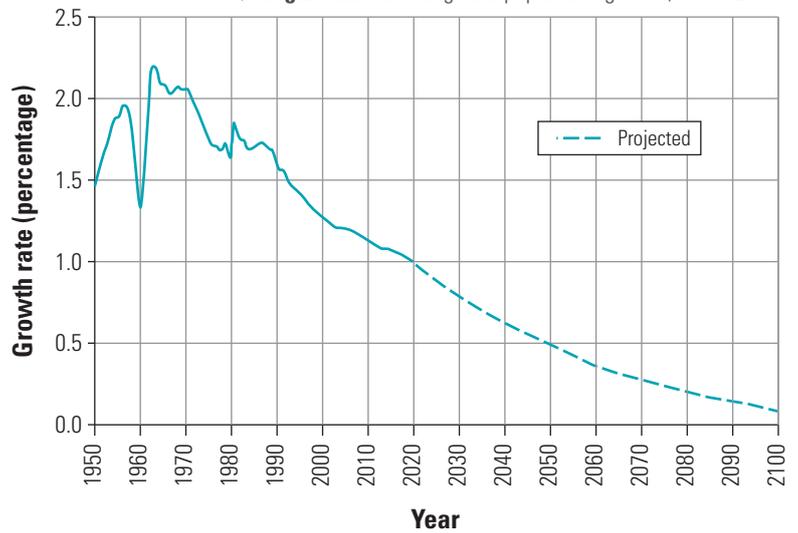
▼ **Figure 1.8** Global births and deaths, 1950–2100
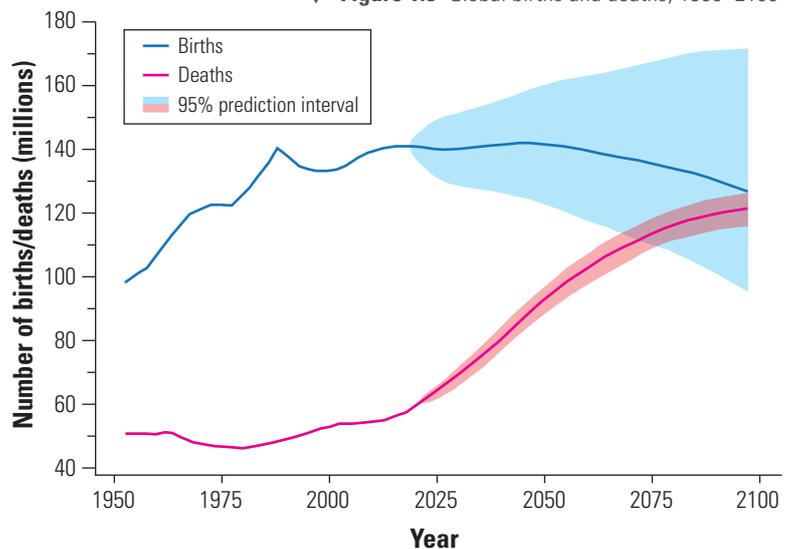
to less than six. Even Asia's share is projected to shrink from just under 60 per cent in 2020 to around 43 per cent by 2100. These projected population figures may *change* significantly depending on the impact of the COVID-19 pandemic on demographic factors such as growth rates, death rates, birth rates, life expectancy, migration and population *distribution*.
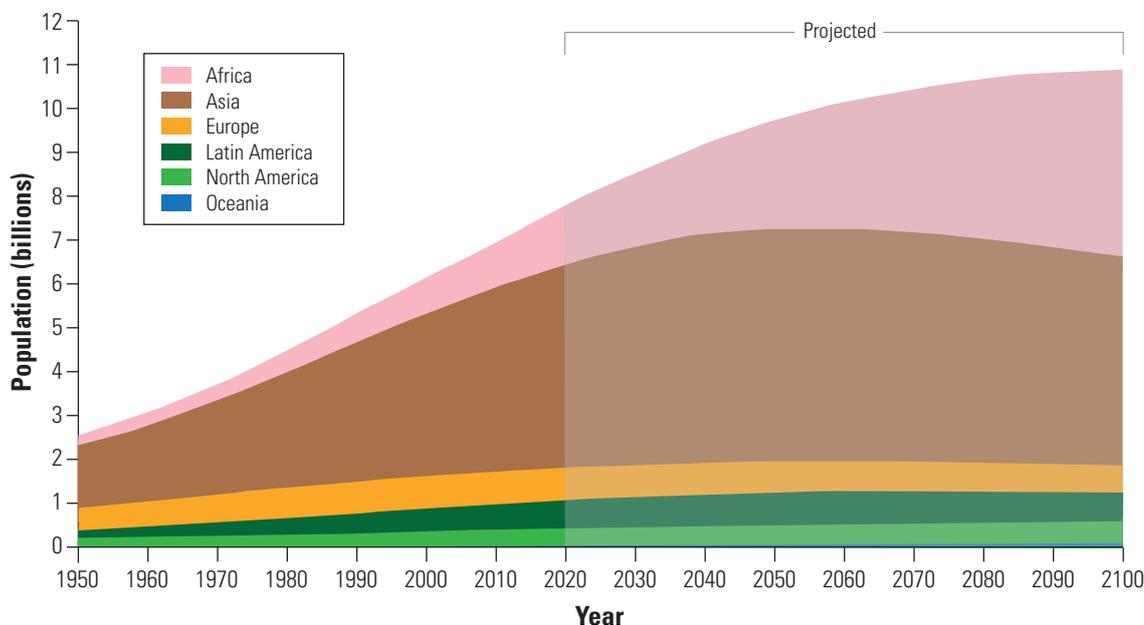
◀ **Figure 1.9** Global population changes by *regions*, 1950–2100

1. With the assistance of the glossary on pages 138–141, develop an understanding of the following terms: crude birth rate, crude death rate, natural increase, total fertility rate, infant mortality rate and life expectancy.

2. On the internet, search for the World Population Clock. Keep a record of the increase for one 15-minute period. Search for, and compare it to, a 15-minute period using China's Population Clock. What conclusions do you reach?

3. Use Figure 1.6 to describe the *changing* gap in each billion that has been added (and is likely to be added) to the world's population over time.

4. Examine Figures 1.6 and 1.7.
   a. Decide which time period had the fastest population growth rate.
   b. Compare this growth rate to the predicted slowest rate of population growth.

c. In 1959–60, China's death rate rose, and its fertility rate dropped, due to a combination of natural calamities and large-*scale* government planning failures. How does this show itself on a global *scale*?

d. Discuss which population dynamics are likely to be most responsible for the post-2000 trends shown on Figure 1.7. Use the data in Figure 1.8 to add depth to your answer.

e. Refer to Figures 1.7 and 1.8. Suggest why global population growth rates of 0.5 per cent in 2050 will add more people to the total population than in the 1970s when growth rates were more than 2.0 per cent.

5. Suggest how future *changes* in growth rates could affect world population *distribution*.

6. Contrast the *changing* contributions of Europe, Asia and Africa to global populations from 1950 to 2020. How is it predicted to *change* after 2020?

7. Briefly describe the trend in births and in deaths shown on Figure 1.8. How do these trends reflect in the data of Figure 1.6?

## Natural population growth and decline

The rate of natural increase is calculated by subtracting death rates from birth rates in a given period. It provides an indication of whether a population is growing, remaining stable or declining in number in a given period – usually one year. The impacts of people migrating into, or from, the area being considered are excluded. Natural increase can be quantified as a rate per 1000 or converted into a percentage. Global patterns of natural increase and decrease can be seen in Figure 1.10.

Population growth rates around the world show considerable variation by *region* and between countries (Figure 1.10). In 2020, the highest growth rates were found in Africa and the Middle East: Angola, Mali, Niger, Democratic Republic of Congo, Chad and Uganda each have an annual natural increase above three per cent. At these rates, countries could see their populations double in less than 25 years. A large proportion of Africa, excluding the southern states and

▼ **Figure 1.10** *Distribution* of natural increase and natural decrease, 2020

Percentage of natural increase
- 3.0 and over
- 2.0–2.9
- 1.0–1.9
- 0–0.9

Percentage of natural decrease
- 0.5 and over
- Less than 0.5
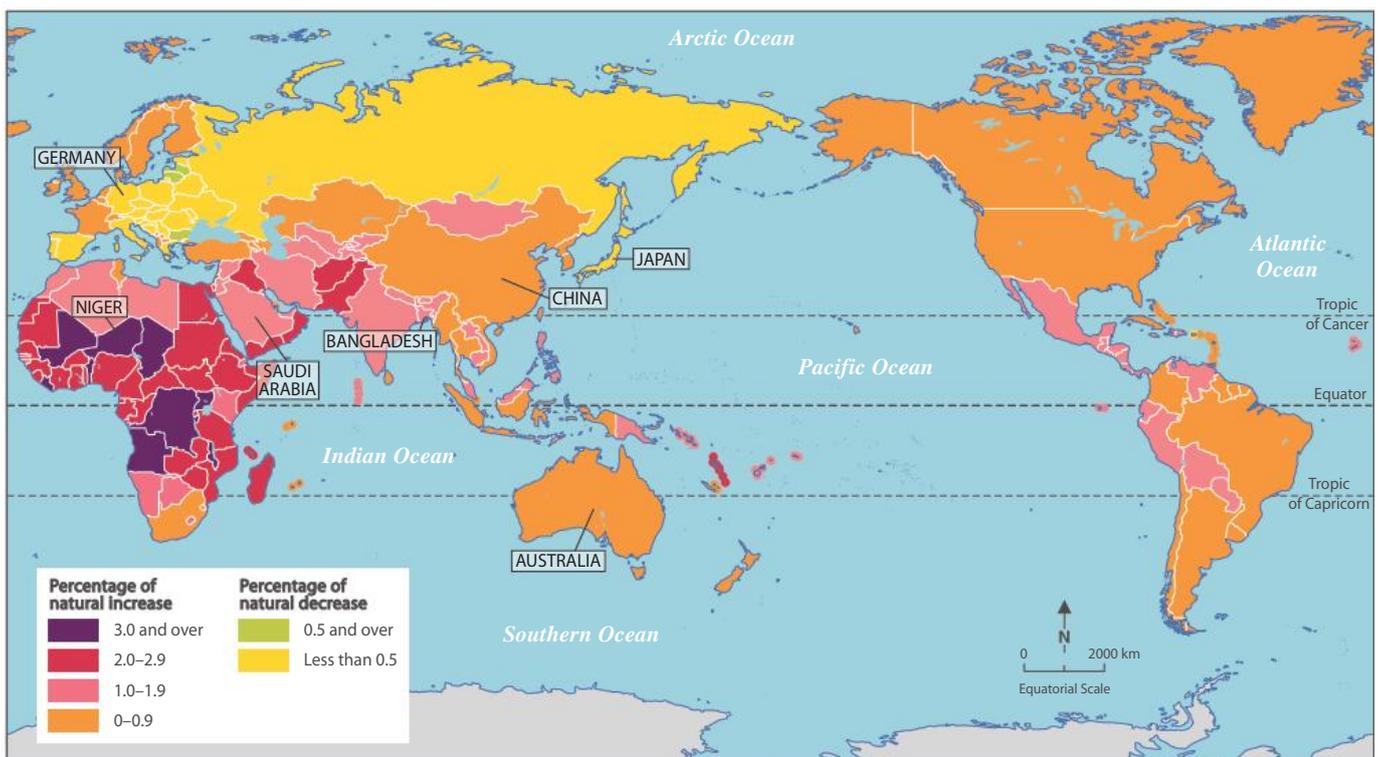
the northern states bordering the Mediterranean Sea, is growing at annual rates of two per cent or more.

The global trend towards lower rates of population growth is evident on Figures 1.8 and 1.10. Figure 1.10 indicates that low rates of population growth have a wide global *distribution* and are found in all inhabited continental *regions*. It is particularly pronounced in Europe, North-East Asia, Oceania, North America and southern Africa. Southern Africa continues to suffer the consequences of HIV/AIDS and its impact on death rates and life expectancy, reducing rates of natural increase. The other *regions* reflect falling and low birth rates, together with slightly rising death rates. The latter trend is mostly associated with ageing populations. This situation can be described as having a strong *spatial association*: the same areas with falling and low birth rates also have ageing populations. Australia's natural population growth rate of just 0.55 per cent in 2020 (see Chapter 9) meant it could take over 120 years to double its total population if the country did not have a substantial rate of immigration.

More than 20 of the world's countries were experiencing a natural decrease in 2020 because death rates exceeded birth rates. This figure could rise to over 50 countries by 2050 and the rate could accelerate in countries already declining. The fastest shrinking populations in 2020 were mostly European: Bulgaria (−0.63 per cent a year), Latvia (−0.54), Ukraine (−0.44), Hungary (−0.41), Germany (−0.35) and Russia (−0.34). Figure 1.11 summarises the *scale* of declining natural population growth rates in selected countries. Russia's population is predicted to shrink by between 8 and 12 million people by 2050 because of its low birth rate, high death rate and high abortion rate. Out-migration, particularly of people in the reproductive age group, will further accentuate the decline. Through the 2010s, Japan's population was decreasing by between 100,000 and 200,000 people a year. The issues this situation raises and the challenges this creates for people and authorities are discussed more fully in Chapters 7, 8 and 9.

▼ **Figure 1.11** Declining populations in selected countries

Country	Population 2020 (millions)	Population 2050 (millions)	Percentage decline
Italy	60.5	54.4	10.1
Poland	37.8	33.3	12.0
Greece	10.4	9.0	13.4
Bulgaria	6.9	5.4	22.5
Ukraine	43.7	35.2	19.5
Japan	126.5	105.8	16.3

▶ ACTIVITIES

1. Describe the global *distribution* of either the countries in the highest two categories of natural increase, or the countries in the two categories of natural decrease. Use your atlas and Figure 1.10 to include specific examples in your answer.

2. Compare the patterns of natural increase in one of the following pairs of *regions*:
   ▶ Africa and Europe
   ▶ North America and South America
   ▶ North-East Asia and West Asia
   ▶ Oceania and South-East Asia.

3. Discuss in a group the possible issues for specific national governments of the global trends of:
   ▶ large and rapidly increasing populations
   ▶ ageing populations
   ▶ decreasing populations.

4. Describe the spatial *distribution* of countries with declining populations in 2020.

5. Refer to Figure 1.11. Which country will lose the largest population by:
   a. total number and
   b. percentage of the 2020 population?

Birth rates, death rates and natural increase

Variations in birth rates and death rates are major causes of natural population increases and decreases. Natural increase or decrease is the result of differences between birth rates and death rates.

Crude Birth Rate (CBR)

Birth rates are correctly termed crude birth rates or CBR. These rates are calculated as the number of births per 1000 people per year in a population. Since this measure does not take into account the gender or age of the population, it is termed a crude birth rate.

The global *distribution* of crude birth rates shown in Figure 1.12 has a strong *spatial association* with the natural increase and natural decrease patterns represented in Figure 1.10. The highest birth rates occur in African countries, with the exception of those located to the north and south of the continent. In 2020 Niger in West Africa and Angola in south-west Africa recorded the world's highest crude birth rates of 47.5 and 42.7 per 1000 respectively. A substantial proportion of the Earth's countries record birth rates of between 10 and 20 per 1000, helping to bring the world average to 18.1 per 1000. As also shown in Figure 1.10, much of Europe and East Asia stands out. Many countries in these two *regions* have very low birth rates therefore producing natural population decreases. The world's lowest birth rates in 2020 were reached by Japan (7.3 per 1000), Greece (7.8), Taiwan (8.0) and Portugal (8.1).

Making generalisations about levels of economic development being *interconnected* with birth rates can be misleading. Not all more economically developed countries, such as the United States and Australia, have very low birth rates or have naturally declining populations. The reverse is more accurate when considering the highest levels of birth rates – these are mostly associated with less economically developed countries such as Uganda and Papua New Guinea.

Figure 1.12 *Distribution* of crude birth rates, 2020
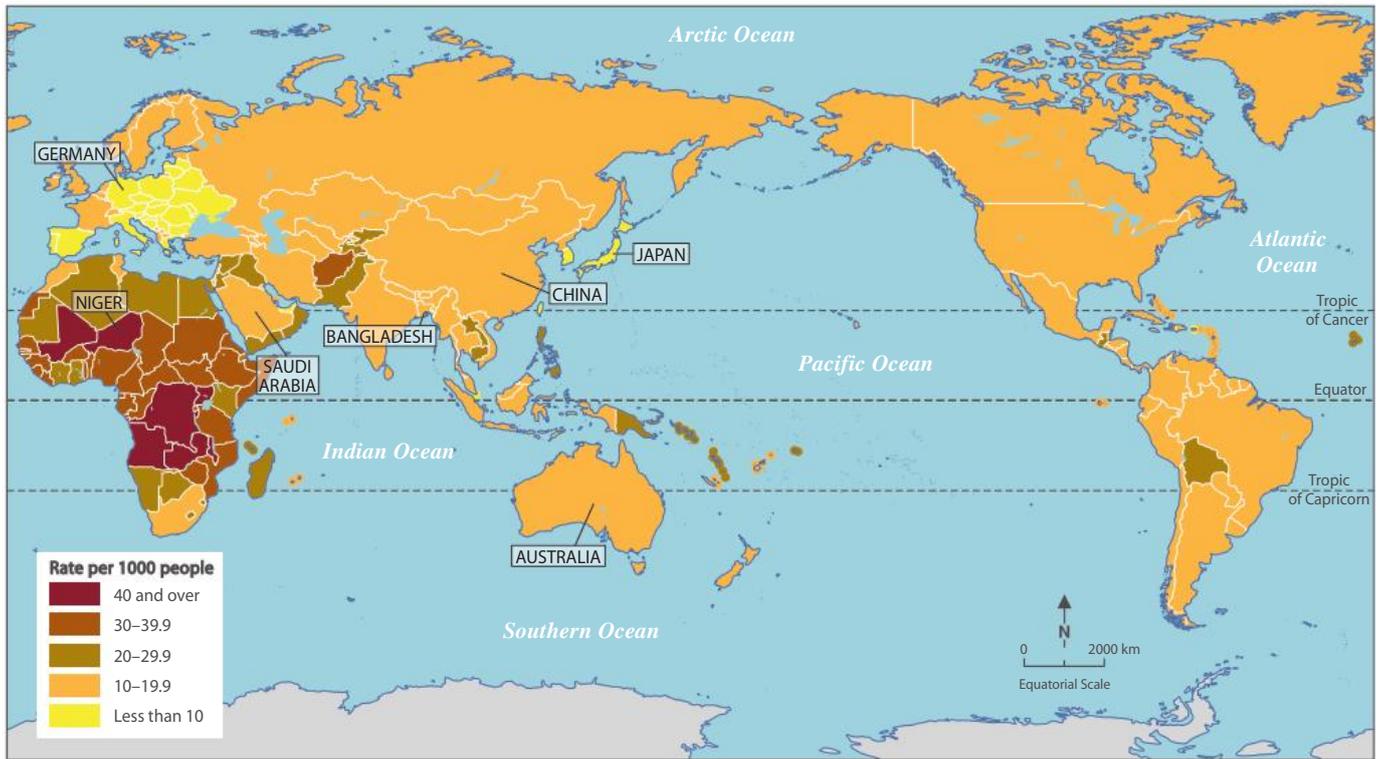
▼ **Figure 1.13** *Changing* crude birth rates (per 1000 per year), 1950–2020

	1950–55	1960–65	1970–75	1980–85	1990–95	2000	2010	2020
Egypt	49.0	45.0	38.0	39.0	27.0	25.2	25.0	27.2
India	44.0	42.0	38.0	35.0	28.2	26.0	22.3	17.8
Indonesia	43.0	43.0	38.0	32.7	25.1	22.6	18.5	15.9
Italy	18.0	19.0	16.0	11.0	9.2	9.4	9.3	8.4
Japan	24.0	17.0	19.0	13.0	10.0	9.6	8.7	7.1
Kenya	53.0	53.0	53.0	45.1	38.2	37.8	35.3	27.2
Mexico	47.0	46.0	43.0	32.5	27.5	23.6	20.0	17.6
World	37.2	34.9	30.8	27.9	24.7	21.0	19.0	18.1

There is an enormous range in the level of economic development for countries ranked in the middle levels of crude birth rates, as shown in Figure 1.12: Australia, Vietnam, India, Myanmar, North Korea, Norway and Namibia for example. Clearly there are other factors affecting the dynamics of their populations and these are considered below.

Over time, and except for prolonged periods of war, famine and disease, the number of births in the world has mostly exceeded deaths leading to a natural increase in population. Since the 1950s, birth rates have fallen and are likely to continue to fall, as Figure 1.8 and Figure 1.13 indicate. Even traditionally high birth rate areas have experienced considerable falls: Pakistan, Philippines and Kenya for example. In China, government planning since 1979 has restricted couples to fewer children and at a later age; though since 2015 this policy has been modified (see Chapter 6). Smaller families such as the one in Figure 1.14 (a) are dominated by older adults. However, birth rates can remain high in some *regions* of the world for a number of *interconnecting* reasons:

▶ high infant and child mortality rates due to unsafe drinking water, disease or food shortage and limited access to health services, means couples are more likely to have additional children to try to ensure some survive to adulthood

▶ in rural areas especially, children can be seen as an economic asset as they help farm or do household chores from a young age; when older, they may earn money for the family (Figure 1.14 (b))

▶ children, especially sons, provide old-age support and security for their parents; few governments in less economically developed countries provide aged pensions

▶ a considerable proportion of couples still have limited or no access to contraception; family planning may be limited, especially in rural areas

▶ women may have little choice about family size and planning. Low levels of education may inhibit their power to make decisions

▶ religious beliefs in some *regions* may inhibit the use of family planning

- pro-natalist policies of some governments legislate against birth control and abortion
- some cultures equate social and personal success with large families.

In more economically developed countries such as Japan, Australia and France, birth rates have declined for a number of *interconnecting* reasons:
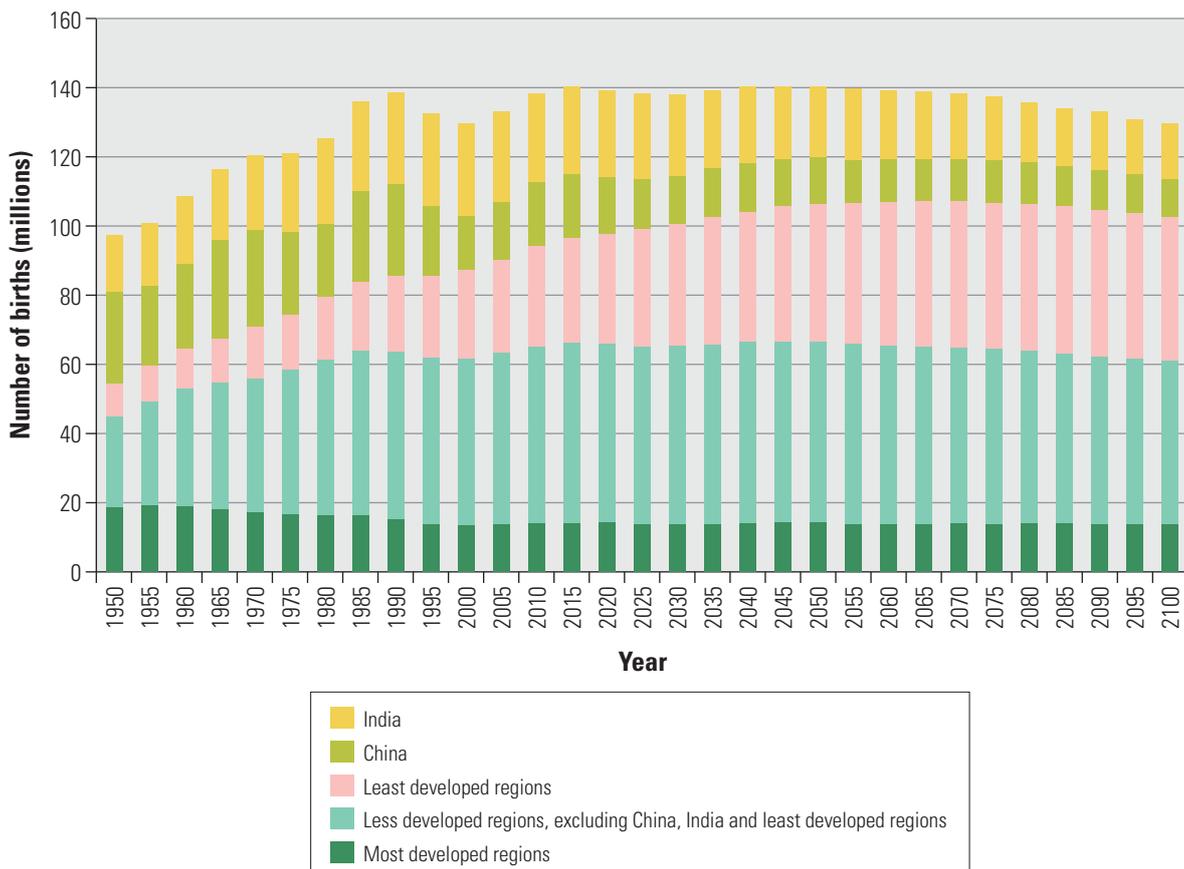
- low infant and child mortality rates due to safe drinking water, effective access to health services and reliable food supply help ensure most children survive to adulthood
- children may be seen as an economic liability due to the high cost of raising them, particularly with education and housing (there may be less household income if one parent is at home most of the time)
- welfare systems and/or superannuation schemes exist to support parents when they retire
- widespread access to and knowledge of contraception and family planning is available
- many women are better educated and expect to have careers outside the home, so delay childbearing or choose to have fewer or no children
- pro-natalist religious beliefs may be rejected by many couples
- social success is not equated with family size; less family pressure to marry and/or have children. In some cases, a culture of smaller families has taken hold.

The global pattern of crude birth rates has become more complex as Figures 1.13 and 1.15 show. Falling birth rates in China and India are being partly countered by the overall increase in births in the less economically developed and least economically developed *regions* of the world.

▼ **Figure 1.14 (a)** China's smaller families feature few young children

▼ **Figure 1.14 (b)** A large farming family. Children are an economic asset, helping with farm work

◀ **Figure 1.15** The number of births by *region*

Number of births (millions) vs **Year**

Legend:
- India
- China
- Least developed regions
- Less developed regions, excluding China, India and least developed regions
- Most developed regions

1. Compare Figure 1.10 with Figure 1.12 to locate and name countries:

   a. that are in the top two categories of both maps

   b. that are in the bottom category of both maps.

2. On the internet, locate the Gapminder website. Select three countries, each with different levels of economic development. Plot crude birth rate against a development indicator such as income per person or life expectancy. Watch the graphic *change* over time, particularly since 1950. What conclusions do you reach? Compare your results with those of other people who selected different countries.

3. Discuss the likely impact on crude birth rates in economically-developing countries of each of the following:

   ▶ widespread availability of ultrasound equipment that determines the gender of unborn babies

   ▶ increased mechanisation of farming activities

   ▶ higher levels of female literacy

   ▶ an end to a long-running civil war.

4. Discuss the likely impact on crude birth rates in more economically developed countries of each of the following:

   ▶ increasing age of marriage and delaying the birth of a first child

   ▶ celebrities having large families

   ▶ government promotion of births through cash incentives and child care vouchers

   ▶ rising costs of raising children and tertiary education fees.

5. Refer to Figure 1.13.

   a. 'Mexico's CBR in 2020 was closest to Italy's CBR 70 years earlier.' True or false?

   b. Which other country shown in Figure 1.13 is in a similar position?

   c. Which country with a CBR above 40 in 1950–55 was below the world average CBR in 2020?

Total Fertility Rate (TFR)

The total fertility rate (TFR) is the average number of births per woman of child-bearing age. Child-bearing age is generally considered to be 15 to 49 years. TFR is strongly *interconnected* with birth rates. The global *distribution* of these two population characteristics has a strong *spatial association*, as a comparison of Figure 1.16 with Figure 1.12 shows.

In 2021, the world's TFR averaged 2.42 children per woman but, as Figure 1.16 shows, there was considerable variation between countries and *regions*. Taiwan, South Korea and Singapore had the world's lowest rates at 1.07, 1.09 and 1.15 children per woman respectively.

As with birth rates, total fertility rates have been falling in all *regions* of the world, and seemingly regardless of the levels of economic development. In 1970 the world's TFR was 4.7 children per woman, almost twice that of 2021. Over 60 per cent of the world's population now live in countries in the two lowest categories shown on Figure 1.16. The factors influencing low birth rates in the more economically developed countries can be generally applied to many parts of the world's population. The major influences on continuing declines in fertility rates are increasingly determined by an *interconnection* of social, cultural and economic factors:

▶ the extension of family planning programs from urban to rural areas and into areas of lower economic development

▼ **Figure 1.16** *Distribution* of total fertility rates, 2021
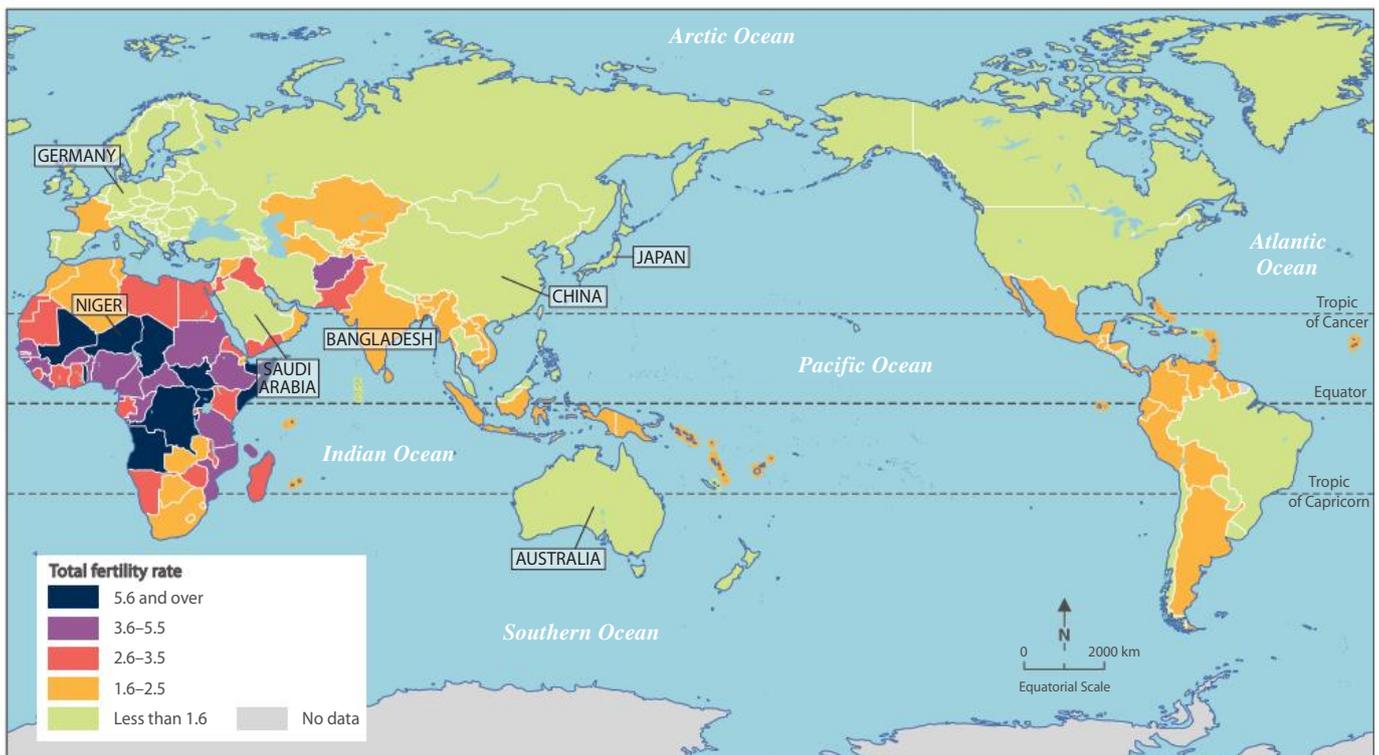
- improvements in health care resulting in lower death rates (see pages 13–15) of young children and therefore reducing the need for replacement children. Health care improvements include vaccinations and safer childbirth and abortions
- an extension of women's education and status. Education has proven to empower the choices available for women in family planning
- increasing urbanisation of the population encourages lower fertility rates due to the higher costs of raising children, greater opportunities for women to pursue careers and the inconvenience of having many children
- the role of government policies, which may include all the above influences, but also promote an anti-natalist line. China's population policies (see Chapter 6) and Bangladesh's two child policy (see Chapter 3) are examples.

Total fertility rate is regarded by demographers and planners as a valuable indicator of future population growth. A key factor is the fertility rate of 2.1. This level is referred to as the replacement rate. Replacement rate is the fertility rate at which a population neither grows nor shrinks in size. However, even when the fertility rate falls below this replacement level, a population can continue to grow significantly. This is because large numbers of young people, born in previous years of higher fertility, are *moving* into their reproductive years, a phenomenon known as population momentum. Several decades of continuous population growth are assured, often compounded by falling death rates among infants and young children. As an example, China's TFR reached the replacement rate of 2.1 in 1992 and has remained below 2.1 since. Even the *change* from a one child policy to a two child policy has kept China's TFR below the replacement rate. Yet its population has continued to grow, although at a slower rate than previously. Perhaps around 2029, when its population is predicted to peak at between 1.45 and 1.5 billion, will a fall in the total population occur.

In the long term, the impact of falling birth rates and fertility rates can produce a 'demographic dividend' with a large, young labour force able to spur a country's economic development further. As that population ages, the dividend may become an ageing liability with a growing and significant proportion of the population being supported by a much smaller workforce. This *process* is examined in greater detail on pages 16–19.

▶ ACTIVITIES

1. Describe the difference between crude birth rate and total fertility rate.

2. Assess each of the following statements using the data and locations of Figure 1.16.

   a. Australia, Argentina and Turkey all have the same levels of total fertility rate.

   b. Most European countries have low total fertility rates.

   c. Africa has a complete range of total fertility rate categories.

   d. The total fertility rate of countries in South-East Asia is dominated by fertility rates of 1.9 and below.

3. With reference to specific *regions*, identify the major similarities between the global *distribution* patterns of crude birth rates (Figure 1.12) and total fertility rates (Figure 1.16).

4. a. What is the significance of a total fertility rate of 2.1 for population planners?

   b. Explain the time lag between a population reaching a fertility rate of less than 2.1, and the time taken for a population to begin to decrease.

5. Discuss the likely *interconnection* between the factors that will influence future falls in total fertility rate in both more developed and less developed economies.

6. Discuss in a group the pros and cons of a population experiencing a demographic dividend.

7. Refer to Figure 1.15 to:

   a. Describe how the number of births has *changed* between 1950 and 2050 for more developed *regions* such as Oceania and North America, and the least developed countries, such as Bangladesh and Tanzania.

   b. Identify how either China or India is different to one of the *regions* described above.

   c. Comment on the world's less developed *regions* projected number of births in 2050 and those of the rest of the world. Your comment should include a comparison with the number of births between 1950, 2000 and 2050.
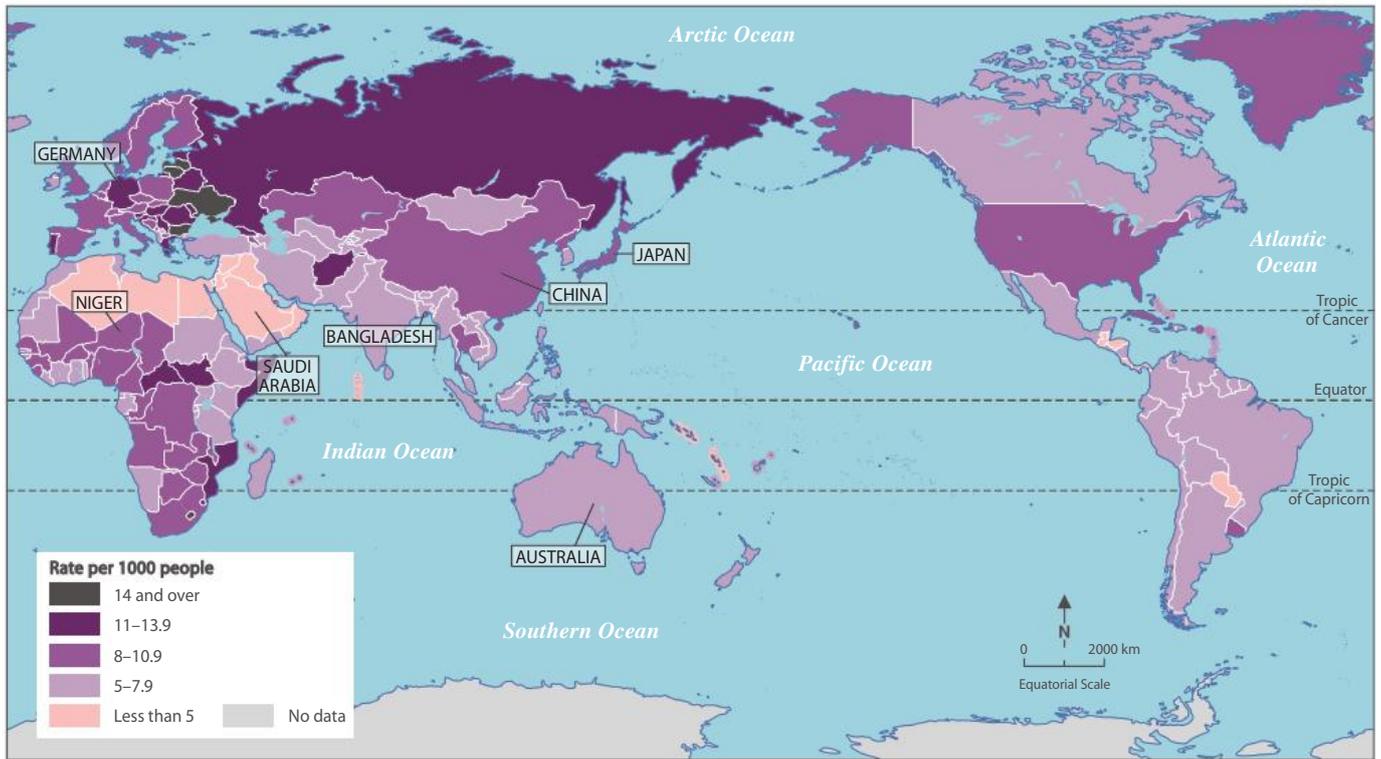
Crude Death Rate (CDR)

Deaths in a population are correctly termed crude death rates or CDR. These rates are calculated as the number of deaths per 1000 people in a year in a population. Like its counterpart of crude birth rate, this measure does not take into account the gender or age of the population, hence it is termed a crude death rate. The crude death rate is subtracted from the crude birth rate to produce either a natural increase or a natural decrease in population. If the result is neither, zero population growth is said to be achieved.

In 2020 the world's average crude death rate was 7.7 per 1000, but as Figure 1.17 shows, there were considerable variations. Qatar, the United Arab Emirates, and Kuwait, all West Asian countries with a large proportion of young immigrant workers, had just 1.6, 2.0 and 2.3 deaths per 1000 people respectively. At the other extreme, the ageing European populations of Lithuania, Bulgaria, Latvia and Ukraine had the world's highest death rates with 15.0, 14.6, 14.6 and 14.0 per 1000 respectively. However, in 2020, Lesotho in southern Africa could claim to have the world's highest CDR at 15.4 per 1000. Death rates for the more economically developed countries and the less economically developed countries often show similarities. Some more developed economies have death rates in excess of some less developed economies (see Figure 1.18),

▼ **Figure 1.17** *Distribution* of crude death rates, 2020

Rate per 1000 people
- 14 and over
- 11–13.9
- 8–10.9
- 5–7.9
- Less than 5
- No data

▼ **Figure 1.18** *Changing* crude death rates, 1950–2020

	1950–55	1960–65	1970–75	1980–85	1990–95	2000	2010	2020
Egypt	24.0	20.0	16.0	13.0	9.0	7.1	7.0	4.4
India	25.0	19.0	16.0	13.0	9.6	9.0	7.5	7.1
Indonesia	26.0	22.0	17.0	11.0	8.2	6.4	6.3	6.7
Italy	10.0	10.0	10.0	10.0	9.7	9.6	9.6	10.7
Japan	9.0	7.0	7.0	6.0	6.9	7.6	8.9	11.3
Kenya	25.0	21.0	17.0	10.0	9.6	12.1	7.9	5.2
Mexico	16.0	11.0	9.0	6.7	5.2	4.8	5.2	5.4
World	19.5	15.4	12.5	10.1	9.1	8.7	8.2	7.7

despite differences in their demographic histories: the populations of more developed economies such as Japan and Italy are ageing and have slightly rising death rates. The populations of less developed economies have been reducing their death rates with improvements in health services, sanitation and food supplies. These situations are reflected in different stages of the Demographic Transition Model (see pages 23–25).

Globally, crude death rates have fallen considerably since 1950 when CDRs in excess of 30 per 1000 were calculated for *places* such as Ethiopia, Guinea, Zimbabwe, North and South Korea. Figure 1.18 details the *changing* crude death rates of selected countries.

Crude death rates have fallen globally for a number of reasons:

▶ the spread of knowledge and more effective control of diseases. In particular the widespread use of vaccines has lowered deaths from tuberculosis, polio, influenza and COVID-19 in less economically developed *regions*

▶ individual government programs and international efforts have targeted safer water supplies (see Figure 1.19) improving sanitation and reducing instances of cholera and gastroenteritis as well as other waterborne diseases

▶ the impact of the Green Revolution has seen an increase in global food supplies and greater food security. In Asia the threat of national famines and associated deaths has been sharply reduced.

▲ **Figure 1.19** In Myanmar, as elsewhere, safer, reliable water supplies have improved hygiene levels and reduced deaths from waterborne diseases

1. 'Crude death rates, like crude birth rates, are highest in African countries and lowest in the more economically developed *regions* of the world.' To what extent do you agree or disagree with this statement? What evidence can you offer to support your agreement or disagreement?

2. Compare the data in Figure 1.18 with that of Figure 1.13.

   a. Establish which country had the highest natural increase in the 1950–55 period. Which country had the lowest natural increase in the same time period?

   b. Did these two countries have the same ranking in 2020? If not, which ones were highest and lowest?

   c. Give at least two reasons for the overall downward trend in crude death rates from 1950–55 to 2020.

3. Use Figures 1.10 and 1.17 to comment on the degree of *spatial association* existing between countries with high CDR and those with a declining population.

4. On the internet, visit the India Population Clock. Comment on how the *changes* relate to crude birth rates and crude death rates. Compare the *change* to China's Population Clock.

Mortality rate and life expectancy

Crude death rates are *interconnected* with several other population characteristics: infant and child mortality, maternal mortality, life expectancy and ageing.

Infant Mortality Rate (IMR) and Child Mortality Rate (CMR)

Infant mortality rate (IMR) refers to the average number of deaths of persons less than one year of age per 1000 live births in a year. Child mortality rate (CMR) refers to the average number of deaths of children under the age of five (including infants) per 1000 live births per year. Both mortality measures are age-specific rates, unlike the more general crude birth and crude death rates discussed earlier.

The levels of infant mortality and under five child mortality clearly have an impact on the level of crude death rates. Consequently, there is a clear *spatial association* between the *distribution* of crude death rate (Figure 1.17) and infant mortality rate (Figure 1.20). This is especially so in Africa where both crude death rate and infant mortality rate are mostly high, but less so in Europe and North-East Asia where infant mortality rates

are low but death rates are in the middle to high levels due to their ageing populations.

Global averages for infant mortality and child mortality rates, like those for crude death rate, have declined steadily since the 1950s. In 1960 the global infant mortality rate averaged 113.7 per 1000 live births with some of the world's least economically developed *regions* reaching over 250 deaths per 1000 live births (for example, Afghanistan 252.7, Yemen 322.3). By 1990, the global infant mortality rate averaged 64.8 per 1000 live births or 8.8 million deaths. In 2020 the global infant mortality rate was estimated to be at 26.1, equating to 4.0 million deaths annually.

Afghanistan has one of the world's highest infant mortality rates – estimated in 2020 to be between 50 and 100 per 1000 live births. Several *interconnecting* factors explain Afghanistan's high mortality rate. Its population is still largely rural and widely-dispersed. Basic healthcare centres are not universal and access to them is difficult, since travelling is often on foot. Health education in rural areas and many towns and cities is lacking, meaning complicated pregnancies

▼ **Figure 1.20**
Distribution of infant mortality rates, 2020

Rate per 1000 live births
- 65 and over
- 45–64.9
- 25–44.9
- 5–24.9
- Less than 5
- No data
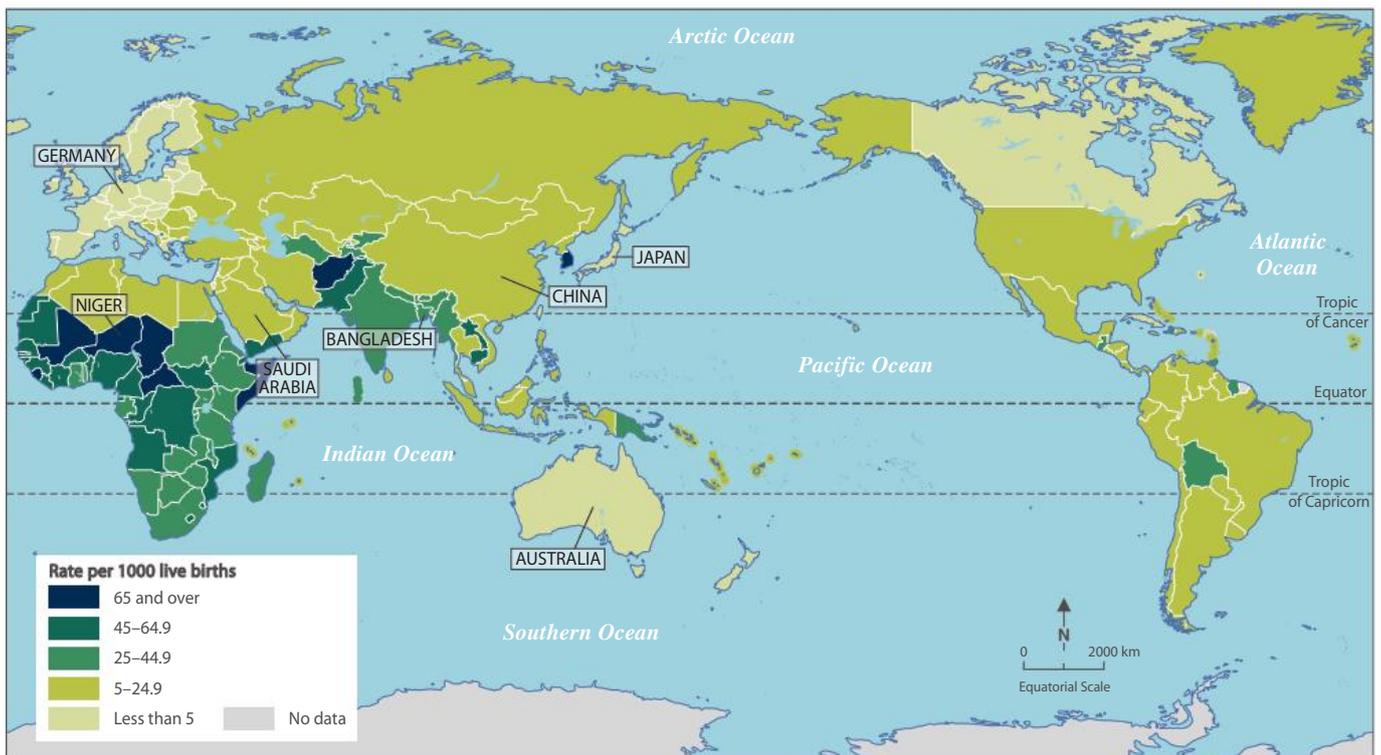
are often left untreated. Furthermore, Afghanistan is suffering from decades of war and internal conflict. Nonetheless rates have dropped: from an estimated 284 per 1000 in 1950, 200 in 1970 to the estimates of 2020 given above. At the other extreme, babies born in Slovenia, Singapore, Iceland and Japan had the best chance of survival in their first year with infant mortality rates estimated at 1.5, 1.6, 1.7 and 1.9 respectively.

Global averages for neonatal mortality (i.e. in the first 28 days after birth) have also fallen. Neonatal mortality rates fell from 36.8 per 1000 live births in 1990 (representing 4.6 million babies) to 17.0 in 2019 (representing 2.4 million babies). Neonatal mortality rates have decreased more slowly than infant or child mortality rates and many of the statistics remain disturbing when *regional* differences are investigated. For example:

▶ three-quarters of all neonatal deaths occur within the first week of birth

▶ a child born in sub-Saharan Africa is 10 times more likely to die in its first month of life than a child born in a high-income *region*

▶ in 2019, 522,000 Indian babies died within the first month of their birth.

Improving infant and child health have become a major priority for governments throughout the world. Their programs recognise that the causes of infant deaths are often preventable. Millennium Development Goal 4 included the target of reducing child mortality rates by two-thirds in the 1990–2015 period – a goal mostly achieved. Infant deaths are often due to respiratory distress associated with low birth weight and are frequently complicated by conditions including diarrhoea, gastroenteritis, measles and influenza. Infant and child mortality rates fall as conditions of safe water supply, adequate sanitation, effective housing and greater food security are achieved. These factors are *interconnected* with better educational opportunities.
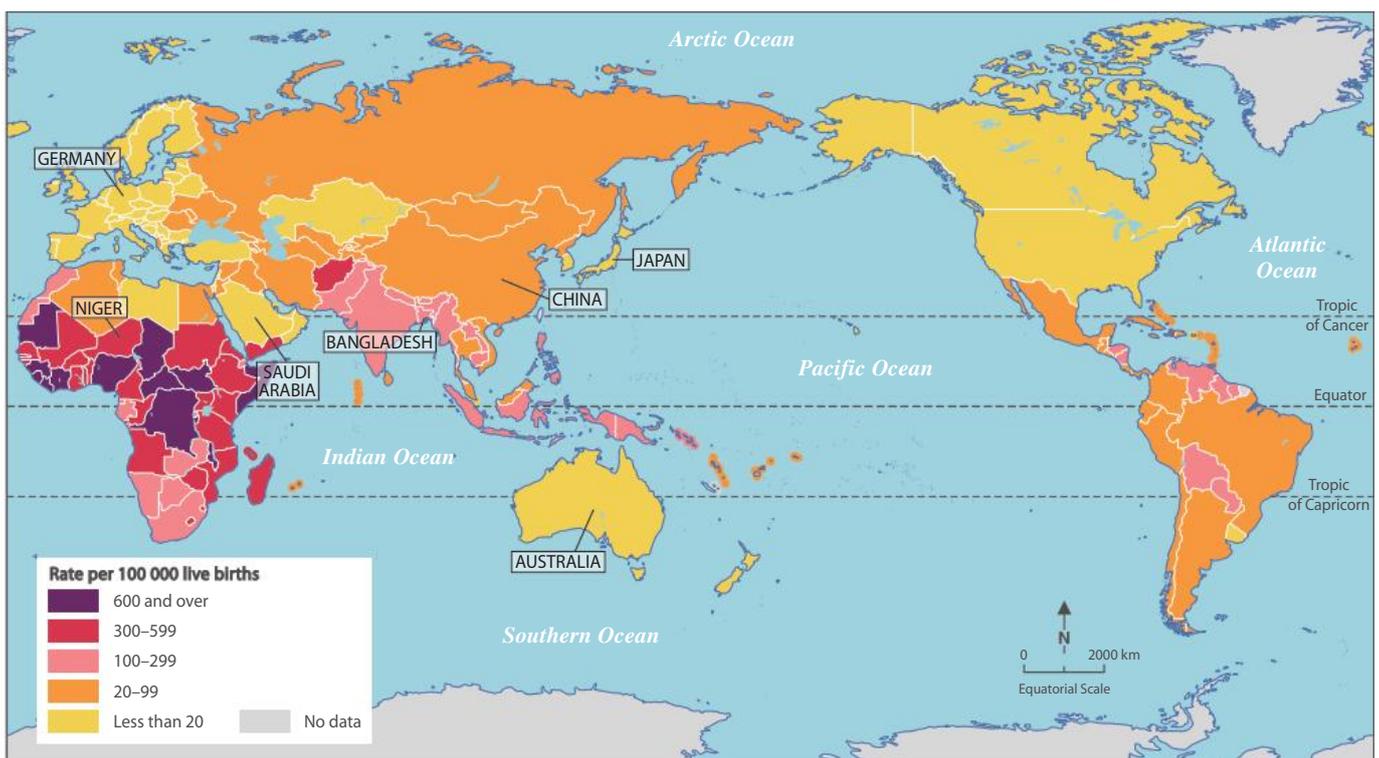
Maternal Mortality (MM)

A component of crude death rate is maternal mortality. This refers to the number of mothers who die because of pregnancy-related conditions or within 42 days of termination of a pregnancy. A familiar global *distribution* pattern is evident in Figure 1.21: most African countries are in the highest categories and the two lowest categories are dominated by a mixture of the more economically developed *regions*. In countries where specific health programs have targeted the deaths of pregnant mothers, rates have lowered substantially. Saudi Arabia, United Arab Emirates, Malaysia and Thailand are examples of success. In the late 2010s, a world average maternal mortality rate of 216 per 100 000 live births was reached. Like all averages there are extremes. Sierra Leone recorded a world high of 1360, although this is almost half its 1990 rate. World lows of less than 2 per 100,000 were recorded by New Zealand and Norway in 2018.

Life Expectancy (LE)

Crude death rates appear to have an inverse relationship to life expectancy. Life expectancy (LE) is defined as the average number of years a person can be expected to live from birth. This simple calculation assumes that conditions affecting longevity such as family structure, health service provision and security remain the same as at birth. As crude death rates continue to fall throughout the world, the United Nations has projected that around the year 2100 most countries will improve their average life expectancies to over 80 years.

Extended life expectancies in a population ultimately produces an ageing population and eventually an increase in death rates. This is a global phenomenon that is raising issues and challenges for governments, planners and communities. Chapters 6, 7 and 8 consider specific examples.

▲ **Figure 1.21** *Distribution* of maternal mortality, 2018

Figure 1.22 India's *changing* population statistics

Year	Total Population (millions)	Crude Birth Rate (CBR) (years)	Crude Death Rate (CDR) (years)	Total Fertility Rate (TFR) (years)	Infant Mortality Rate (IMR) (years)	Life Expectancy (LE) (years)
1960	447.8	42.3	22.5	5.7	160.0	42.4
1970	555.9	40.1	16.4	5.2	129.0	48.8
1980	700.1	36.3	12.3	4.6	115.0	55.4
1990	873.8	30.0	10.6	4.0	88.0	58.5
2000	1054.0	24.8	8.9	3.4	68.0	62.2
2010	1225.0	22.8	7.5	2.6	49.1	65.7
2020	1325.0	18.2	7.3	2.3	40.5	69.7
2030*	1456.0	15.3	7.2	2.1	31.7	72.8
2050*	1623.0	11.8	8.6	1.9	19.3	78.0

*projected statistics

India's *changing* population characteristics, shown in Figure 1.22, illustrate the *interconnection* between the various components of a population. Crude death rates have fallen along with infant mortality rates. This is the result of mass vaccinations, improved water supplies, the development of rural health centres and the growing urbanisation of the population. In response, life expectancy has risen. The gap between crude birth rate and crude death rate narrows but the total population has continued to rise.

Data on life expectancy shows only part of a more complex picture. In most countries, regardless of their level of economic and social development, there is a marked difference in life expectancy for males and females, with females in most societies having a longer life expectancy than males. For example, Indian males born in 2021 have a projected life expectancy of around 68.7 years, while females have a life expectancy of around 71.5 years. By contrast, Japanese males and females born in 2021 have a life expectancy between 13 and 16 years longer than their Indian counterparts: 81.7 for males, 87.7 for females.

Gender ratios

Differences in life expectancy are not the only differences between males and females. Typically, at birth, between 103 and 106 males are born to every 100 females in nearly all locations throughout the world. Important exceptions are the populations of India, China and Vietnam where the average sex ratio at birth is 111 males for every 100 females. *Interconnecting* factors explaining these anomalies include:

▶ the traditional social system of the population that favours boys over girls driven by the fact that in some societies it is expected that the son looks after parents in their old age

▶ due to the culture of family sizes becoming smaller, there is growing pressure to ensure a boy, or boys, are part of a family

▶ the availability of gender-determining technology, such as ultrasound, to establish gender during pregnancy

▶ the legality of abortion, which may be encouraged by government authorities. This occurred in China during the early years of the One Child Policy (see Chapter 6).

As a consequence of these factors, parents may opt to terminate a pregnancy if they would prefer a son over a daughter. Over time, the disproportionate gender ratio of a population should come back closer to global averages. This was the case with South Korea after the 1990s and appears to be occurring in China's population. Through all major age groups, females naturally have greater numbers, but it is especially noticeable in the older age groups (see Figure 1.28).

▶ ACTIVITIES

1. What major similarities are there between the *distributions* of infant mortality rates and crude death rates? Why should this be so?

2. How does the infant mortality rate differ from the child mortality rate and the neonatal mortality rate?

3. Explain how a decline in infant mortality rate and child mortality rate could affect each of the following:
   ▶ life expectancy
   ▶ crude death rate
   ▶ total fertility rate.

4. Suggest why global figures for infant mortality rates and child mortality rates have declined since the 1950s. What are the likely factors preventing further declines, especially in less developed economies?

5. Which of the factors affecting Afghanistan's infant mortality rate can be regarded as social? Are there any political factors involved?

6. Refer to Figure 1.20. Identify the outliers of high infant mortality not located in Africa or South Asia.

7. What is maternal mortality? Suggest the types of health programs governments could implement to lower maternal mortality rates.

8. Refer to Figure 1.21. Compare the *distribution* of maternal mortality levels of Africa with that of South and South-East Asia.

9. Refer to Figure 1.22.
   a. When is India's total fertility rate predicted to be at replacement level?
   b. Explain why India's population is expected to continue to grow long after replacement rate is reached.

10. What is life expectancy? Discuss how *environmental*, economic, social and cultural factors could impact positively and negatively on levels of life expectancy.

11. What social challenges could develop in a population with a disproportionate sex ratio?

Ageing populations

An ageing population is one in which the proportion of the population aged 65 years and over is increasing. Some organisations such as United Nations' agencies calculate the proportion of ageing in a population from 60 years and above. Ageing populations are the result of falling birth rates and rising life expectancy. As a result, there are proportionately fewer people in the young and reproductive age groups and more older people making up the total population. The United Nations Population Division (UNDP) describes ageing as a human success story, reflecting the advancement of public health, medicine and economic and social development, and their contribution to the control of disease, prevention of injury, and reduction in the risk of premature death. In many rural areas, ageing of the population may be related to out-migration of younger people seeking employment opportunities or a more diverse social *environment*. An older demographic is left, unable to produce sufficient children to sustain the local population numbers and services. Scenes like the one in Figure 1.23 have their equivalent in many Australian rural areas, as well as in other parts of the world including Japan, South Korea, Spain, Italy and Germany.

The ageing of populations is a global *process*. Nearly every country is experiencing an increase in the size and proportion of its older population. Figures 1.24 (a), 1.24 (b) and 1.24 (c) together with Figure 1.25 document this *process*. In 2018 a turning point in population dynamics was reached: for the first time in human history the number of people aged 65 and over outnumbered the number of children under five years. In 1900 the world's average life expectancy was around 30 years. By the 1980s it had more than doubled to 62 years. In 2021 it stood at 73.2 (70.8 years for males and 75.6 years for females). This average was higher than any country's average back in 1950. By 2050 the average is likely to have advanced to 77.1 years. Australia's equivalent figures in 2021 were 82.9 years: 80.7 for males and 85.2 for females.

The World Health Organization (WHO) projections for 2050 are a doubling of the population aged over 65 to 1.5 billion. Historians may well label this century 'the ageing century' as a consequence. The startling *changes* shown in Figures 1.24 (a), 1.24 (b) and 1.24 (c) together with Figure 1.25 reinforce this label.

The proportion of older people in a population will continue to increase between 2020 and 2050 in all of the world's inhabited *regions*. The largest increase is likely to be in East and South-East Asia, adding between 300 and 320 million to the total of 261 million aged 65 and over. China, Japan and Indonesia will contribute substantially to this total. Sub-Saharan Africa could experience a 218 per cent rise in its aged population: from 32 million in 2020 to 101 million in 2050. Today's more economically developed countries, including Russia and Italy, will by then have up to 30 per cent or more of their populations aged 65 and over. The prediction for Japan is 39.6 per cent by 2050, up from 28.4 per cent in 2019.
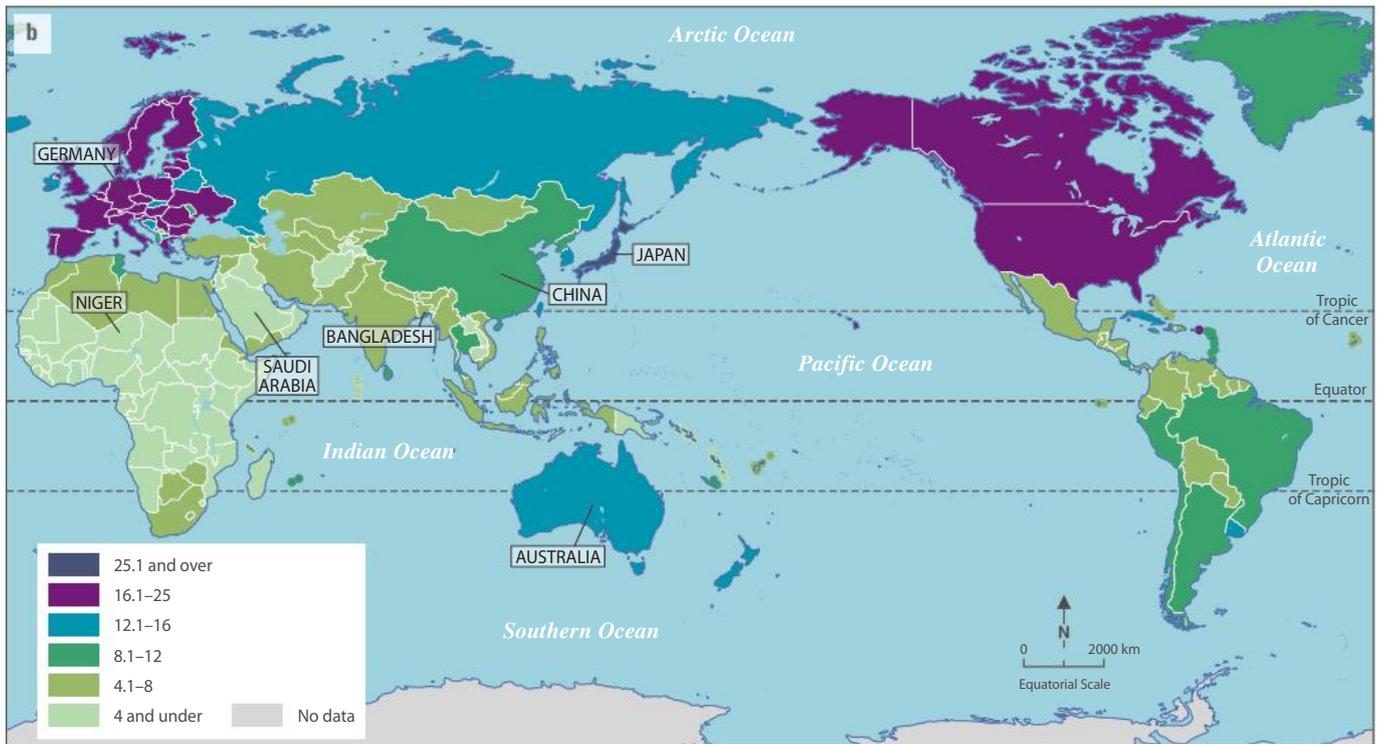
▶ **Figure 1.23**
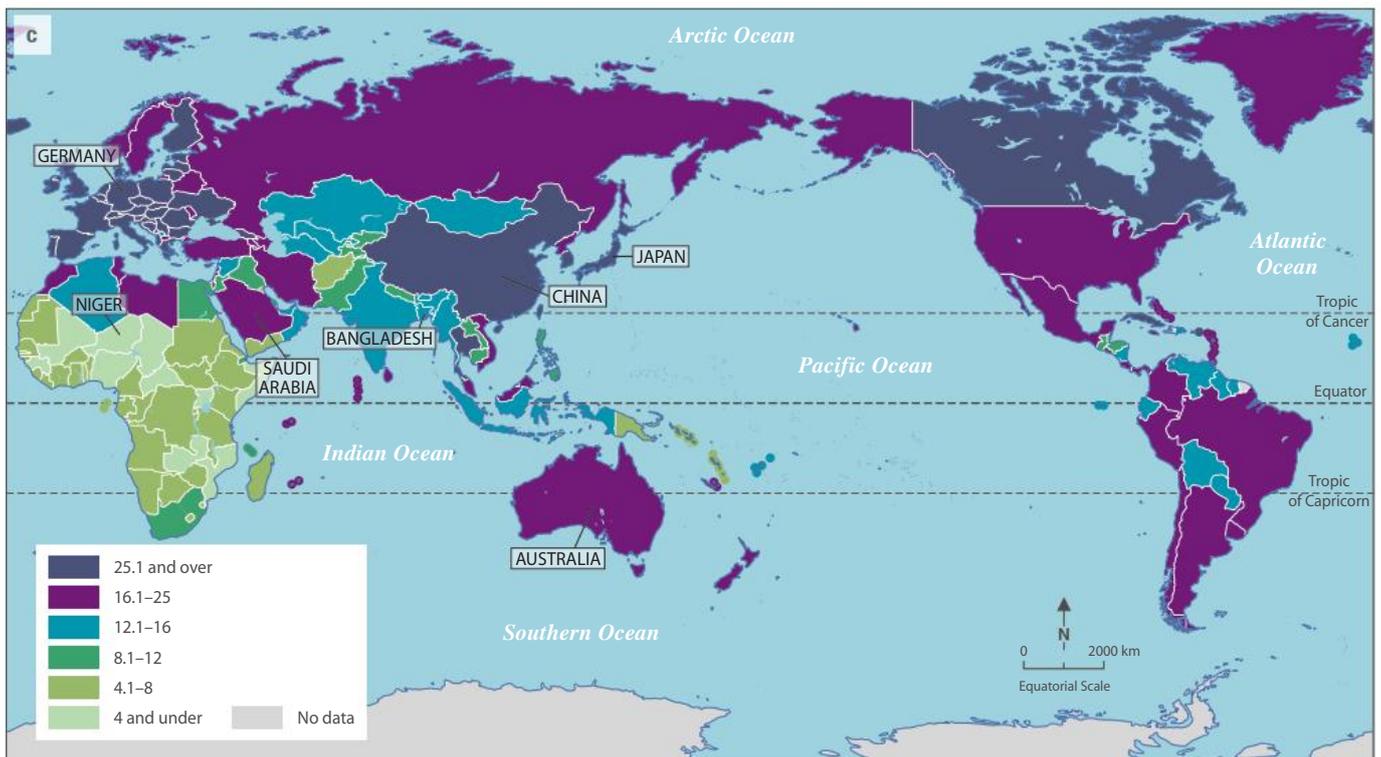A market in rural France, with local customers mainly from the older age groups

▼ **Figure 1.24** **(a)** Percentage of the population age 65 and over, 1990
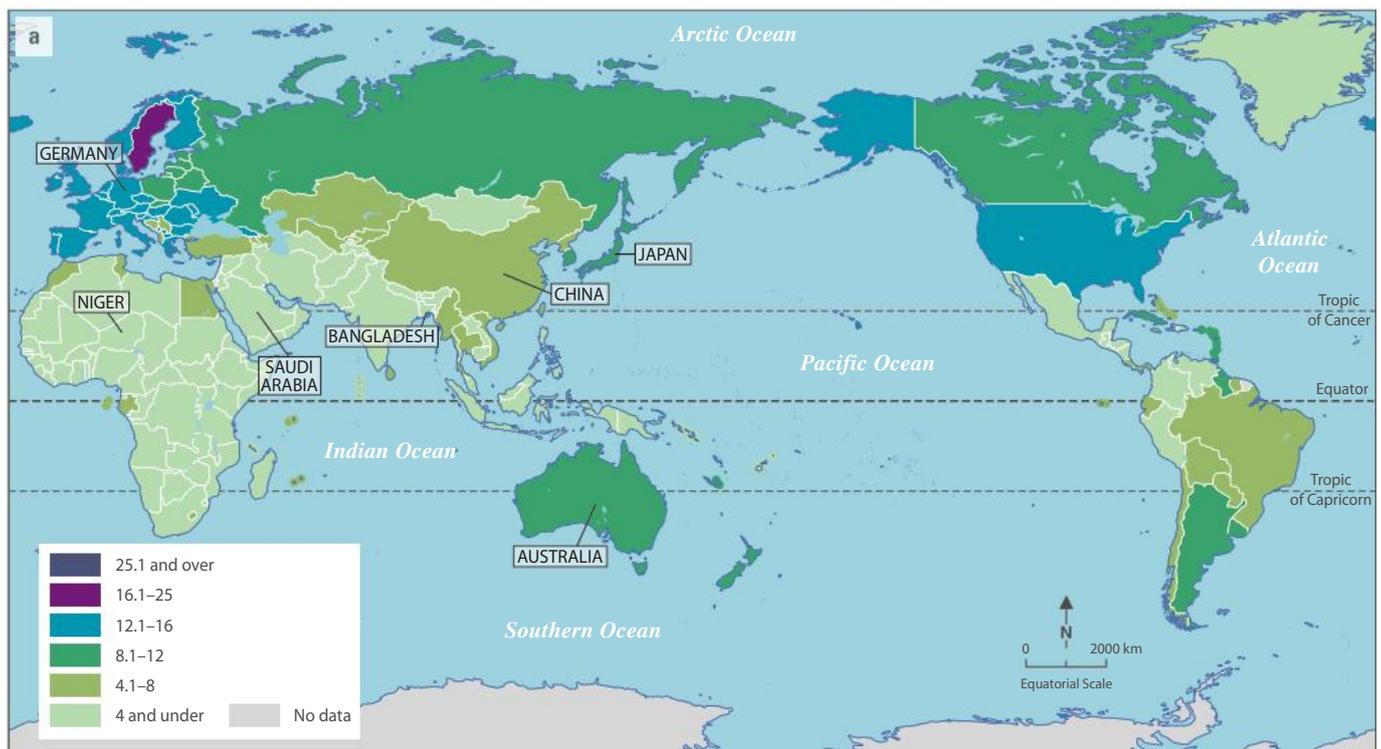
▼ **Figure 1.24 (b)** Percentage of the population age 65 and over, 2020

▼ **Figure 1.24 (c)** Projected percentage of the population age 65 and over, 2050

Falls in the CDR (and infant and child mortality rates) have produced a young population structure in many less economically developed *regions* of the world. However, this demographic dividend (see page 11) may not last. The young population will eventually age, and combined with predicted falls in the TFR, the speed of ageing is proving to be more rapid than it was for the more developed economies. For example, it took around 100 years (1860s to 1970s) for France's population of 65 years and over to grow from 7 to 14 per cent of the total population. But it has taken less than 25 years (2000 to 2025) for an equivalent growth in Brazil and in China (see Chapter 6).

▼ **Figure 1.25** The world's ageing population

	65 years and over	**80 years and over**
1990	319 million or 6% world population	54 million
2019	703 million or 9% world population	143 million
2050 (projected)	1500 million or 16% world population	426 million

The *process* of ageing is a significant issue. It challenges governments and organisations as well as communities and individuals in provision of healthcare, pension and social protection systems. In Australia, as elsewhere, the concept of the length of a working life and a retirement period is being discussed and rethought. A higher dependant population (persons under 15 years and those 65 years and over), even with minimal government services for some sectors of the population, will require considerable increases in expenditure. One estimate is that by 2050 there could be fewer than two people working for each person above the age 65 in the European Union. The ratio in 2010–12 was approximately four potentially working-age persons for each person aged 65 and over. Figure 1.26 illustrates this challenging *process* as a global one.

There is a strong *spatial association* between the *distribution* of high life expectancy, the proportion of older people in a population and the challenge of long-term care provision. The World Health Organization (WHO) believes between 25 and 30 per cent of those aged 85 and over will develop some form of dementia. Worldwide in 2020 there was an estimated

50 million people with some form of dementia. By 2050 this figure could possibly rise to between 130 and 152 million. Sixty per cent of these people will be in low- and middle-income countries. WHO estimates the worldwide costs of dementia were over US$800 billion in 2015. Again, there is an uneven *distribution* in these costs. Direct social and medical care costs were proportionately higher in the world's more economically developed countries, but lowest in Africa. The cost of care given by family and friends with little or no formal medical assistance was the reverse with the highest proportion in Africa and the lowest in the more economically developed countries of North America and Western Europe.

Dependency ratio

Demographers, economists, planners and politicians are some of the people who use the term 'dependant population'. It is closely related to two other terms: 'economically active' and 'non-economically active'.

The economically active or working population is considered by the United Nations Population Division to be within the 15 to 65 age group. The non-economically active are those persons under age 15, like those in Figure 1.27, and those aged 65 and over. This latter group may be dependent on other family members, pensions and or investment payments. Many people aged 60 and above continue as economically active, contributing to their own wellbeing as well as that of the broader community. These are obviously very broad groups which do not always take into account school leaving age and tertiary study or early and late retirement ages or part-time work.

Economic factors are impacted by a high old-age dependency ratio. Old-age dependency ratio is the number of dependents aged 65 or over relative to the number of economically active people, usually expressed per 100. Figure 1.26 is a sample of countries showing the considerable range in this measure.

In Figure 1.26 Japan's old-age dependency ratio for 2019 is 77.7. In other words, there are 77.7 people dependent on income derived from taxes of every 100 paid workers. By 2050 there will be more dependents than paid workers. The challenge already exists for Japan's government: Chapter 7 investigates this further.

In more economically developed countries the proportion of young dependents has fallen due to a decline in the birth rate and increases in life expectancy. This *change* corresponds with an increasing number of people aged 65 and over. In many less economically developed *regions*, young people become part of the workforce at earlier ages than their counterparts in more economically developed countries. At the other end of the age *scale*, older persons in less economically developed countries may remain part of the workforce longer than their counterparts in more economically developed countries.

▼ **Figure 1.26** Economic old-age dependency ratio (per 100 economically active people), selected countries

Country	2019 ratio	2050 ratio
Angola	6.9	8.9
Australia	34.4	54.7
Brazil	18.2	46.2
China	18.7	53.0
Germany	54.4	89.2
India	14.1	27.7
Indonesia	10.5	26.9
Italy	50.1	97.7
Japan	77.7	126.5
Niger	10.1	8.3
Russia	27.3	47.5
Saudi Arabia	6.0	32.4
South Africa	10.3	18.2
United States of America	42.3	62.1
Vietnam	11.3	35.4

◄ **Figure 1.27**
Some of Iran's dependant population

1. What do you understand by the term 'ageing population'?

2. 'The *distribution* of the ageing population in 2020 has a strong *spatial association* with other population dynamics such as crude birth rate and crude death rate.' Discuss.

3. Refer to Figures 1.24 (a), 1.24 (b) and 1.24 (c). Describe the *changing distribution* of the two highest categories for:
   a. Europe
   b. Sub-Saharan Africa
   c. One other world *region*.

4. Discuss why different *regions* of the world are ageing at different rates and times.

5. In what ways are ageing populations an issue, and a challenge, for governments as well as individuals?

6. Discuss the social and economic advantages of an economically-active working population aged 65 and over.

7. Refer to Figure 1.26.
   a. Which of the countries listed had a ratio of over 50 dependents per 100 working persons in 2019? How many more could be added to the list by 2050?
   b. How does Japan's 2050 estimate stand out from the other countries listed?
   c. Discuss why Niger's ratio is predicted to *change* in the opposite way to the other listed countries.

8. What is a 'dependant population'? What are the limitations of using this term?

9. The children in Figure 1.27 were between 4 and 5 years old in 2020. In what years are they likely to become economically-active? When will they again become part of the dependant population, according to the United Nations definition of dependency? What differences might be expected in dependency ages in urban and rural areas of the nation?

Svenja Keele
PhD Candidate in Political Environmental Geography at the University of Melbourne

CAREER PROFILE

I have been involved in Geography studies and Geography-related work for over 15 years. In my undergraduate degree (BA/BSc) I majored in Physical Geography, which allowed me to pursue my fascination with how different landscapes form through interactions between rock, water, climate, the biosphere and human populations. I went on to do honours research in Geography, using soil sediments to reconstruct over a century of environmental impacts of mining on the west coast of Tasmania and comparing these to historical records like photographs and diary entries from early explorers.

I have always thought that a focus on real-world challenges and the ability to bridge the physical and social sciences are key strengths of Geography, so important to achieving more holistic responses to complex contemporary environmental challenges. My work in environmental consulting was diverse, encompassing contaminated land, environmental impact assessments, environmental approvals and environmental management systems as well as sustainability assessments, sustainable master planning, behaviour change for sustainability and, most recently, climate change adaptation. Delivering these kinds of projects drew on many skills including geographic skills in population and spatial analysis, in using both quantitative and qualitative data, and in good science communication.

Environmental consulting is an excellent career option for Geography students who are often fluent across multiple disciplines and able to see the significance of connections between specialist studies. We understand how urbanisation is connected to population growth and demographic change, to land use and infrastructure planning, and to economic concentration but we also understand how these link to changes in family and work life, to experiences of inclusion or marginalisation, to developments in technology, to patterns of resource consumption and pollution, and to broader trends like globalisation. This is a world view that cannot be over-emphasised, in my opinion, and it is one that employers value highly.

At The University of Melbourne I teach various Geography subjects and, best of all, help with the running of Geography field trips! I'm not sure where this will take me next, but I have thoroughly enjoyed my career to date and have Geography to thank for equipping me with the training, inspiration and networks to make it happen.
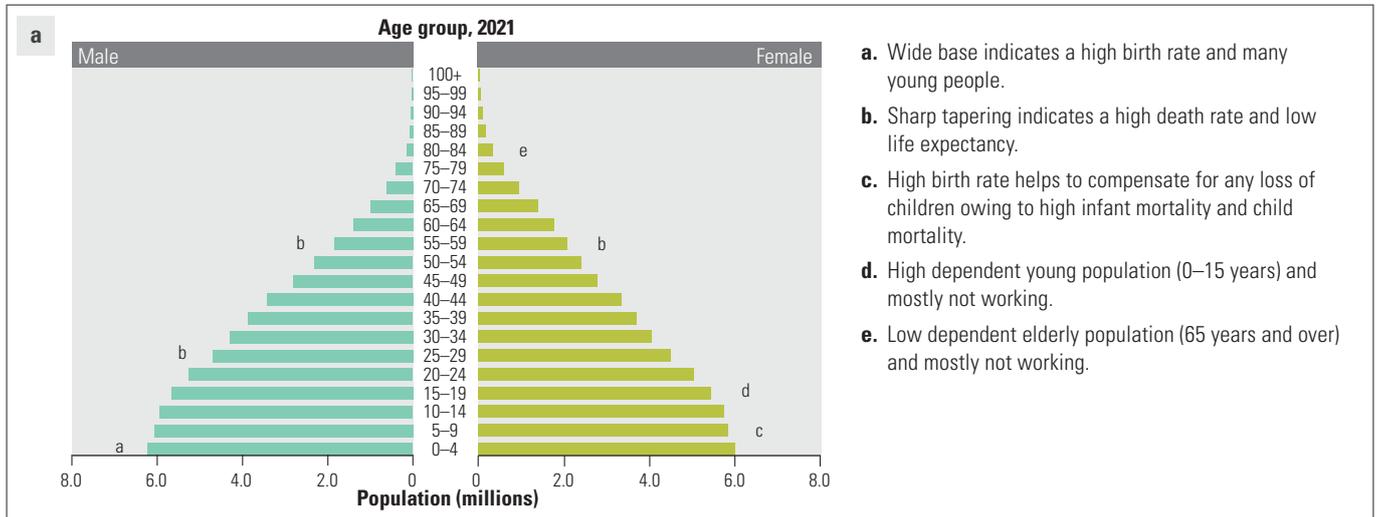
Population structures

Age-sex structures, also known as population pyramids, are widely used to illustrate a population's structural characteristics of age and gender. Population structures are back-to-back bar graphs with males on one side and females on the other, typically arranged in five-year age groups (cohorts). The bars on the graph may be shown as both the total number of ma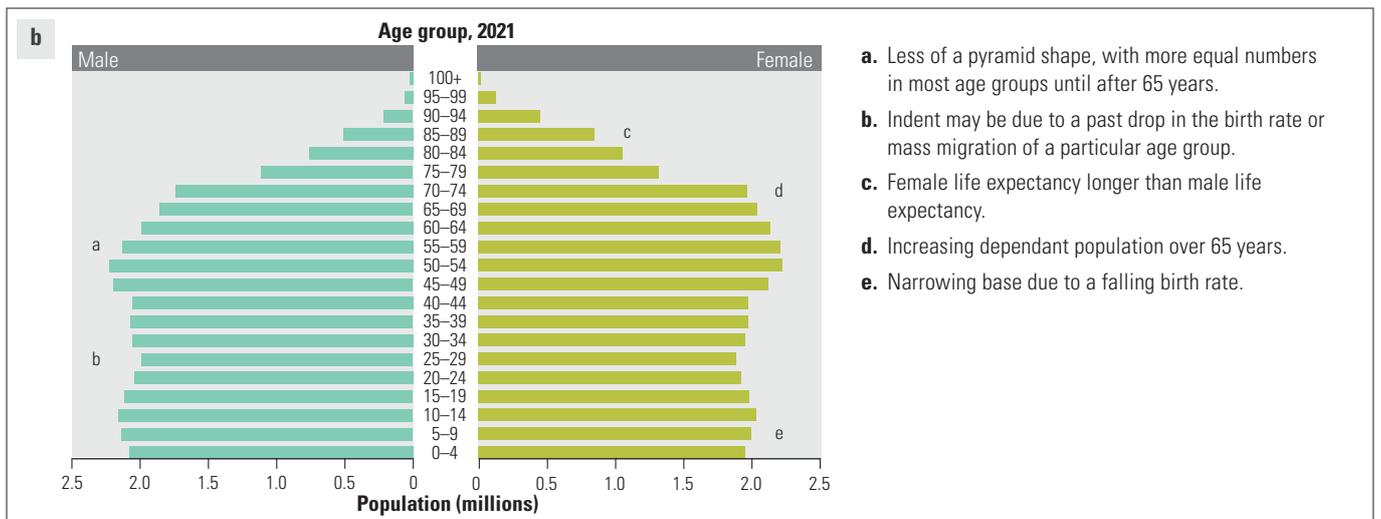les and the total number of females, or as the percentage of the total population. Figures 1.28 (a), 1.28 (b) and 1.28 (c) show how population structures can be interpreted.

Inferences about a population's past demographic history and future trends can be made from population structures. For example, a larger-than-average number aged 10 to 20 in a population (possibly from a previous baby boom) suggests there will be an
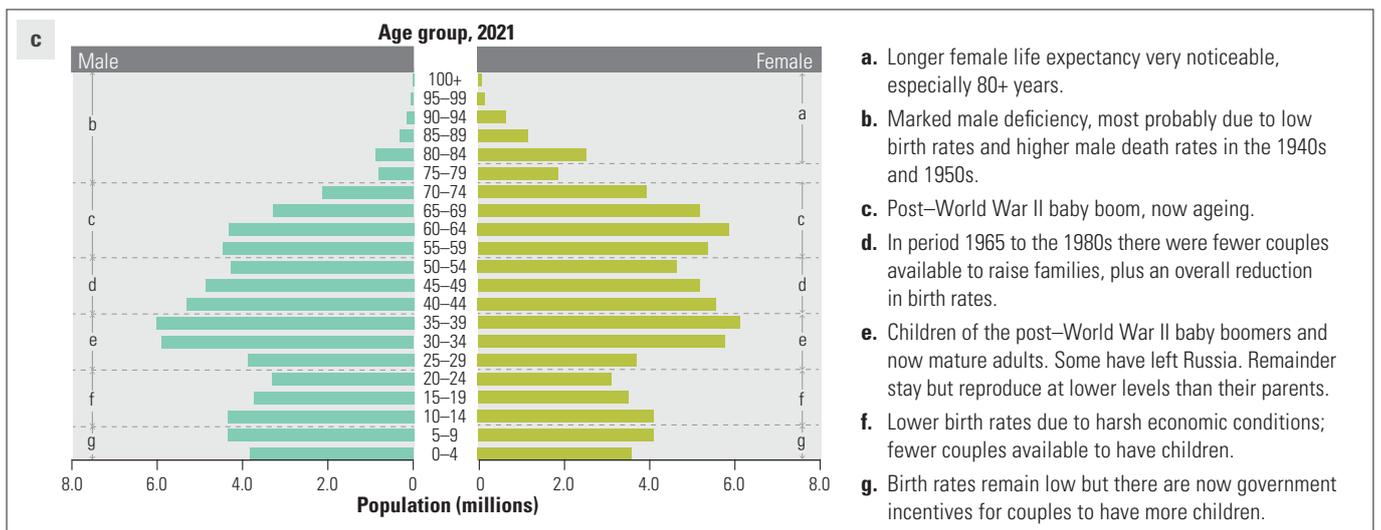
▼ **Figure 1.28** Interpreting population pyramids **(a)** A young, growing population of 110.8 million; Philippines, 2021

a. Wide base indicates a high birth rate and many young people.

b. Sharp tapering indicates a high death rate and low life expectancy.

c. High birth rate helps to compensate for any loss of children owing to high infant mortality and child mortality.

d. High dependent young population (0–15 years) and mostly not working.

e. Low dependent elderly population (65 years and over) and mostly not working.

▼ **Figure 1.28 (b)** A mature, ageing population of 68.1 million; France 2021

a. Less of a pyramid shape, with more equal numbers in most age groups until after 65 years.

b. Indent may be due to a past drop in the birth rate or mass migration of a particular age group.

c. Female life expectancy longer than male life expectancy.

d. Increasing dependant population over 65 years.

e. Narrowing base due to a falling birth rate.

▼ **Figure 1.28 (c)** Interpreting Russia's declining population of 142.3 million, 2021

a. Longer female life expectancy very noticeable, especially 80+ years.

b. Marked male deficiency, most probably due to low birth rates and higher male death rates in the 1940s and 1950s.

c. Post–World War II baby boom, now ageing.

d. In period 1965 to the 1980s there were fewer couples available to raise families, plus an overall reduction in birth rates.

e. Children of the post–World War II baby boomers and now mature adults. Some have left Russia. Remainder stay but reproduce at lower levels than their parents.

f. Lower birth rates due to harsh economic conditions; fewer couples available to have children.

g. Birth rates remain low but there are now government incentives for couples to have more children.

increased demand for tertiary education, employment opportunities and housing in the next 10 to 20 years. And as that age group matures it will begin to reproduce, possibly causing another baby boom to occur. Figure 1.28 (c) analyses a complex demographic history with future issues and challenges identified.

Population structures can be developed to show other important population characteristics: ethnicity, birthplace and migration, a city or *region*, employment, and infection and vaccination rates for example. Figures 1.29 (a), 1.29 (b) and 1.29 (c) represent a range of structures that provide a strong insight into specific population situations.

▶ ACTIVITIES

1. Which population, Philippines or France, is likely to have a high birth rate? Justify your answer from Figures 1.28 (a) and 1.28 (b).

2. Identify on the population structure (Figure 1.28 (b)) the locations of France's post–World War II baby boomers (i.e. born between 1945 and 1960).

3. Using examples from Russia's population structure (Figure 1.28 (c)), discuss how a population *change* in one period can have an impact on later periods.

4. How might continued emigration of young Russians affect the country's future population structure?

5. a. What challenge does a youthful population have for its government?

   b. How do these implications differ for a high-dependent ageing population?

6. a. Identify and describe three contrasting characteristics of the United States' 2016 population structure as shown in Figure 1.29 (a).

   b. Suggest the likely impact of the immigrant population on the demographic characteristics of the locally born population.

7. Refer to Figures 1.29 (a) and 1.29 (b).

   a. What similarity and difference are there in the immigrant component of the two populations?

   b. Is the immigrant population of the United States and Dubai largely a dependent or a working population?

   c. What additional information would you need to know about the populations before deciding if the proportion of the immigration population is an issue for each location?

8. Refer to Figure 1.29 (c).

   a. Approximately what proportion of Botswana's population is affected by HIV/AIDS?

   b. In which age groups is the condition most prevalent?

   c. Suggest how the *distribution* of HIV/AIDS within the population could impact on future birth rates.

   d. Outline the challenges this issue could present to government authorities and to rural communities.
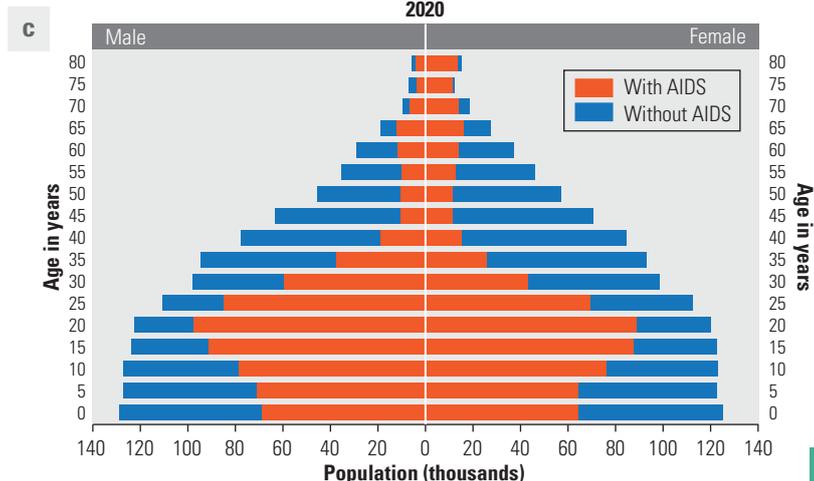
▼ **Figure 1.29 (a)** Immigrant and locally born United States' population, 2016
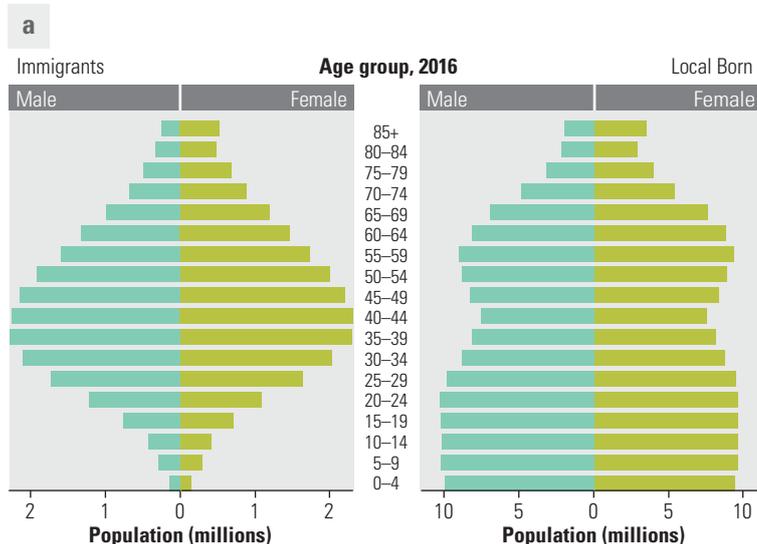
▼ **Figure 1.29 (b)** Immigrant and locally born population, Dubai, 2015
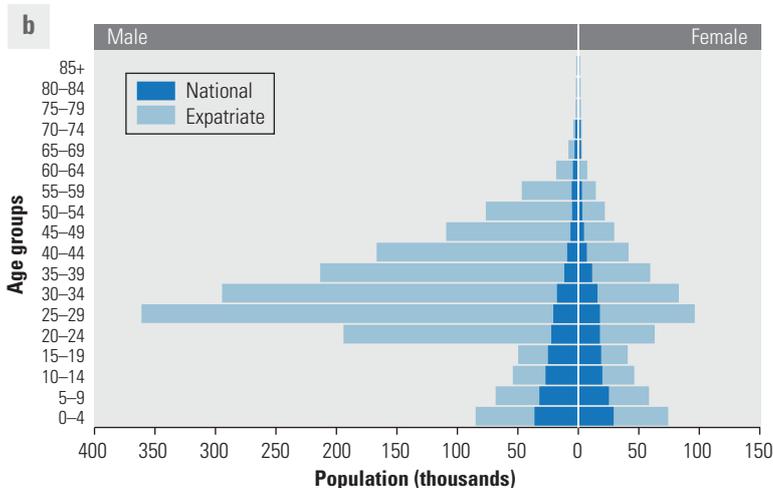
▼ **Figure 1.29 (c)** The impact of AIDS on Botswana's population structure, 2020

Population *change* over time

There have been various attempts by geographers, sociologists, economists and others to consolidate the *processes* bringing about *change* in populations through the use of theories and models. Two of these have made considerable impacts on approaches to our understanding of the *process* of population *change*: Malthus's 'Essay on the Principle of Population' and the 'Demographic Transition Model'.

Malthusian theory

▲ **Figure 1.30**
Thomas Malthus, author of 'Essay on the Principle of Population'

One early demographer was English clergyman Thomas Malthus (1766–1834) (Figure 1.30). His 'Essay on the Principle of Population' (1798 and later editions) was a political piece defending his traditional Christian view of the world and criticising more radical, secular ideas of social *change*. At this time, England's Industrial Revolution was *changing* the structure of society and the population. It was becoming increasingly urban, death rates were starting to fall but the birth rates remained high. It seemed as if the population was growing out of control. At the same time, traditional social and religious attitudes were being challenged by recent revolution in France, developments in industrial technology and by new economic theories, all of which sought to empower people. Malthus rejected those ideas and thought people were subject instead to natural, biological limits. He hypothesised that while the world's population would grow exponentially (2, 4, 8, 16, 32…), food production would only increase arithmetically (2, 4, 6, 8, 10…), over the same period.

Malthus recognised improvements were happening in agriculture and therefore with the amount of food being produced. However, he argued that the population would naturally respond by continuing to increase. There would inevitably be a point of crisis when prices of scarce goods became unaffordable and the productivity of the land would not be able to *sustain* the population living from it. Such a situation would undermine social *sustainability* with a breakdown in law and order and social morals as carrying capacity was exceeded. When this point was reached, Malthus believed there would be a positive check to population growth, namely a "gigantic inevitable famine … and with one mighty blow levels the population with the food of the world."

An interpretation of Malthus' theory is shown in Figure 1.31. It shows that a population remains *sustainable* while food production grows faster than its population. A point of crisis is reached when food production cannot keep up with population growth. The population declines in number, possibly due to famine, disease and or civil unrest. But it is able to recover in numbers until the next point of crisis is reached.

For Malthus, there were other possible positive checks that would lower population totals. Disease, disasters and war, which also could be linked to food shortages, could increase death rates. Malthus' arguments were strongly critical of Britain's working class for their rapid reproduction, which he believed would lead to widespread poverty. The poor health of sections of the working class, leading to high mortality rates, could be viewed as a positive check. In Malthus' view, charity for this poor section of the population would only encourage further reproduction and eventually more poverty.

In addition, there were preventative measures society could use to check the rapid population growth:

▶ couples should practise abstinence, delaying marriage and sex until they could afford to raise children

▶ marriage between couples of extreme poverty or with 'social defects' could be restricted.

Since the publication of his 1798 essay and its later editions, Malthus´ ideas have found many critics as well as supporters. His predictions have been largely unfounded. Despite a greatly increased world population (see pages 4–5), there have been major increases in food production during the 19th Century and especially in the second half of the 20th Century. Large *scale* irrigation schemes, widespread use of artificial fertilisers, mechanisation of farming and the development of hybrid plants and selective breeding of animals have increased global food production. At the same time, fertility rates have fallen, particularly as populations have become more urbanised. Malthus never anticipated that family planning would be widespread in populations and that the use of contraception would be so accessible at all levels of society. He also grossly underestimated the massive increase in production, and the significant decline in European population due to migration, that followed their colonisation of the New World, including the Americas, Africa and Oceania.

Since the late-1940s renewed support for Malthusian arguments has come from various interests. Often these Neo-Malthusian viewpoints have used only certain aspects of Malthus' original ideas. In particular:

▶ there is ongoing evidence that population growth in some *regions* of the world will eventually outstrip resources. In Sub-Saharan Africa, food production has fallen way behind population increases. The Malthusian checks of starvation and disease have been realised at various times since the 1960s – in Ethiopia, Somalia, Sudan, Chad and Niger, for example. The food shortages in these *regions* may be due more to political conflicts and rural out-migration than to the productivity of the land, however
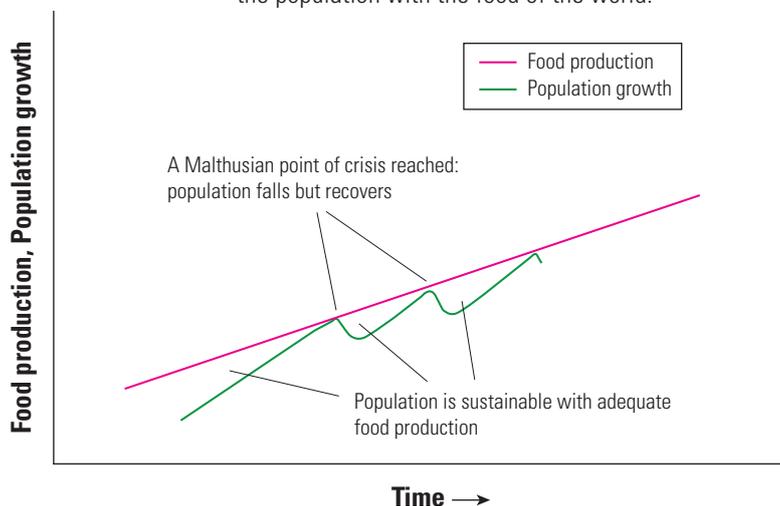

▲ **Figure 1.31** A graphic interpretation of Malthusian theory of population growth and food production

▶ population control advocates, including those in the major international Development agencies such as the United Nations, International Monetary Fund and World Bank, often take up Malthus's viewpoints. Restricting the number of children a couple can have would help reduce the pressure on existing and future resource use, as well as food supplies. China's one child policy (see Chapter 6) can be seen as a Malthusian preventative check. While Neo-Malthusians support contraception and abortion as a means of population control, Malthus believed in couples practicing self-control through abstinence

▶ Neo-Malthusians have extended the original argument to one concerning population growth and economic development, as well as the inevitable *environmental* degradation and resource overuse that result from high population growth rates. They argue an ever-increasing world population is simply not *sustainable*. They point to the apparent dwindling oil reserves of the world; the pressure on farming land, as well as its loss due to overuse and partial replacement with urban land uses; and the overfishing of the world's oceans. Neo-Malthusian arguments by environmentalists, such as the Ehrlichs' *The Population Bomb* (1968) and the Club of Rome's *The Limits to Growth* (1972), were influential during the high global population growth rates of the late-1960s and early-1970s (Figure 1.7).

▼ **Figure 1.32** Projections of total crop yields and population growth, Africa 2010 to 2050
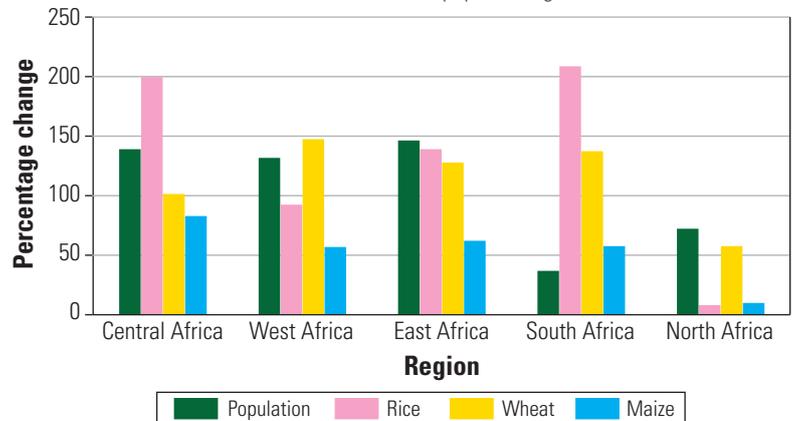
▶ ACTIVITIES

1. In what way could a disease such as HIV/AIDS or COVID-19 be considered a Malthusian check on population growth? How far do you agree with this perception? What additional information would help you with your decision?

2. In a *region*, what evidence could indicate that a point of Malthusian crisis could have been reached?

3. The Green Revolution, Blue Revolution and genetic farming are three broad trends that appear to refute Malthus's theory. Briefly, what do these terms mean? In what way do they refute Malthus' theory?

4. How realistic do you think the situation in Figure 1.31 could be in a population?

5. What factors contribute to a population's *sustainability* apart from its own food production?

6. Refer to Figure 1.32, a projection by the United Nations Development Programme (UNDP).

   a. Describe the variations between projected population growth and *changes* in crop yields in African *regions*.

   b. To what extent does the projection support or refute Malthus's original arguments?

   c. Neo-Malthusians could argue that the projected growth in the African population is economically *unsustainable*. What other information would you need to support or refute the argument?

The Demographic Transition Model (DTM)

A more recent model for identifying population *changes* is the Demographic Transition Model (DTM) (Figure 1.33). It attempts to describe, explain and predict the way a population could *change* over time, passing through a series of stages from an agriculturally-based society to an urban-based one. The model was based on the birth rates and death rates of England and Wales (Figure 1.34). It was then expanded to include the more economically developed countries, particularly those of western Europe, North America and Asia.

In Stage I (High Stationary), both birth rates and death rates are high and variable, resulting in a mostly low rate of population growth. Population would be agriculturally-based with a need for large families providing labour and old-age security. Fluctuations in population growth would have been due to famine, war, natural disasters, peaceful periods and good harvests. There are no countries in this stage today but, historically, most pre-industrial societies would have been in this early stage.

In Stage II (Early Expanding) the birth rate remains high as the death rate falls rapidly as a consequence of improvements in sanitation, medical care and food security. Thus, rates of natural increase rise throughout this stage. In the 1980s and 1990s, many Sub-Saharan countries such as Niger and Burkina Faso were at this stage. As birth rates fall globally, there are fewer countries left to experience most of this stage. Populations in both Stage I and Stage II had an age–sex structure, or population pyramid, with a broad, young base tapering rapidly to a narrow, old apex, or top (see Figure 1.33). At the time of his writing, Malthus' England was most likely in this stage (see previous section).

During Stage III (Low Expanding) the birth rate begins to fall. Typically, this is due to improvements in education, access to contraception, and lower infant and child mortality – features commonly associated with a society growing wealthier, healthier and more urbanised. The death rate continues to fall, but at a slower rate than in the previous stage. Natural increase is initially high but begins to fall as birth rates drop. Brazil, Vietnam and Bangladesh would fall into this stage. Population structures for Stage III continue to be broad based but with a thickening in the middle years representing the surviving children from an earlier age entering the economically active age groups (refer to Figure 1.33).

In Stage IV (Low Stationary) both birth rates and death rates are low, producing low rates of natural increase. Populations experiencing this stage would average long life expectancies. They would have access to health services and reliable supplies of food. Urbanised, developed economies such as those of the United States, France and Australia would be in this stage.

Some demographers have added another stage to this model – Stage V (Stagnating/Declining) – to account for the phenomenon of an ageing population, and its associated low birth rates and slightly rising death rates. Countries in Stage V have close to zero population growth or a declining population total. Russia, Japan and Germany are experiencing Stage V

conditions. Structures for populations in Stage IV and Stage V exhibit a shrinking young base and a broadening older top (refer to Figure 1.33). As such the graphic representation becomes less and less like the shape of a pyramid.

The economic, social and political events that helped determine these *changes* are not intended as a guide for countries to follow, but rather as an indication of how future birth rates, death rates and natural increases may evolve. The model's projected pathways are not inevitable. While it is possible to find examples of countries that fit the stages of the Demographic Transition Model, not every country will necessarily match it. The disastrous famine in China from 1959 to 1961, the impact of HIV/AIDS in southern

▼ **Figure 1.33** The stages of the Demographic Transition Model and associated population pyramids
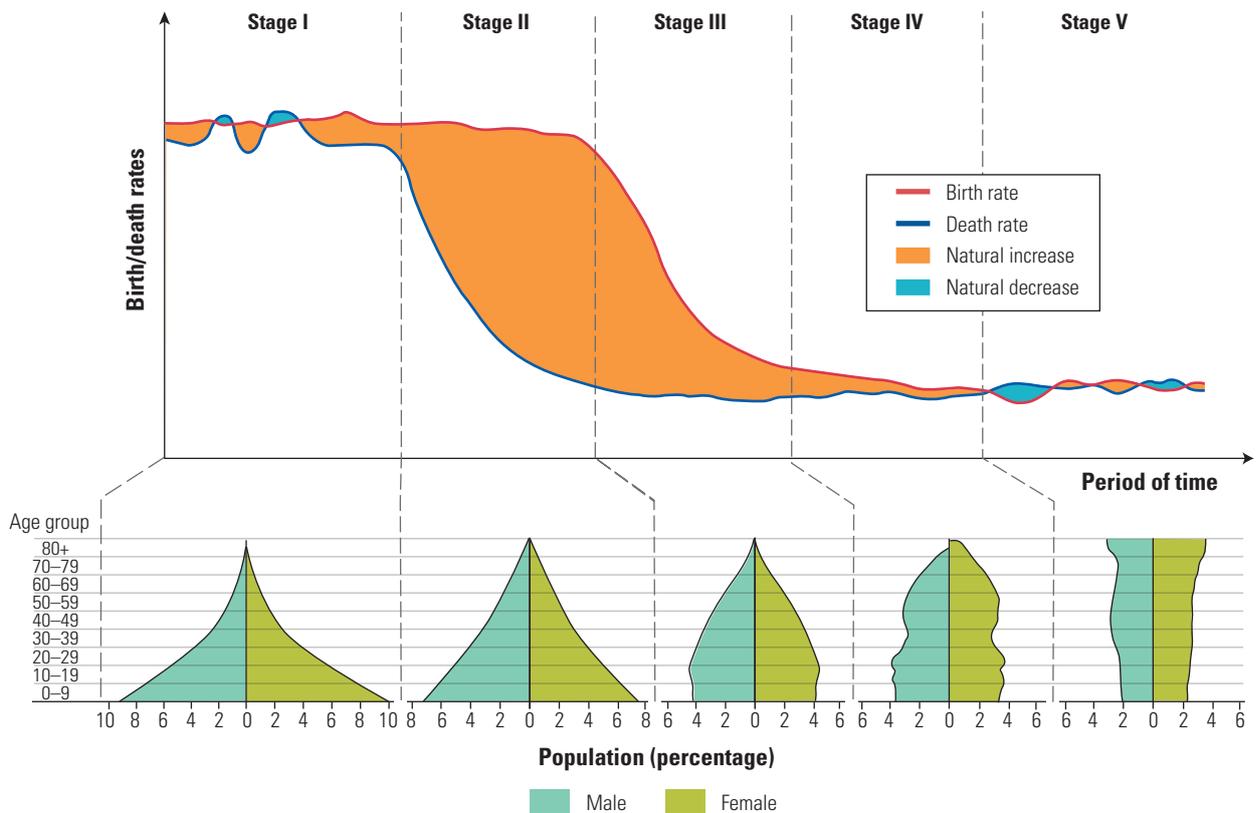
▼ **Figure 1.34** The Demographic Transition of the United Kingdom
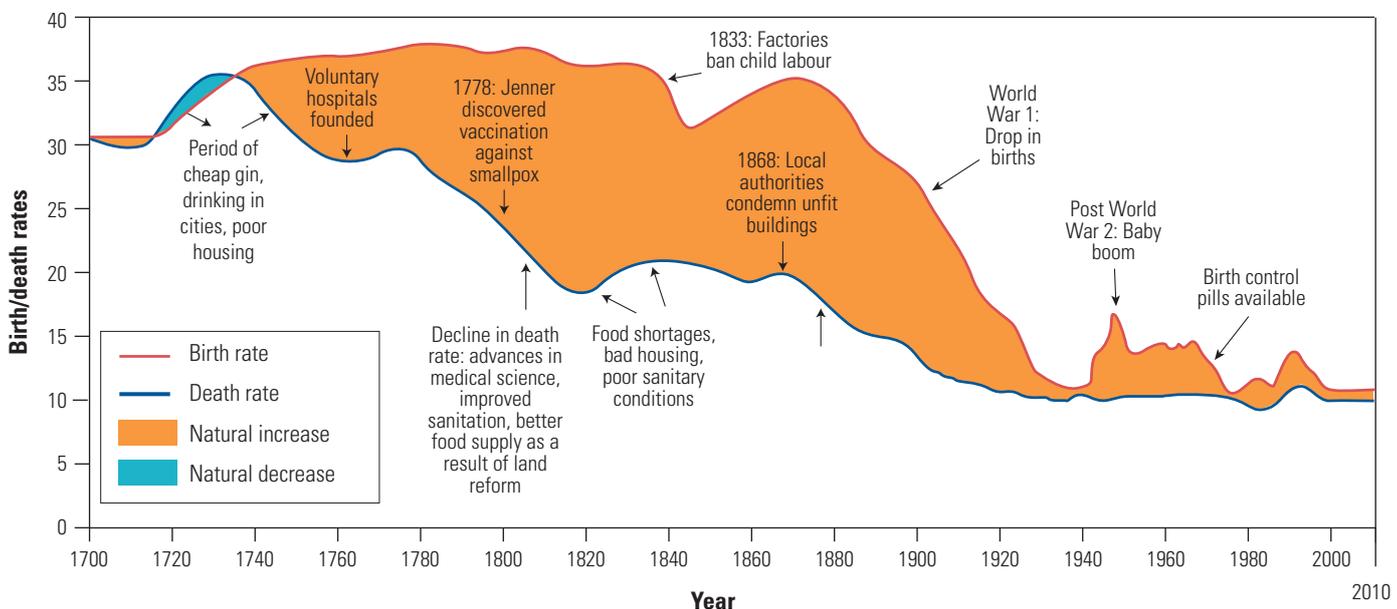
African countries in the 1990s and 2000s, the civil and international conflicts of the Middle East in the 2010s, the baby booms after prolonged wars, and even the COVID-19 pandemic, do not fit comfortably into the stages of the Demographic Transition Model. The time period for countries to go through these stages is not specified and not all countries may end up at Stage IV or Stage V.

The Demographic Transition Model has been criticised by demographers in less economically developed countries (where large populations and masses of cheap labour are seen as great assets) as not being applicable to their circumstances.

Together with opponents of anti-natalist policies, the large population growth experienced in Stages II and III may be seen as a demographic dividend (see page 11) rather than an implied burden on a country. The proportion of the working age population is growing at higher rates than the dependant population which is shrinking or remaining low.

▶ ACTIVITIES

1. Why do the bases of the population structure diagrams shown in Figure 1.33 broaden then begin to narrow? Give your answer using the terms birth rate, death rate, total fertility rate and life expectancy, as well as the stages of the Demographic Transition Model.

2. a. Evaluate the extent to which you think the United Kingdom's demographic history shown in Figure 1.34 fits the Demographic Transition Model.

   b. Use the annotations in Figure 1.34 to suggest how each situation impacted on the birth rate and the death rate.

3. Look carefully at the data in the table below.

	1950–55	1960–65	1970–75	1980–85	1990–95	2005	2020	2050	2100
Country A									
Birth rate	48.0	53.0	52.0	49.0	46.0	41.5	36.6	22.0	13.1
Death rate	32.0	30.0	26.0	23.0	19.0	16.6	12.8	8.2	8.9
Country B									
Birth rate	39.0	35.0	39.0	27.0	17.0	18.7	14.3	10.6	8.3
Death rate	12.0	9.0	8.0	6.0	7.0	5.9	6.4	9.0	12.5
Country C									
Birth rate	30.0	20.0	18.0	19.0	12.6	8.5	8.9	8.0	8.0
Death rate	11.0	8.0	8.0	10.0	10.1	9.6	10.7	13.7	14.1
Country D									
Birth rate	45.0	42.0	34.0	31.0	20.0	18.3	13.6	9.9	8.3
Death rate	15.0	12.0	10.0	8.0	9.0	6.4	6.8	9.5	13.2

   a. For countries A, B, C and D suggest, with a reason for each, their position on the Demographic Transition Model in 1950–55. How had these positions *changed* by 2020? How might they *change* by 2050? And again in 2100?

   b. The four countries are Sri Lanka, Afghanistan, Brazil and Poland – but not in that order. Suggest which country fits each set of statistics. On what basis did you make your decisions?

   c. Use the world maps of this chapter to describe the 2020 global context of each country identified above.

4. Discuss in a group how each of the following could impact on the position of a country's population in the Demographic Transition Model. Try to consider more than one immediate consequence of each event, remembering the consequences are likely to be *interconnecting* and that the consequences of *change* can vary from a few years to decades.

   ▶ increasing urbanisation of the population

   ▶ successful rural health programs established

   ▶ widespread civil war leading to mass emigration of people

   ▶ sustained improved agricultural yields

   ▶ average age of marriage rises from 20 to 32 years

   ▶ more women enter the workforce improved access for education and more diversified work opportunities for females

   ▶ increased payments for new born babies and greater access to child care facilities.
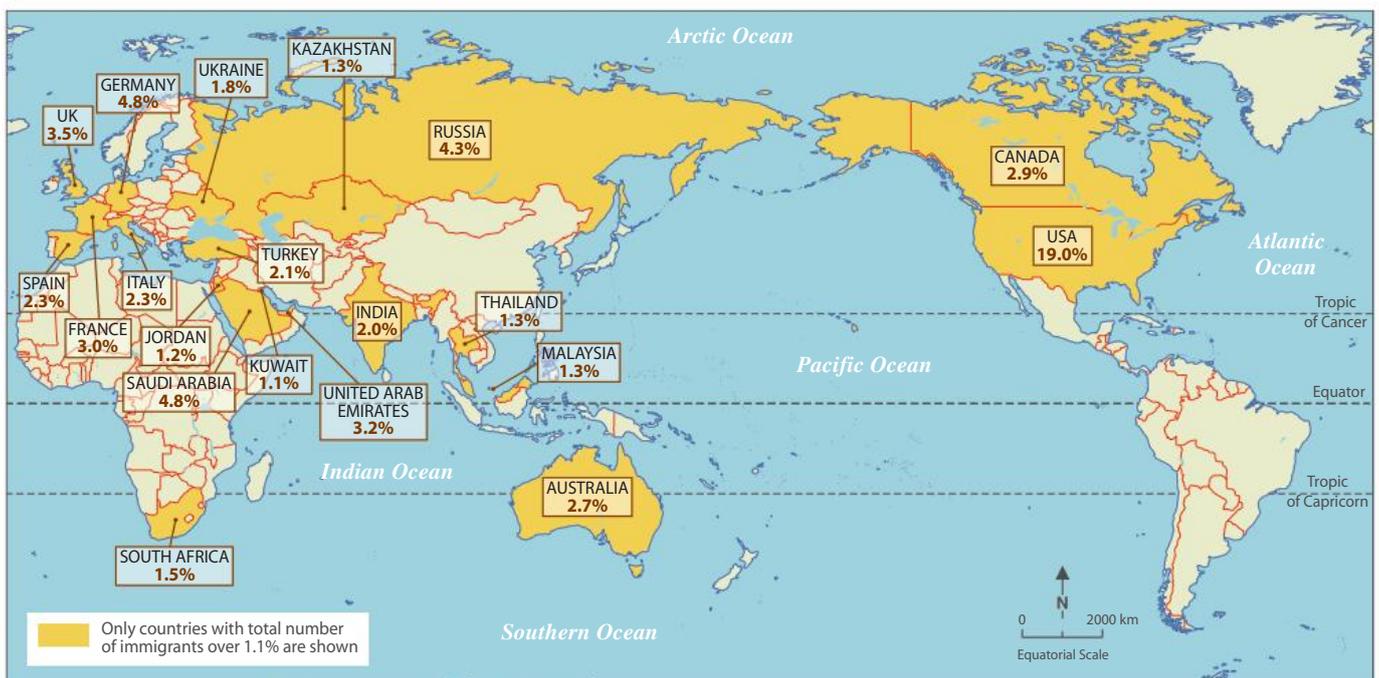
2 Population movement

Global population *movement* has often been an important issue throughout history because the *movement* of people is one of the fundamental features of human demography. In the 21st Century migration continues to be of enormous significance at a variety of *scales*, over different *distances* and in different *places*. The *changes* generated by migration out of and into *regions*, creates many economic, political, social and *environmental* challenges and is so-ingrained in modern culture that it is even the subject of street art (Figure 2.1). The *movement* of people from one *place* of residence to another may occur over varying timescales and is referred to as migration. Migration is an important factor in overall population *change* in many *places* including the United States (see Figure 2.2). Population *change* is determined by natural increase plus net migration. Today there are more people on the *move* than ever before, in part forced by conflict.

The world has witnessed many migrations, across continents and across millennia, as people have left their homes in search of a better way of life. They may have been pushed away from home because of their declining circumstances due to warfare, famine, disease, lack of employment, etc or pulled

▼ **Figure 2.1** Anti-racist street art in Bristol, England

▼ **Figure 2.2** Share of world's migrant population in 2019

Only countries with total number of immigrants over 1.1% are shown

GERMANY 4.8%
UKRAINE 1.8%
KAZAKHSTAN 1.3%
UK 3.5%
RUSSIA 4.3%
CANADA 2.9%
USA 19.0%
TURKEY 2.1%
SPAIN 2.3%
ITALY 2.3%
FRANCE 3.0%
JORDAN 1.2%
KUWAIT 1.1%
INDIA 2.0%
THAILAND 1.3%
MALAYSIA 1.3%
SAUDI ARABIA 4.8%
UNITED ARAB EMIRATES 3.2%
AUSTRALIA 2.7%
SOUTH AFRICA 1.5%

Arctic Ocean
Atlantic Ocean
Pacific Ocean
Indian Ocean
Southern Ocean
Tropic of Cancer
Equator
Tropic of Capricorn

0   2000 km
Equatorial Scale

toward other *places* where there is less risk, more job opportunities and perhaps greater religious or political freedom. There are many historical examples of population *movement*, such as the transatlantic slave trade from the 15th Century to the 19th Century, a forced migration that is the largest that the world has witnessed; and slavery on a smaller *regional scale* has occurred at different times and *places* through history. This chapter, however, will focus on some of the more recent migrations that have occurred since the 1950s, examining the major *processes* and geographic patterns involved.

Patterns of migration

The United Nations reported that, globally, there were almost 293 million international migrants in 2020 (Figure 2.3). Between 1990 and 2020, the number of international migrants worldwide increased by over 128 million and is over three times the estimated number in 1970.

Overall, the number of migrants has been increasing in the last 25 years. Many factors influence population migration including the impact of government policies, economic conditions, wars and revolution, political boundary *changes* and hazard events. Through the ages people *moved* in search of more reliable food supply, safety or more favourable resources – they sought a better life, just as people are now (Figure 2.4). The situations and stories are different, yet similar patterns exist. From 'boat people' who fled Vietnam after the end of the Vietnam War in 1975 to escape political repression to the less well-known *movement* of Guatemalans to Mexico seeking better economic opportunities – the study remains a fascinating one. In recent years, forced migration – involving refugees and asylum seekers – has increased at a faster rate than voluntary migration.

In 2020, 3.6 per cent of total world population lived in a country other than that of their birth, though this varies widely between countries. For example, Niger had 0.1 per cent and Australia had 2.7 per cent of the world's total migrant population in 2020. Globally, the most significant international flow of people is from less economically developed to more economically developed *regions*, though there are also significant flows between developed countries and also between less developed countries. As migration affects the *distribution* of people in different *places*, it is an important part of the study of human population. Internal and international (external) migration affects urbanisation because most internal and international migrants *move* to cities.

Internal, or within country, migration does not feature in international statistics. It is difficult to provide these statistics because many countries do not collect data on internal migration. However, the United Nations states that internal migration is accelerating especially in populous countries including China (see Chapter 6) and is far greater than international *movements*. High internal migration flows may not bring about significant *changes* in population *distribution* if outward flows are offset by inward flows. Government policies may shape both internal and international migration patterns.

▼ **Figure 2.3** Overview of international migrants by development level and major area, 1990–2020

	International migrants (millions)			
	1990	**2000**	**2010**	**2020**
World	152.5	172.6	220.0	293.0
Developed *regions*	82.4	103.4	130.7	162.0
Developing *regions*	70.2	69.2	89.3	131.0
Africa	15.7	14.8	17.0	25.0
Asia	48.1	49.2	65.9	85.6
Europe	49.2	56.3	70.7	87.0
LAC (Latin America and Caribbean)	7.2	6.6	8.2	13.5
Northern America	27.6	40.4	51.0	73.0
Oceania	4.7	5.4	7.1	8.9

▼ **Figure 2.4** This retirement home complex on lakefront property in Florida is prized by many retired Americans

▶ ACTIVITIES

1. Refer to Figure 2.1. What does it mean? Where do you think such street art might be found in Australia?

2. Visit the Migration Museum (London) website (https://www.migrationmuseum.org/) and view the exhibition '100 Images of Migration'. Select one or two images that you found:
   ▶ interesting
   ▶ surprising
   ▶ confusing.
   Discuss your findings with a classmate or as a whole class.

3. Refer to Figure 2.2.
   a. Name the highest three recipient countries for immigrants by percentage.
   b. Describe the global *distribution* of international migrants.
   c. Predict how this might *change* in the next ten years. On what basis did you make your prediction? What factors might account for predictions that differ from yours?

Types of *movement*

What are the major types of population *movement*?

Why do people *move* from the *place* where they were born? Migration flows can be classified by their duration (time) and their spatial patterns. Migration can be short term or long term. For example, people temporarily evacuating when there is a disaster counts as temporary migration, as those who are affected will return to their homes. Taking a holiday or business trip is not classified as migration.

Migration can be classified as voluntary – such as when people decide to *move* for study or work – or forced, as occurs with refugees (Figure 2.5). It can also be classified as internal (*movement* within a country) or international, also known as external migration.

▲ **Figure 2.5** Refugees from Eritrea, in the Horn of Africa. They fled from Eritrea in 2008 and now live in Tel-Aviv, Israel

Spatial categories

Spatial classifications of migration types consider the *scale* of the *movement*.

▶ **Intra-urban migration:** refers to *movements* within urban areas. For example, people *moving* from a house in a city to an apartment in the city.

▶ **Internal migration:** describes *movement* within a country. For example, a worker *moves* from a city to a *regional* centre to buy a more affordable house.

▶ **International migration:** describes *movements* across national boundaries. For example, in the three years after Poland joined the European Union in 2004, over half a million Polish people migrated to the UK in search of employment to support a better quality of life.

Temporal categories

Temporal classifications of migration types consider the time frame of the *movement* – both long-term and short-term:

▶ **Seasonal migration:** describes a periodic short-term *movement* to a new address, for example to harvest a fruit or vegetable crop over several weeks or months (Figure 2.6). This term also describes migration where, in *places* including Northern Ghana, people *move* from the northern savannah during the dry season to more humid areas to access a better food supply before returning to their subsistence farming lifestyle in the rainy season. In some *regions* and nations, seasonal internal migration involves very large numbers of people e.g. for religious observance or to assist in the harvest, and has great economic and cultural significance as well as ensuring enduring *interconnections* between urban and rural communities.

▶ **Temporary migration:** refers to a semi-permanent short-term migration; for instance, young adults leaving the family home to study at a *regional* university.

▶ **Recurrent migration:** occurring more than once. Migrant workers in France may come for a year or two and later return.

▶ **Indefinite or permanent migration:** long-term *change* of residence. This can be triggered by a search for a better quality of life, which may include employment opportunities, lifestyle factors, seeking asylum and personal freedom. Permanent migration can also be the result of indefinite migration. Most international migration to Australia is permanent.

◀ **Figure 2.6** Seasonal migration – strawberry picking in Plant City, Florida

1. Match the following terms with the definitions below.

   internal migration   asylum seeker

   net migration   international migration   migration

   country of destination   emigrant

   internally displaced person   emigration   host country

   immigrant   immigration   country of origin

   a. the *movement* of people from their *place* of residence to another

   b. the number of people arriving in a country minus those departing from that country, usually reported over a 12-month period

   c. the *movement* from one country to another

   d. *movement* out of a country

   e. to *move* from one's native land to another

   f. a person who *moves* to a country from another one. Also called external migration.

   g. *movement* into a country

   h. the *movement* to a new home within one country

   i. the country that is a source of migratory flows (sending country, source country)

   j. the country that is an end point for migratory flows (host country, receiving country)

   k. the country receiving immigrants

   l. a person who leaves their own country because they fear for their safety, so they seek protection from the government in another country

   m. according to United Nations High Commissioner for Refugees (UNHCR), these are 'persons or groups of persons who have been forced to flee, or leave, their homes or *places* of habitual residence as a result of armed conflict, internal strife, and habitual violations of human rights, as well as natural or man-made disasters involving one or more of these elements, and who have not crossed an internationally recognised state border'.

2. Some groups use the term 'refugee' and others 'displaced person'. What are the similarities and differences between these terms?

3. Draw a concept map of the different types of migration.

4. Refer to Figure 2.6. Does this fit your stereotype of an international migrant?

5. a. Outline the advantages and disadvantages of migration for the seasonal workers represented in the photograph below.

   b. Investigate and describe how important seasonal workers are to some Australian businesses.

   c. How did the COVID-19 pandemic restrictions in international *movements* affect supply of seasonal workers in 2020 or 2021?

Seasonal workers in the cotton fields on the Harran plain near the Turkish–Syria border work in difficult conditions

Causes of migration

The decision to leave one's home can be understood by considering the forces that push a person away from their current home as well as the forces that pull a person to a destination. These forces are known as push factors and pull factors, and these often *interconnect*. Push factors can include famine, such as the famine that took place in Ethiopia in the 1980s. Pull factors include the lure of jobs, as has happened for young people who *move* to the Bangladeshi capital of Dhaka to find work in the garment industry. Often people migrate because of a combination of push and pull factors (Figure 2.7). These decisions are based on perceptions of the destination that may be different from what occurs. The *move* may result in disappointment, but migrants vary greatly in their ability to respond if they are disappointed – many will have used too much of their available wealth to return home, or may be too embarrassed to do so. While it is common for people to migrate for work, many have been driven away by *environmental* hazards or conflict.

▼ **Figure 2.7** People migrate for negative (push) and positive (pull) reasons

Push factors	Pull factors
Unemployment or underemployment	Potential for better employment
Poverty	Greater wealth, higher standard of living
Famine	Fertile land; reliable fresh water supply
Drought or flood leaves subsistence farmers without food	Adequate and reliable food supplies
Political, religious or social persecution	Better safety and tolerance
War, conflict	Political security
Lack of services	A range of services provided, for example, education and health services
Disasters	Less hazardous situation
Isolation and loneliness	Access to family and friends
Adverse climate	Less extreme climate

A range of factors cause population *movement*:

▶ ***Environmental***: major biophysical characteristics and *processes* including climate, landforms, vegetation, water, soil. These include monsoons, mountainous landforms, tundra and floodplains. Biophysical features that have been altered by humans are also relevant. *Environmental* hazards such as floods, earthquakes and tsunamis may result in permanent and temporary population *movements*.

▶ **Social**: those elements relating to people, their community, type of society; for example, rural areas, traditional villages and urban centres. Some people may be able to migrate to a different *place* if they already have family members who have settled before them (a *process* called chain migration). Many migrants *move* as part of these family or community groups, either together or over time, so their social bonds remain significant even in their new host countries where they often live near each other in enclaves for support. Furthermore, the social position of an individual or their family in terms of class, ethnicity, colour, caste, age or gender may shape decisions about migration by influencing the power they have over their lives.

▶ **Economic**: aspects related to income generation, employment, investment opportunities and expenditure including cost of living, and a countries' main exports or imports. There has been a huge internal population migration in China in recent years due to job opportunities in the large and growing *regional* cities, especially in the eastern provinces.

▶ **Political**: relating to government, such as laws, policies and regulations. The type of government is also relevant; for instance, whether it is democratic or autocratic (the latter may include communist governments or dictatorships). Political action can be carried out by a government or by groups and organisations. Australian government policies provide incentives to encourage migrants to settle in rural and *regional* centres rather than capital cities. Government systems may include central (e.g. Federal), state or provincial and local governments – each with different levels of authority, power and influence extending over different *regions* within a nation.

▶ **Cultural**: those elements that are related to customs and beliefs including religion. Religious persecution is the most common cultural reason for migrating. This is sometimes included in social factors, but it can be useful to consider this separately. Migration often involves migrants undergoing enormous cultural *change* – often losing their links to home and the past as they are faced with challenges such as adapting to unfamiliar urban cultures when they migrate to cities.

Reasons for migration are complex. They can be the result of a personal decision (which is known as high agency) or in response to forces that individuals cannot control (low agency). Often the decision of one household member, especially parents, affects the rest of the household (Figure 2.8).

Internal and international migration after retirement has become a growing trend over the last decade among people with strong financial resources.

▶ **Figure 2.8**
Continuum of migrant agency and migrant categories

Slavery and trafficking: These are illegal activities in which victims are trapped and used as slaves. They have no choice and are forced unwillingly in activities. Human trafficking is a modern term for slavery.

Refugees: According to the UN, refugees are defined as people who are forced to leave their country because they have been persecuted (or have a reasonable fear of persecution). They have a small amount of agency to influence when they will leave and where they will go.

Displacees: Those forced to move because of a situation that they can't control including environmental disaster, violence, or government decision (e.g. China's Three Gorges Project to dam the Yangtze River to produce hydroelectric power and reduce flooding downstream displaced 1.3 million people. They were relocated to other parts of the province).

Economic migration: Move to get a job (or a better job)

Family migration: When a spouse or relative relocate to join their family

Lifestyle migration: People migrate to access a better lifestyle (e.g. Australians who retire to Bali, Indonesia).

Source: Adapted from Robert McLeman, 2014, *Climate and Human Migration*, Cambridge University Press, New York

Many Britons choose to settle in sunny Malta, Spain and Cyprus while Portugal has the third-largest European expatriate community after Spain and France. Many of these are retirees. Americans flock to Florida (Figure 2.4) resulting in Florida boasting a high proportion of elderly people (20 per cent). Other Americans choose to retire abroad, often in Mexico, Central America, Asia or Europe. Thousands of financially independent Australians are making their retirement homes in Indonesia, Vietnam, Malaysia or Thailand. It is an appealing option as costs are between 50 per cent and 80 per cent lower than living in Australia, a significant pull factor. Migrants can have a positive impact on the host country by contributing to the economy, but the overall financial impact is partly influenced by the amount of remission payments from their income they may make back to family members in their original homeland.

People may flee the devastation of earthquakes (for example, Nepal in 2015), some never to return; others may be attracted to an area which has a successful irrigation project leading to job growth in agriculture. For example, in the Emerald *region* of Queensland west of Rockhampton, the Fairbairn Dam has enabled increased production of melons, grapes and citrus crop, attracting agricultural workers to the area on a temporary and permanent basis, and from the late 1960s a similar migration occurred to north Western Australia because of the development of the Ord River Scheme. Government-run agricultural development schemes through 'transmigration' have caused tens of thousands of migrants to *move* in recent decades for example to Borneo and Irian Jaya in Indonesia and to the Amazon basin in Brazil. But the gains in economic opportunity are often challenged by the costs of *environmental* destruction and disruption to native communities.

A factor rarely considered in population studies is that people sentenced to imprisonment are forced to migrate from their *place* of residence. Nationally, Aboriginal and Torres Strait Islander adults are 15 times more likely to be imprisoned than non-Indigenous Australians. This concerning migration pattern is one that the Australian government wants to *change*, by improving community programs and developing strategies to address the underlying complex causes of Indigenous incarceration.

International Migration

An international migrant is defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as 'any person who lives temporarily or permanently in a country where he or she was not born and has acquired some significant social ties to this country'. But definitions vary. Migrants can become naturalised citizens or legal permanent residents. They may be refugees (Figure 2.9) and asylum seekers, international students and others on long-term temporary visas, or unauthorised immigrants. Nomadic peoples are usually not considered migrants, though they may regularly cross international borders. Two small groups that maintain a nomadic lifestyle are the European Roma and the Tuareg of Northern Africa. The United Nations reports that in 2019 around half of all international migrants lived in just ten countries. These are listed in Figure 2.10.

Overall, almost equal numbers of males and females migrate, though this varies from *place* to *place*. For example, there is a high demand for migrant workers in the oil-driven construction booms in countries of Western Asia. They are mostly adult males, and some are highly skilled whereas others are not.

Numbers of temporary migrants in the form of international students studying overseas are surging, increasing from two million in 2001 to more than five million in 2019. International students bring significant economic, social and cultural benefits to the host country. These cultural and economic *interconnections* have strong influence on the characteristics of *places*, bringing cultural practices which can foster intercultural understanding and bring economic benefits to the host country. Responses to the COVID-19 pandemic have, however, severely reduced the flow of international students globally. This has caused considerable economic hardship in typical host countries but the resulting *re-distribution* of demand for higher education presents new opportunities elsewhere.

▼ **Figure 2.9** Somali children attend an outdoor classroom at the Friends Primary School in Ifo Refugee Camp, Dadaab, Kenya. Ifo is one of five refugee camps in the area. Ifo has 80,000 Somali refugees, and 220,000 people are housed across the five camps

▼ **Figure 2.10** Countries that have the highest immigrant populations, 2019

	Country	Immigrant population
1	United States of America	51 million
2	Germany	13 million
3	Saudi Arabia	13 million
4	Russian Federation	12 million
5	United Kingdom	10 million
6	United Arab Emirates	9 million
7	Canada	8 million
8	France	8 million
9	Australia	8 million
10	Italy	6 million

1. What are push and pull factors?

2. Give two examples of a push factor and two examples of a pull factor.

3. Justify where you would put imprisonment on the agency continuum in Figure 2.8.

4. Using the table format and headings to the right, classify the following headline statements according to factors that contribute to migration *movements*.

    a. Jewish immigration into Israel surges more than 40 per cent in the first four months of 2015.

    b. 151,000 Irish emigrate between 2010 and 2014 to find work – it's a brain drain.

    c. After the 2010 earthquake disaster, affected Haitians migrate to stay with friends.

    d. Retirees migrate to the sun belt in the United States.

    e. After the transfer in 1997 of sovereignty of Hong Kong, many Chinese settle in Vancouver, Canada.

    f. Indonesian government's transmigration program *moves* six million people to less populous areas of the country.

    g. Turkish guest workers apply to stay as permanent settlers, and later bring their families.

    h. Filipino women find work as domestic cleaners and carers in Italy.

    i. 70 per cent of immigration to USA involves family reunion.

    j. Australian Fly-In-Fly-Out (FIFO) mining workers chose to live in Bali, Indonesia.

Use your prior knowledge to add an example in the third column of the table.

Factors	Statements	Another example
Environmental		
Social		
Economic		
Political		
Cultural		

5. a. What type of migrant is depicted in the Haiti photograph below?

    b. Briefly outline the event that caused this population *movement*.

    c. Why could this *movement* be considered temporary?

A tent city in Port-Au-Prince, Haiti after the 2010 earthquake

Rural–to–urban migration

Rural-to-urban migration is a major factor that fuels the *process* of urbanisation. Rural-to-urban migration describes the *movement* of people from the countryside to a city, a type of internal migration. The world is rapidly becoming more urban as overall quality of life is often thought to be better in city *environments*. In 1900, 15 per cent of the world population lived in cities; by the 1950s, this had doubled to 30 per cent. By 2010, more than 50 per cent of the world's population was living in cities, according to the United Nations. In 2020, 56 per cent of all people lived in cities. However, the urbanisation trend varies between countries. For example, in 2020, Singapore was 100 per cent urbanised, followed by Australia at nearly 90 per cent, Canada and the USA at 82 per cent, China and Indonesia at 56 per cent. Push and pull factors of migration can be applied more broadly to the examination of any migration flow but are commonly applied to rural-to-urban migration or (as it is sometimes called) 'countryside to curbside'.

Urban areas are growing faster in economically less developed countries than anywhere else in the world. In less developed cities, rural migration to the city sometimes ends in life in an informal settlement – a slum or shanty town in which dwellings are poor quality and services are inadequate (Figure 2.11). Slums are described as informal settlements, as they are unplanned and buildings are constructed using poor materials. Jobs there are often temporary and mainly in the informal sector unregulated by government. Globally, about 25 per cent of total city dwellers live in informal settlements attracted by the relatively low cost of housing. A much higher proportion exists in the cities of poorer nations. These slums face a range of problems as they develop on land that is vacant, including government land, and sometimes next to railway lines. Some of these sites are flood-prone, polluted, degraded or subject to landslides. Infrastructure including water, sewerage,

▲ **Figure 2.11** Mumbai slums in India have developed on vacant land adjacent to the railway line, a safety risk for children living there

waste disposal, power, policing and public transport is often lacking. This leads to social challenges of overcrowding, crime, high risk of fires and inadequate sanitation allowing the easy spread of disease.

In 2019, the World Bank estimated that an average of over 400,000 migrants arrive in Dhaka, Bangladesh's capital city, each year, seeking work or fleeing natural hazards. Dhaka is one of the most densely populated cities in the world, as well as one of the world's fastest growing cities. Almost half of the 20 million people in Dhaka live in shanty towns, mostly one room dwellings. Located in wetland *environments* and almost surrounded by rivers, parts of the city are

little more than two metres above sea level, putting residents at risk of constant flooding during the monsoon season (Figure 2.12). For the vast majority, there is no supply of safe fresh water, creating a significant challenge to the people living there.

The consequences of rural-to-urban migration include not simply population decline in rural areas but also a shift in the demographic structure of the donor and host areas. It is the young who migrate most often, adding to the host *region's* economic potential and leaving older adults to predominate in the donor areas. This *process* presents a social and economic challenge to governments at different *scales* and *places*.

Vieli Choka
Settlement Case Worker, Whittlesea Community Connections

My job involves settling refugees and migrants in the City of Whittlesea. I assist my clients with locating housing, furniture and material goods plus schooling for children, language courses and other programs that help transition new arrivals into their new homes. Most of my clients have suffered trauma and experienced conflict in their homeland. My role is to help them.

I grew up in Ghana in the border region of Burkina Faso. My father worked in Ghana but has family in Burkina Faso. Burkina Faso had been a French colony, with a different culture and economic base to Ghana, which had been colonised by the British. My brothers and sisters and I regularly moved backwards and forwards across the border and became accustomed from an early age to appreciating cultural differences. This provided a framework for my later career as a case worker for refugees.

I studied Geography at school and have always loved it. Geography isn't so much a subject; it is more a way of thinking. My first job was as a Human Rights Advocate with the commission for Human Rights and Administrative Justice in Ghana. This job involved working with villages in the northern parts of Ghana in the West African region. Our aim was to break down the social barriers that discourage girls from attending school. Later I worked with Liberian refugees in camps. This was to be my first introduction to work with refugees. Growing up and working in Africa, I was exposed to a number of different cultures and I was very aware of poverty and social disadvantage. I moved to Australia, where I studied community development and worked with Companion House, assisting survivors from torture and trauma – mainly refugees – and met and worked alongside people from many other countries and cultures. Many of these people had studied Geography.

Geography encourages respect for different cultures and an understanding of the socio-political factors that might lead to migration, such as refugee movement. I have always been fascinated by different cultures and wanted to help people. If you want to work in a variety of places and with people from different cultures, particularly in refugee advocacy, studying Geography would be ideal.

Rural-to-urban migration in Australia

In Victoria, Australia, the population continues to grow, but growth is not the same in all areas, as cities are growing faster than other *regions*. Young people might migrate from *regional* Victoria to the city on a temporary or permanent basis for education and employment opportunities and may also be attracted to the city's lifestyle possibilities.

Retirees and young families may *move* to *regional* Victoria to reduce their cost of living and because they are attracted to a different way of life (Figure 2.13). People who make the *move* from capital cities to *regional* areas for lifestyle reasons are sometimes called 'sea-*changers* or tree-*changers*' depending on whether they *move* to the coast or the bush. These '*changers*' may bring economic benefits to their new *region* and may require a greater provision of services. Now the effects of the COVID-19 virus have led to a significant reversal in the direction and size of migration flows that favoured *regional* areas in Victoria in 2021. The persistence and size of this trend will be strongly influenced by whether people are able to keep working remotely from their new rural or provincial home, and after the pandemic whether job and other opportunities such as education for internal migrant's children are available.

▼ **Figure 2.13** Net migration to Melbourne and *regional* Victoria by age, 2011–16
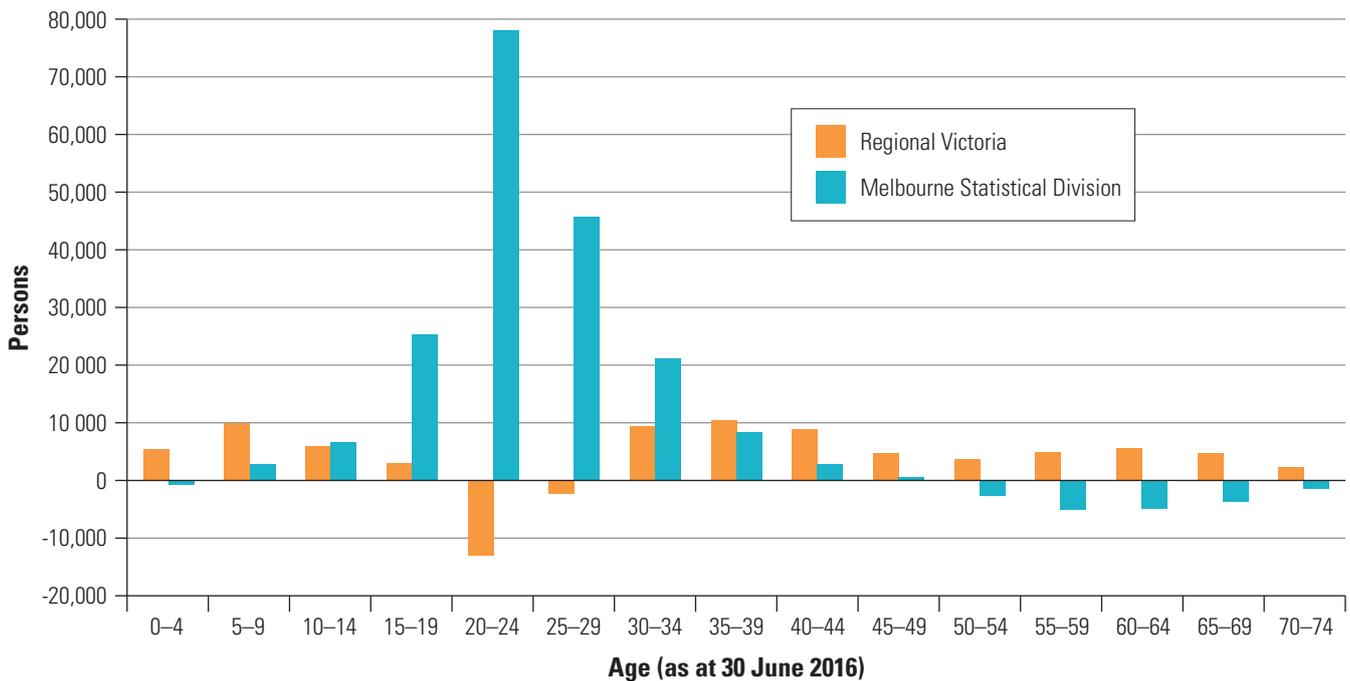
► ACTIVITIES

1. Why is rural-to-urban migration a global trend?
2. What are some of the problems associated with rural-to-urban migration in less developed cities?
3. How might rural-to-urban migration affect population structures in the donor area and in the host area?
4. Refer to Figure 2.13. What are the three main trends in this graph?
5. 'Rural-to-urban migration can be a means to a better life for well-prepared, skilled workers or it can simply displace workers to an urban *environment* in which they are just as poor as they were before.' Discuss this statement.
6. Research the effects of COVID-19 on rural-to-urban migration trends in one *place*.
7. Investigate your local area using Australian Bureau of Statistics (ABS) data and other sources. What trends of migration have occurred in your lifetime? Compare this with another local area that you predict will be different to your area. What are the similarities and differences?

Economic migration

Economic or labour migration is a significant worldwide pattern. In 2020, the ILO (International Labour Organization) estimated that there were 164 million people living outside their country of origin in order to work for 12 months or more. Governments recognise that immigrant labour can make a valuable contribution to the economy where there are worker shortfalls. It is important that government policies are able to protect migrant workers, who can be vulnerable to exploitation.

There are many broad patterns of labour migration. Since the 1980s many labour migrants have *moved* from:

▶ Southern and Eastern Europe to North-West Europe
▶ Central America to North America
▶ South Asia to the Middle East
▶ New Zealand to Australia.

More than 4.5 million Indonesians are working outside their home country: 70 per cent of them are women, many of whom work in the domestic sector as maids.

Greece provides a recent example of the consequences of the Global Financial Crisis of 2010, which led more than 200,000 Greeks to emigrate to seek employment in 2010–15. As Greece's unemployment spiralled to 22 per cent in 2012, Greeks migrated to other parts of Europe encouraged by the European Union's laws that allow citizens the right to '*move* and reside freely within the EU'. Fifty per cent have found work in Germany. Others have also sought work as far afield as Australia, which has also accepted a wave of Greek immigrants since 2010, many of whom are well educated and highly skilled. An estimated 6000 Greek and Cypriot residents migrated to Victoria during 2010–15. Many of these migrants are returnees, usually holding dual citizenship.

Benefits and disadvantages of labour migrants

Labour migration can be beneficial for migrants, although sometimes they can be exploited. Both the donor countries and the host countries gain economic benefits from labour migration but overall, the score card is complex. Labour migration can significantly *change* the population size and structure for donor and host countries.

Impacts on the country of origin

Many labour migrants *move* to the host country to better support their families at home, and plan to return home in the future. Their earnings (known as remittances) are sent back to families and provide an important source of funds (Figure 2.14). Globally, an estimated US$719 billion was sent by migrants to relatives in their home countries in 2019. The money that is sent back is often used to buy food and other essentials. Remittances *interconnect places* and have a significant positive impact on the economy in the countries that receive them. In Nepal they make up more than one-quarter of total Global Domestic Product (GDP). The flow of money from migrants is a reliable source of income for the families who receive them – but it is dependent on favourable government policies controlling labour and immigration in the foreign lands to which the migrants have *moved*. Recently, large numbers of guest workers have been forced, or have chosen, to *move* back to their original homelands because of the COVID-19 pandemic.

Figure 2.15 shows both the percentage contribution remittance funds make to a country's GDP and the total value of remittance in-flows to the top ten receiving countries in the developing world.

▼ **Figure 2.14** Major flow of remittances from the United States, the United Kingdom and Canada, 2018
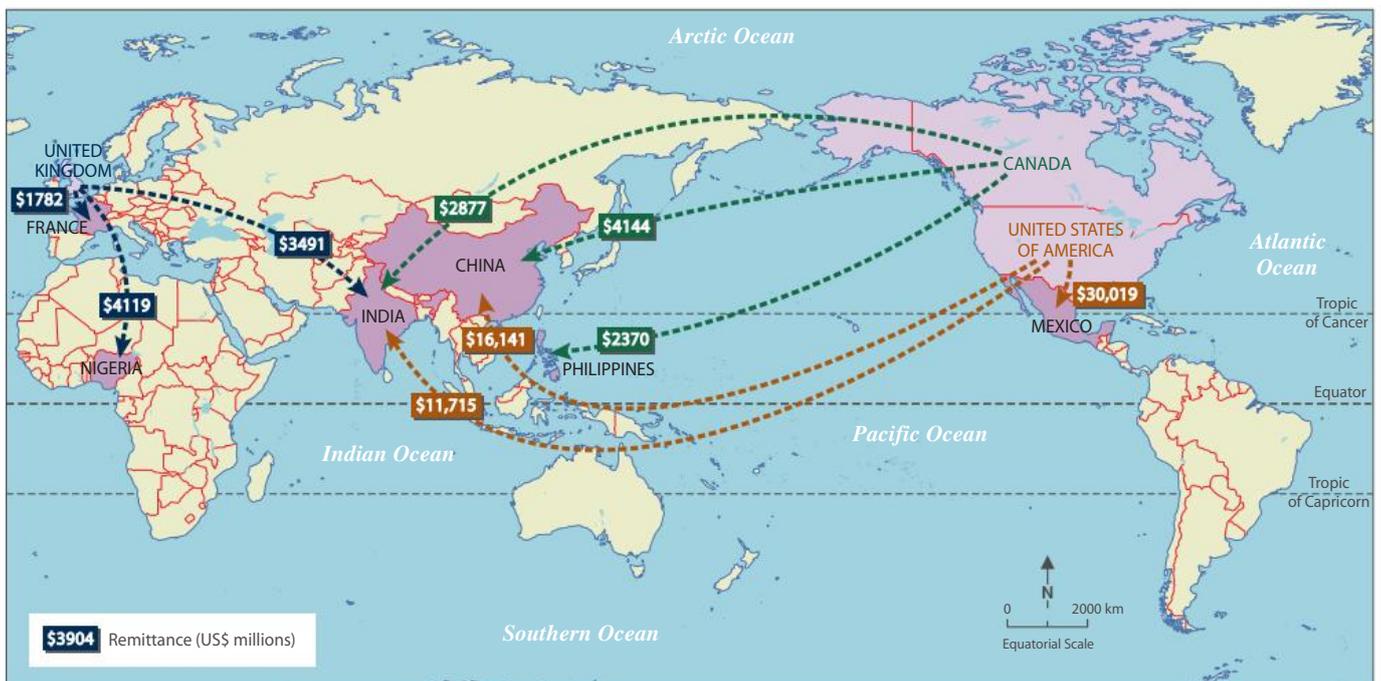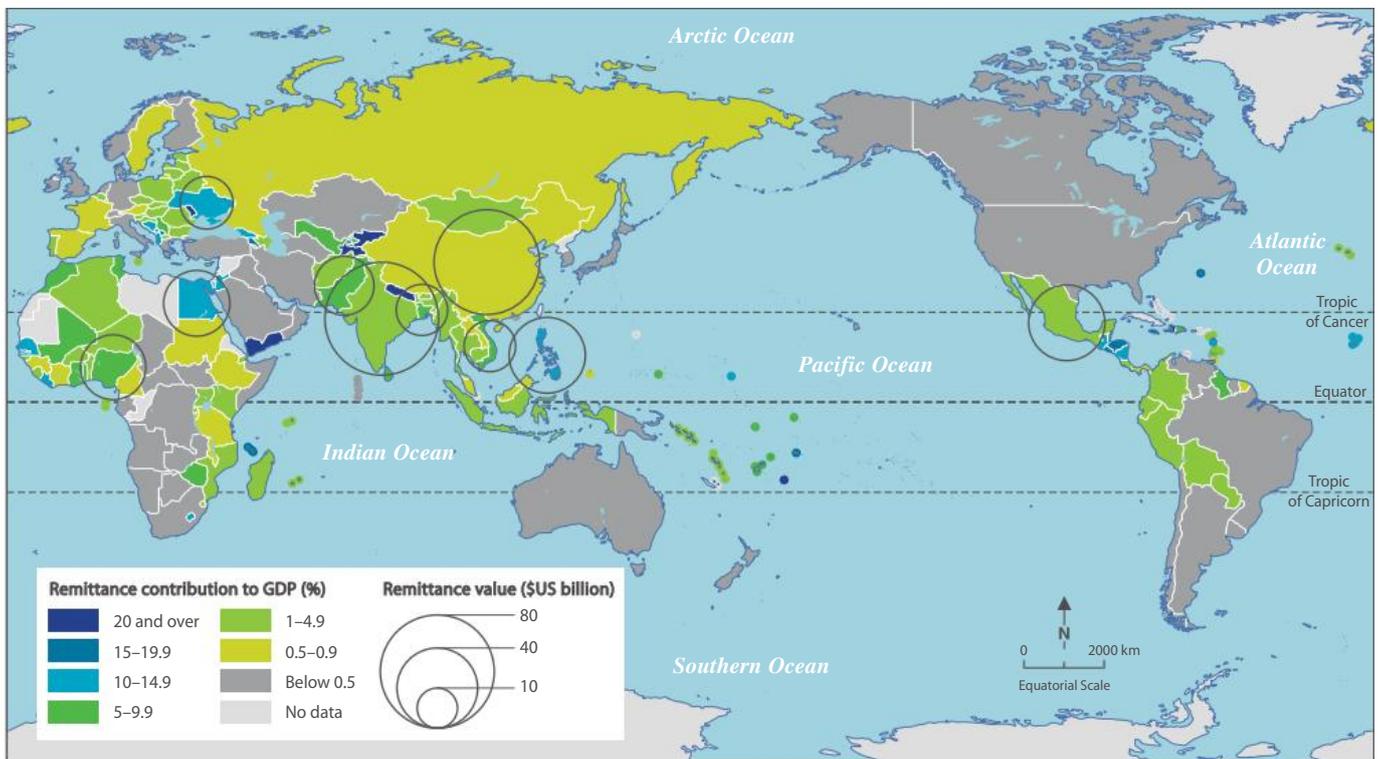
▲ **Figure 2.15** Remittance money from migrant workers flowing back to their country of origin is a significant driver of population *movement* in addition to providing economic benefit, 2018

The World Bank estimated that remittance flows to developing countries totalled $482 billion in 2018. Worldwide, remittance flows, including those to high-income countries, were an estimated $689 billion in 2018. In developing countries, remittances from international migrants are far greater than the funds sent to poor countries from foreign aid. In this way, the donor *region* benefits economically. The hundreds of millions of dollars sent back each year have a dramatic effect on rural communities enabling them to purchase food and other goods and invest in improvements in their farming activities. Remittances reduce poverty though it is not always the poorest in the community who have a family member who sends money home. Returning migrants bring savings, skills and international contacts, strengthening the *interconnections* between *regions*.

However, there can be negative social impacts, such as when families are separated, and when children are left behind with extended family they grow up without everyday contact with their parents. In China, for example and especially in rural communities, over 60 million children are left behind with their grandparents when one or more of their parents live elsewhere to work – often in *distant* cities or industrial zones. There is also a loss of young and able working people and those most likely to have education and skills, a phenomenon known as 'brain drain'.

Impacts on the host country

International migration can bring economic benefits to the host country, as it boosts the supply of low-cost labour. Services can be maintained through filling job vacancies and the use of cheaper immigrant labour can

reduce the costs to industries including agriculture, manufacturing, construction, restaurants and childcare so that economic growth can be sustained.

Socially, migrant workers can face language difficulties and can place pressure on housing and services. When the immigrant population has limited skills or education, they can be trapped in unskilled jobs with no prospects to develop their career. Locals may fear losing their jobs to incoming workers and may discriminate against migrants – especially those from cultures or ethnicities deemed different to their own. Yet the host country benefits, as migrants contribute to economic growth by spending money on food and services.

Labour workers often come not intending to stay but find that long-term settlement is an attractive option. For example, large-*scale* migration of workers from Turkey to Germany occurred in the 1960s and 1970s. They worked in many occupations including the German car industry. In Germany, there are 1.55 million people who hold Turkish citizenship, thereby forming the largest group of non-citizens in Germany. Though Turks are now the largest ethnic minority in Germany, with a significant community of second- and third-generation Turks, it has been difficult for them to obtain German citizenship. This *changed* in 2000 when a new citizenship law took effect. Children born to foreigners in Germany now receive German citizenship, if one parent has been a legal resident for at least eight years. Even with these legal measures, some racial or ethnic tensions still remain.

Migrant workers in United Arab Emirates

The highest density of foreign nationals is found in the Gulf countries of the United Arab Emirates (UAE), Qatar, Kuwait, Bahrain, Oman and Saudi Arabia. On average, more than 50 per cent of the population of each of these countries is made up of labour migrants, sometimes known as 'guest workers'. Workers are mainly employed in construction though, increasingly, guest workers are needed to meet shortages in professions such as management, law, education and health. In 2019, the majority of flows of annual labour workers to Gulf countries came from South Asia (Figure 2.16). India has the largest annual flow and, overall, it is also the largest donor country with an estimated four million Indians working in the Gulf in 2019.

South Asian migrant workers who work in the United Arab Emirates (Figure 2.17) arrive on visas that are tied to individual employees. Reports that the employers have removed workers' passports so that they have no authority to leave are common. The pay

▼ **Figure 2.16** Labour migrants to the Gulf countries
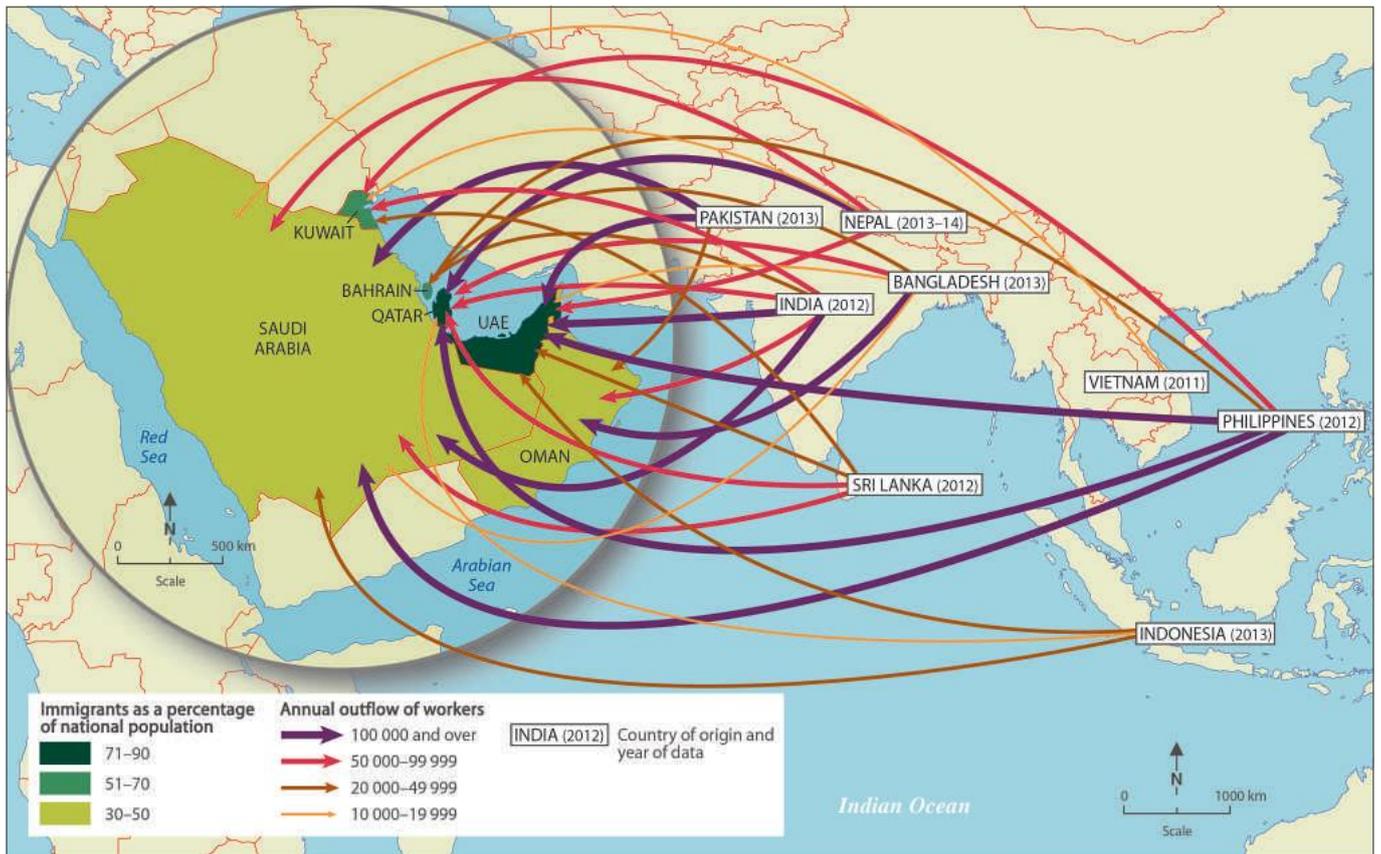
▲ **Figure 2.17** Migrant workers at a construction site in Dubai, United Arab Emirates

and living conditions are usually poor for unskilled workers because UAE have few laws to protect the basic rights of the migrant workers. The UAE's sponsorship system gives employers nearly total control over the workers' employment. Employers can have a worker's visa revoked, leading to deportation. The Human Rights Watch has investigated reports of abuse and exploitation of workers. At worst they described situations of forced labour, in which workers'

wages were inadequate and their accommodation sub-standard. Men who went on strike about their low pay and conditions were deported. Unions are banned and summer working conditions are arduous. During summer months in July and August, average maximum temperatures reach above 40°C. Migrant workers can *change* the age-sex structure of the population in a country or *region* (Figure 2.18).

▼ **Figure 2.18** Population pyramid showing the skewed age–sex *distribution* of the Emirate of Dubai
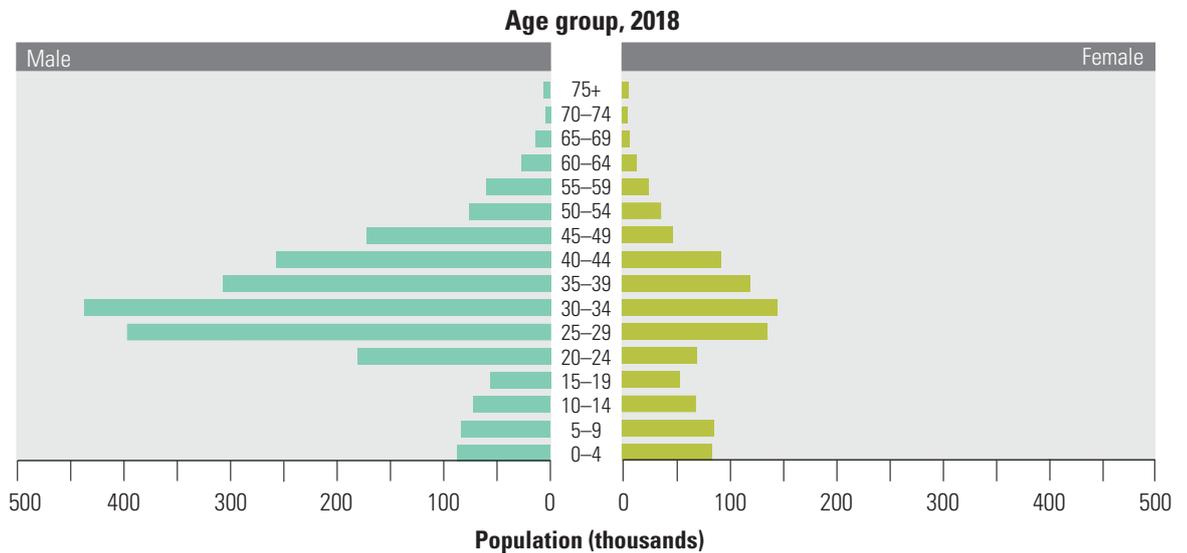
▶ ACTIVITIES

1. What is labour migration?

2. Explain the term remittance using your own words.

3. Refer to Figure 2.14. Describe the flow of remittances from the United States, the United Kingdom and Canada.

4. Examine Figure 2.16.
   ▶ Rank the donor countries according to size.
   ▶ Which three Gulf countries have the highest proportion of migrants?

5. Refer to Figure 2.18. Describe how economic migration has contributed to structural *change* in population.

6. Construct a table that shows the benefits and disadvantages of labour migration.

   a. For the *place* losing people:

Benefits	Disadvantages

   b. For the *place* gaining people:

Benefits	Disadvantages

7. Examine Figure 2.15. Which countries have the highest remittances as a percentage of GDP?

8. Examine the interactive map at Pewresearch.org and search for 'Remittance flows worldwide in 2017' and 'Origins and destinations of the world's migrants, 1990–2017'. Choose one country that has a high proportion of remittances and investigate which countries host these nationals.

Forced migration

In 2019, there were more than 79.5 million forcibly displaced people worldwide, and half were under 18 years old according to the United Nations. Included in the definition of forcibly displaced people are refugees, asylum seekers and internally displaced persons (IDPs). Refugees are forcibly displaced people who have left their country of origin. Eighty per cent of the world's refugees are in less developed countries which have fewer resources to manage the issue. In 2019, the highest numbers of refugees came from Syria (Figures 2.19 and 2.20). With over 3.6 million refugees in 2019, Turkey was the country housing the most refugees of any country, mostly from war-torn Syria (Figure 2.19). Internally displaced persons are those who have been forced to leave their homes as a result of armed conflict or disaster and have not crossed an international border (Figure 2.21).

The Office of the United Nations High Commissioner for Refugees (UNHCR) states that 'the terms asylum seeker and refugee are often confused: an asylum seeker is someone who says he or she is a refugee, but whose claim has not yet been definitively evaluated'. More than one million people seek asylum on an individual basis every year.

Reasons for refugees

People become refugees for a number of reasons:
- ▶ They flee persecution for their political or religious beliefs, ethnicity, nationality or membership of a particular social group
- ▶ They leave as a result of war
- ▶ They leave because of a natural disaster, though this may include the effects of human-induced climate *change*.

An irregular migrant is a migrant without documented approval to remain in a country. Such a migrant is also called an illegal or unauthorised migrant. They enter a country without permission or have overstayed the duration of their visa. An asylum seeker is generally not considered an illegal immigrant as their refugee status has not yet been determined.

◀ **Figure 2.19** A Syrian boy receiving food in a refugee camp on the Turkish–Syrian border

▼ **Figure 2.20** The Syrian refugee crisis has significant impacts on the lives of children, many of whom are without one or both parents, without passports and without access to education. Children fear for their safety and suffer from violence and dislocation. There are over 2.5 million Syrian children are who refugees in 2019
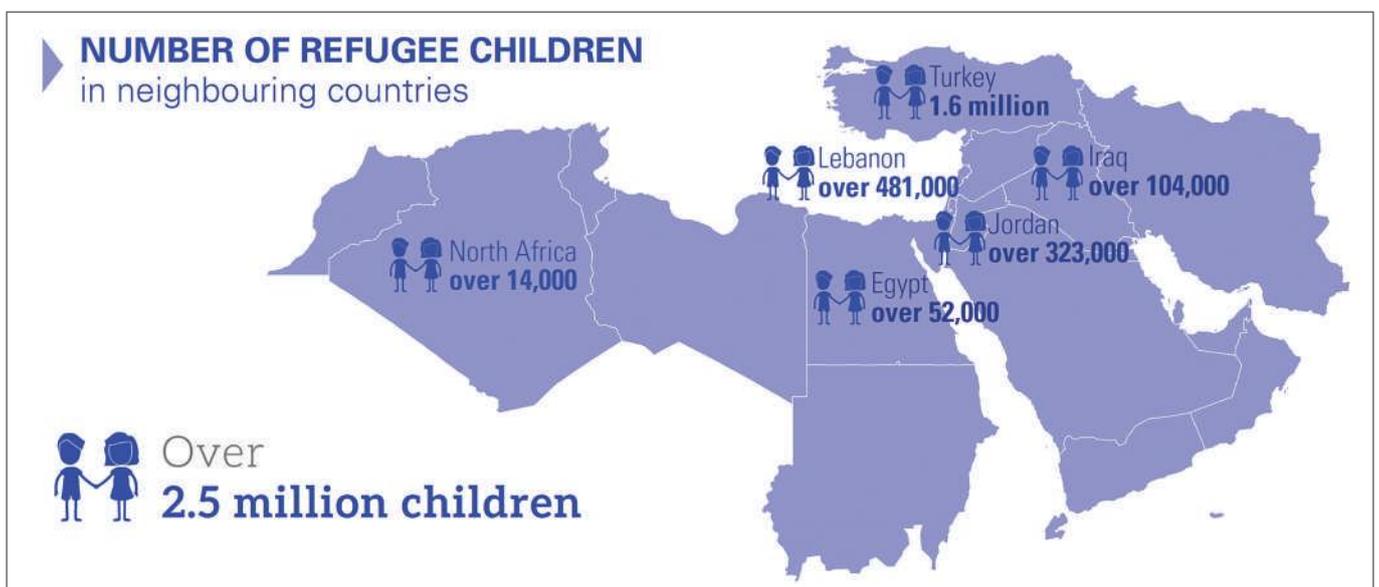
NUMBER OF REFUGEE CHILDREN in neighbouring countries

Turkey 1.6 million
Lebanon over 481,000
Iraq over 104,000
Jordan over 323,000
North Africa over 14,000
Egypt over 52,000

Over 2.5 million children
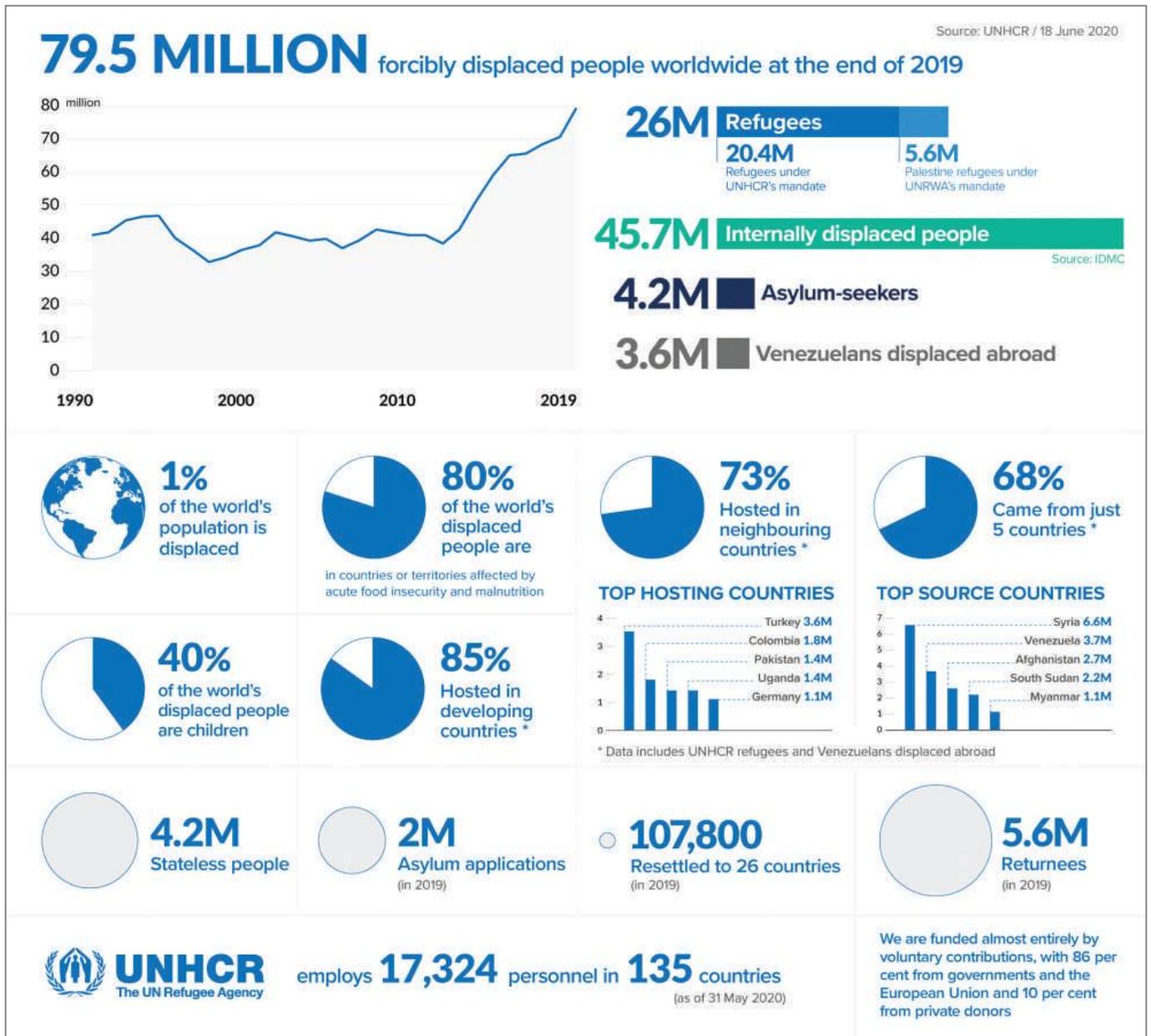
Responses to refugees

Responses to refugees are:

▶ Refugee warehousing. Many refugees are exiled in refugee camps in which they survive but their life opportunities are limited. It is not a long-term solution. Millions live in refugee camps, in sub-standard *environments*, with little chance of building their skills or access to educational opportunities. Many people exist in camps for five, ten or more years.

▶ Repatriation (return) to the country of origin once the situation is safer. Refugee repatriation rates are improving. During 2013, some 414,000 refugees returned to their various countries of origin and this increased to 583,800 in 2018. While that may sound like a lot, it's actually less than half of the average annual return rate of the first decade of the 21st Century.

▶ Resettlement into the country to which they have fled, or to a third country. In 2018, less than 1 per cent of the 10 million refugees registered with UNHCR were resettled. In 2018, 25 countries admitted 92,400 refugees for resettlement during the year.

▶ ACTIVITY

1. In the month since the conflict began in Ukraine on 24 February 2022, over three million people have fled their homes to seek safety in neighbouring countries. Use https://data2.unhcr.org/en/situations/ukraine to investigate the current situation and international responses.

2. Analyse Figure 2.22 to outline the world *distribution* and magnitude of internally displaced people. Select one location to investigate and evaluate the immediate and longer-term responses to this issue by national and global organisations. Use the International Displacement Monitoring Centre (IDMC) website (internal-displacement.org) to begin your investigation.

   Locations that you might select include: Syria, Afghanistan, Bangladesh, Burkina Faso, Central African Republic, China, Columbia, Democratic Republic of Congo, Ethiopia, Guatemala, Iraq, Libya, Mali, Myanmar, Philippines, Somalia, Sri Lanka, Sudan and Yemen.

China 4,034,000
Sri Lanka 87,000 | 1,700
Myanmar 270,000 | 80,000
Lao PDR 103,000
Thailand 61,000
Japan 265,000
Cambodia 70,000
Viet Nam 89,000
Philippines 4,094,000 | 183,000
Malaysia 63,000
Papua New Guinea 31,000 | 1,300
Indonesia 463,000 | 23,000
Australia 25,000

Bangladesh 4,086,000 | 520
Nepal 121,000
India 5,018,000 | 19,000
Pakistan 100,000 | 16,000
Afghanistan 117,000 | 461,000
Iran 520,000

Yemen 31,000 | 398,000
Somalia 479,000 | 188,000
Ethiopia 504,000 | 1,052,000
Kenya 74,000 | 1,800
Uganda 130,000 | 2,300
Burundi 27,000 | 530
Malawi 117,000 | 150
Mozambique 506,000 | 5,300
Zimbabwe 52,000

Iraq 37,000 | 104,000
Syria 17,000 | 1,847,000
Albania 33,000
Libya 4,600 | 215,000
Spain 23,000
Sudan 272,000 | 84,000
Chad 30,000 | 58,000
Niger 121,000 | 57,000
Mali 6,600 | 284,000
Burkina Faso 513,000
Nigeria 157,000 | 248,000

Cameroon 24,000 | 67,000
Congo 166,000 | 2
Central African Republic 102,000 | 96,000
Dem. Rep. Congo 233,000 | 1,672,000
Abyei Area 40,000
South Sudan 294,000 | 259,000

Canada 41,000
United States 916,000
Mexico 16,000 | 7,100
Guatemala 21,000
El Salvador 1,900 | 454,000

Colombia 35,000 | 139,000
Brazil 295,000
Bolivia 77,000 | 31
Paraguay 54,000
Argentina 23,000
Uruguay 22,000

East Asia and Pacific 9,601,000 | 288,000 (29.6%)
South Asia 9,529,000 | 498,000 (30%)
Middle East and North Africa 631,000 | 2,566,000 (9.6%)
Sub-Saharan Africa 3,448,000 | 4,597,000 (24.1%)
Europe and Central Asia 101,000 | 2,800 (0.3%)
The Americas 1,545,000 | 602,000 (6.4% of the total figure)

iDMC internal displacement monitoring centre

The country and territory names and figures are shown only when the total new displacements value exceeds 20,000. Due to rounding, some totals may not correspond with the sum of the separate figures.

The boundaries and the names shown and the designations used on this map do not imply official endorsement or acceptance by IDMC.

More than 3 million
1,000,001 to 3 million
200,001 to 1,000,000
20,001 to 200,000
20,000 or less

Total 24,855,000 | 8,553,800
New displacements - disasters
New displacements - conflict
33.4m

Migrants crossing the Mediterranean, 2015–2019

The European Union (EU) – then an alliance of 28 countries located in Europe – faced a migration crisis of an unprecedented *scale* in 2015. Migrants risked their lives aboard unseaworthy boats in the Mediterranean in an attempt to reach Europe. In April 2015, a boat transporting nationals from Syria, Eritrea, Somalia, Mali, Sierra Leone and Senegal capsized off Libya drowning hundreds of people. Migrant arrivals by sea and deaths at sea was highest in 2015 (see Figure 2.23) and is still a major issue. It is challenging to manage this *scale* of migration as people who are faced with hunger, persecution and war take desperate actions to improve their situation. Other vessels in difficulty have been rescued and, tragically, some vessels in the Mediterranean have been discovered sunken without rescue alerts raised. With nearly 9000 lives lost at sea through people smuggling from 2017–2020, this has become an international humanitarian concern. There is a significant disparity in the geographical *distribution* of this problem and responses to it – Italy, Spain and Greece carry most of the burden of processing asylum claims as most boats arrive on their shores (Figure 2.24). Over 200,000 people entered the EU in 2017, including some 171,072 people who came by boat. Nevertheless, this pattern is *changing* in recent years with the number of refugees reducing in the central and Eastern Mediterranean route but increasing in the Western Mediterranean route to Spain.

Under the Geneva Conventions, refugees fleeing from persecution or life-threatening violence have a right to claim asylum. Escalating conflicts in Syria, Iraq, Afghanistan, Somalia and Libya are pushing migrants towards Europe. In 2019, of the 721,090 people who applied for asylum to the EU, only a small proportion came by boat (Figure 2.25); 538,000 of the applicants who were processed were granted asylum (Figure 2.26). Though the EU is trying to reach an agreement on how asylum seekers can be more equitably *distributed* within the EU, this has not yet been resolved.

Some individuals and groups who oppose immigration suggest that migrants arriving by boat are mostly economic migrants who risk the journey for the chance of economic improvement; however, many are in fear of persecution or starvation and so have a legal right to seek protection and safety in another country as refugees. The debate about how to classify, and therefore manage, migrants seeking refuge or just a better life in Australia is a major moral issue as well as a legal and political challenge as it is in other *places*.

▼ **Figure 2.23** Mediterranean migrant arrivals and deaths by route, from 1 January to May, 2021

▼ **Figure 2.24** Arrivals by sea to Italy, Greece and Spain in the Mediterranean *region*, 2014–2019

Country	Total 2014	Total 2015	Total 2016	Total 2017	Total 2018	Total 2019
Italy	170,100	153,842	181,436	119,639	23,400	11,500
Greece	34,442	853,650	173,614	29,595	50,500	59,700
Spain	N/A	5309	8162	22,108	58,600	26,200

Note: All numbers are minimum estimates based on data from respective governments and International Organization for Migration (IOM) field offices.
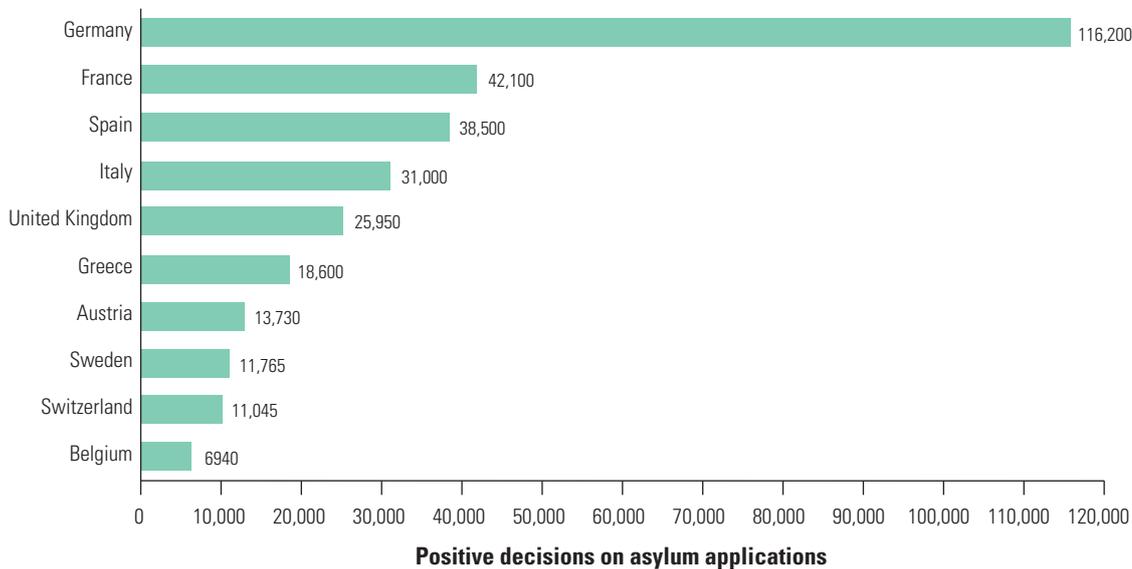
◀ **Figure 2.26**
Positive decisions on asylum applications by top 10 EU countries, 2019

Positive decisions on asylum applications

Country	Value
Germany	116,200
France	42,100
Spain	38,500
Italy	31,000
United Kingdom	25,950
Greece	18,600
Austria	13,730
Sweden	11,765
Switzerland	11,045
Belgium	6940

▶ ACTIVITIES

1. What is the EU?

2. What is an irregular migrant?

3. a. Outline the trends in arrivals by sea in Figure 2.24.

    b. Refer to Figure 2.23. In 2021, in total how many asylum seekers arrived by sea to Italy, Greece and Spain?

    c. Go to the Missing Migrants Project website (https://missingmigrants.iom.int/) and look at the current data for the Mediterranean *region*. How has this *changed* from the peak *movements* in 2015?

4. Refer to Figure 2.26. List which countries accepted over 40,000 asylum seekers in the EU in 2019.

5. Myth or fact? Form teams to investigate these statements about asylum seekers arriving in Australia. Discuss your results in class and use data and facts to support your findings.

    ▶ 'Most asylum seekers arrive by boat to Australia.'

    ▶ 'Australia faces one of the largest volumes worldwide of asylum seekers.'

    ▶ 'Asylum seekers take jobs from Australians.'

6. Go to the UNHCR (UN Refugee Agency) to find data on the Mediterranean situation (https://data2.unhcr.org/en/situations/mediterranean). Investigate how the migrant flows have *changed*.

3 Population trends and issues: growth in Bangladesh

Bangladesh gained its independence from Pakistan in 1971 when there were 65.5 million people living there. At Independence, the annual rate of population growth was around 3 per cent but thereafter it varied considerably. By the early 2020s, the population had more than doubled to 168 million, but the annual rate of growth then was only a third of the 1971 figure.

This chapter will consider the characteristics of the population of Bangladesh, the issues and challenges associated with its growing population, and the strategies that have been implemented to manage these issues.

What are the geographic characteristics of Bangladesh?

▶ **Figure 3.1** *Regional* location of Bangladesh

Bangladesh is a small country located between India and Myanmar (Burma) in southern Asia (see Figures 3.1 and 3.2). It has a small-*scale* land size of approximately 144,000 square kilometres (around half the size of Victoria). Ninety per cent of this land has an average elevation of around 10 metres above sea level (see Figure 3.3).

The southern coast of Bangladesh is the vast delta of the Ganges, Brahmaputra and Meghna rivers. The rivers are *interconnected* to the Bay of Bengal through a series of distributaries. The islands that comprise this *region* are covered by the largest mangrove forest in the world, known as the Sunderbans.

▶ **Figure 3.2** Natural features of Bangladesh

▲ **Figure 3.3** Low-lying fertile areas in Bangladesh are prone to flooding

◄ **Figure 3.4**
The Sunderbans are home to the endangered Bengal tiger

The Sunderbans is a UNESCO World Heritage site and a very biodiverse *environment*, home to a wide range of fauna including the Bengal tiger (see Figure 3.4), crocodiles, spotted deer and birds.

Due to its location, Bangladesh is vulnerable to many natural disasters such as cyclones and flooding. During the monsoon season, huge rainfall totals, high tides and coastal land erosion pose enormous problems for the large population who live in low-lying *regions* prone to flooding. When flooding occurs, approximately 10,000 square kilometres of Bangladesh can be covered in water, significantly affecting both people and the *environment* (see Figure 3.5).

▶ **ACTIVITIES**

1. Describe the *relative* location of Dhaka, the capital of Bangladesh, from Figure 3.2.

2. Describe the natural characteristics of Bangladesh as shown in Figure 3.2.

3. What *environmental* issues may arise for the population from the location of the capital, Dhaka?

4. Identify issues that may arise for those farmers located in the rural *region*, south of Barisal.

5. Use the internet to study maps, images and information about the Sunderbans to make an informed assessment of the threats to the *region*. Construct a table to show social, *environmental* and economic issues.

6. Describe the *spatial association* between flood-affected areas in Figure 3.5 and the *distribution* of people (see Figure 3.7).

7. Describe the *spatial association* between surges and coastlines, as seen in Figure 3.5.

▼ **Figure 3.5** Bangladesh's vulnerability to hazards

Drought prone area	**Hot spots** (most vulnerable zones)
Flood prone area	Large rivers
Surges	Urban centres
	Coastal
	Wetlands
	Soil erosion risk area
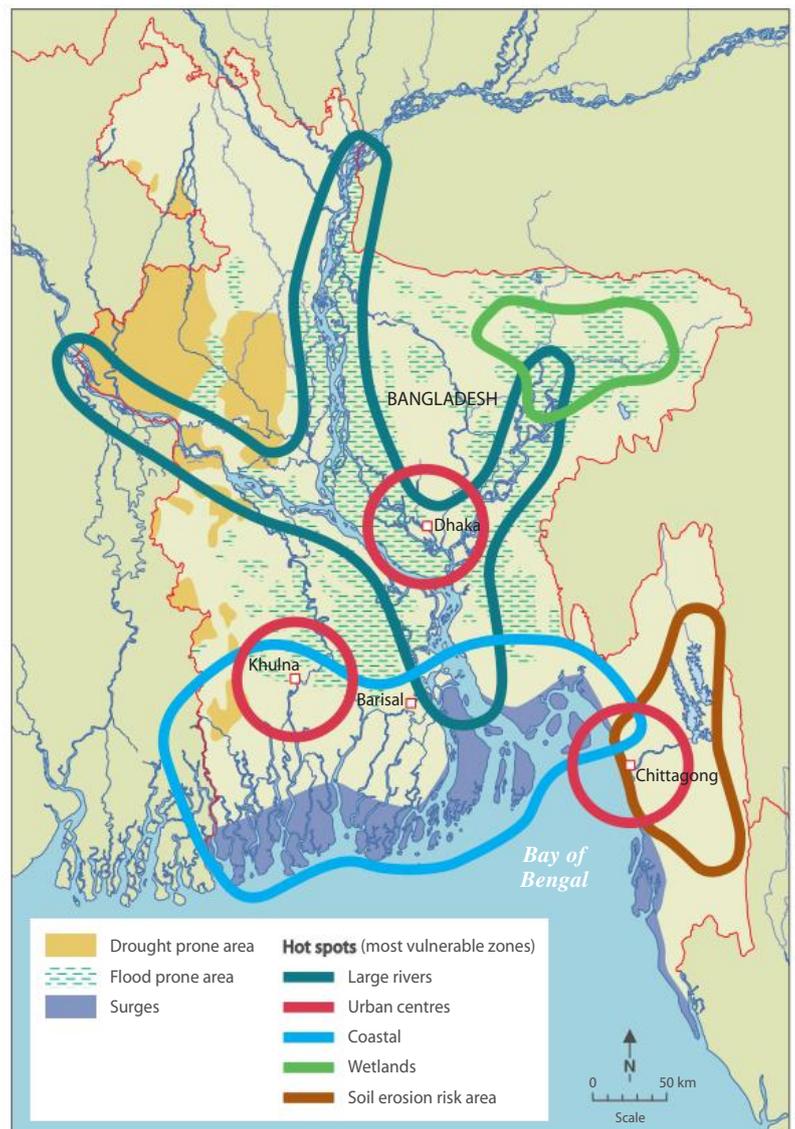
What are the population characteristics of Bangladesh?

Although the last official census in Bangladesh was conducted in 2011, the United Nations and other agencies periodically monitor the population and develop accurate predictions of population *change*.

Total population over time

Population *changes* in Bangladesh since 1975 are shown in Figure 3.6. In 2020 the Bangladesh Bureau of Statistics (BBS) stated that the population of the country was 168 million. This makes Bangladesh the eighth most populous nation globally. While estimates of predicted population are varied, the Population Reference Bureau (PRB) estimates the 2050 population at 231 million. This large-*scale change* in population over a relatively small time period will create many population issues, as discussed later in this chapter.

Population density

In 2019, Bangladesh was one of the most densely populated countries on earth with an average of 1116 people per square kilometre. This can be compared to Australia with an average of 3 people per square kilometre. As in most countries, the population *distribution* within Bangladesh is uneven (see Figure 3.7). Spatial data such as this enables governments and planners to pinpoint *regions* of high population density and therefore high needs in terms of education, transport and health infrastructure.

Ethnicity

Bangladesh's population is ethnically homogeneous (i.e. with similar characteristics) and dominated by the indigenous Bengalis at 98 per cent. In terms of religion, overall, 89.5 per cent of the population is Muslim, with Hindus being the next largest group at 9.6 per cent.

Development

In 2020 Bangladesh was ranked 133 out of 189 countries on the Human Development Index (HDI). The HDI is a tool developed by the United Nations Development Programme (UNDP) to measure and rank a country's levels of social and economic development. It is based on four criteria, that in 2020 for Bangladesh were: life expectancy at birth (72.6 years); mean years of schooling (6.2 years); expected years of schooling (11.6 years); and Gross National Income (GNI) per capita (US$4976). Recent improvements in the indicators have been evident.

Urbanisation

While the nation is still very much an agrarian one with 61.1 per cent of the population living in rural areas, the percentage of urban dwellers has been steadily increasing from 7.9 per cent in 1971 to the current estimate of 38.9 per cent (2021). This increasing *movement* of rural dwellers to the major cities mirrors a major global trend. The *process* of *change* from an agrarian population to an increasingly urban one can result in many problems, such as the overcrowding seen in Figures 3.8 and 3.9.

The capital and largest city of Bangladesh is Dhaka which has a metropolitan population of over 22 million. Dhaka is often called the Rickshaw Capital of the world with more than 600,000 cycle rickshaws on the roads every day. The next largest city is Chittagong, with a population of over 5 million.

▼ **Figure 3.6** Population *changes* in Bangladesh
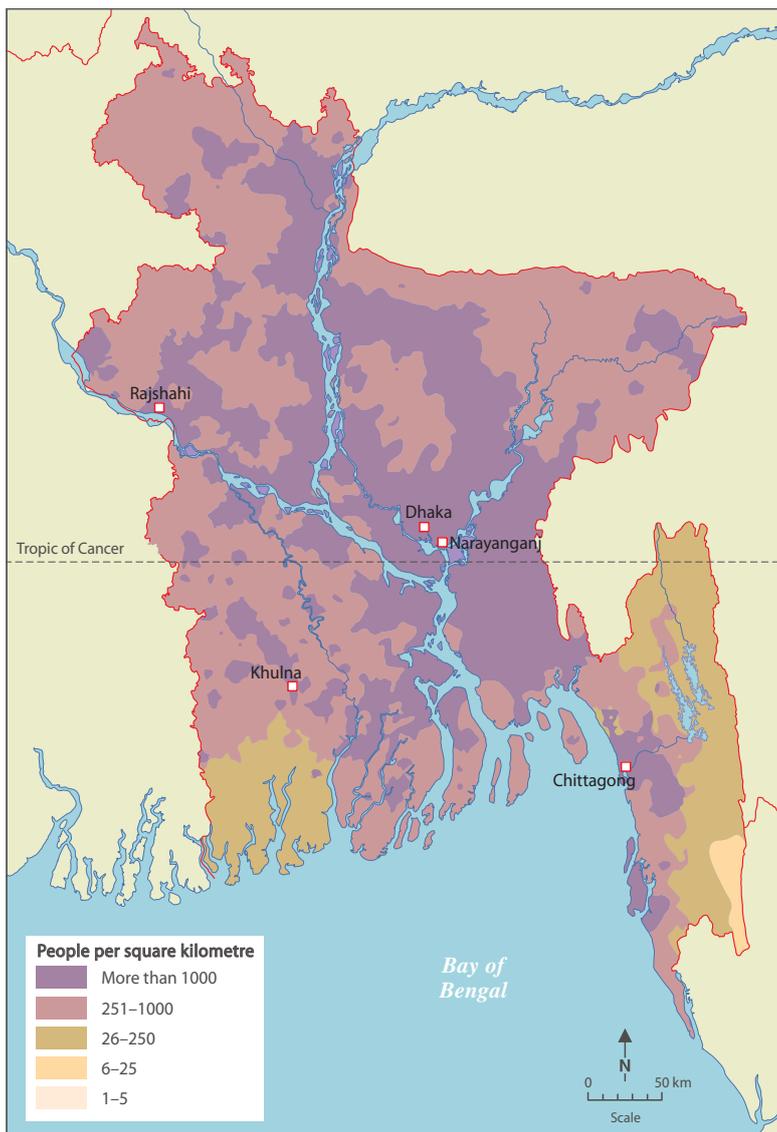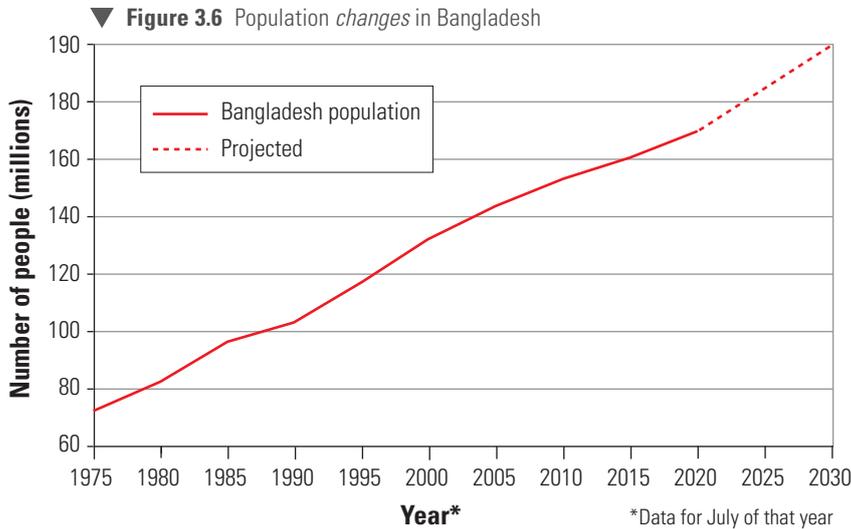
◀ **Figure 3.7**
The *distribution* of population in Bangladesh

▲ **Figure 3.8** Urban crowds in Bangladesh

▶ ACTIVITIES

1. Refer to Figure 3.7.

   a. Describe the *distribution* of population densities of over 1000 people per square kilometre.

   b. Suggest reasons to account for the *distribution* pattern you see.

2. What main factor would account for the lower population density shown around the coastline? Refer to Figures 3.2, 3.5 and 3.7.

3. Describe how the natural characteristics of Bangladesh may influence population density and *distribution* using Figures 3.2, 3.5 and 3.7.

4. Draw a graph which illustrates the increase in urbanisation in Bangladesh from 1960. Use the information in the text or use the internet to look for more details about Bangladesh's urban population (like knoema.com or worldbank.org).

5. Refer to Figures 3.8 and 3.9. Identify and categorise the major issues related to a high population density in Bangladesh's urban *regions*.

6. a. What evidence is there in Figures 3.8 and 3.9 to indicate that Bangladesh is a developing country?

   b. Suggest one strategy that could improve the quality of life for people in urban Bangladesh.

◀ **Figure 3.9**
High population density in Bangladesh

What is the nature of the population trend in Bangladesh?

The population of Bangladesh has increased by 2.5 times since independence in 1971. The population of Bangladesh was estimated by the Bangladesh Bureau of Statistics (BBS) to be over 168 million in 2020 and at current growth rates is predicted to increase to a peak of 192 million in 2053 before it begins to decline. The current population is a result of a growth rate that peaked at 3.3 per cent in 1967 and was still as high as 2.7 per cent in 1980. Currently it is estimated that the population of Bangladesh is growing at a rate of 1.01 per cent per year. Figure 3.10 shows the declining rate of growth of Bangladesh's population. This is the result of *changes* in birth rates (and therefore fertility rates), death rates and life expectancy. Although the rate of growth is declining, the total population continues to grow due to population momentum. Population momentum is described in more detail on page 91. The birth rate of Bangladesh is estimated to be 17.5 per 1000 and the death rate, 5.5 per 1000: the result is a natural increase of 12 per 1000. There is on average, one birth every 10 seconds and one death every 36 seconds so the total population continues to grow.

Bangladesh is broadly similar to other countries in the *region* in terms of natural increase in population. According to World Bank statistics, the current rate of growth in Bangladesh and India is 1 per cent per annum and in Myanmar, 0.6 per cent per annum. This is considerably lower than Pakistan where the growth rate is 2 per cent per annum. These neighbouring countries, however, all have a comparable downward trend in growth rates over time.

Changes in fertility rate

In 1971, the total fertility rate (TFR) in Bangladesh was around 7 children per woman. The United Nations now estimates that the fertility rate in Bangladesh is just under two children per woman (1.979). This significant decline can be seen in Figure 3.11. Currently the global average fertility rate is 2.5 babies per woman; thus Bangladesh is now less than the global average.

The government of Bangladesh has focussed on the need to decrease the fertility rate to slow the growth of population and as a consequence, the use of contraceptives is high (see Figure 3.11). A recent report indicates that 60 per cent of females use some form of contraception. The strategies to reduce the fertility rate are discussed later in this chapter.

Although Bangladesh's TFR is below replacement rate (2.1 children per woman), the total increase in the population reflects the number of females who are in their child-bearing years, a result of previous years of higher fertility. Therefore, even with the current low fertility rates, the total number of children being born is high as a result of population momentum.

▶ **Figure 3.10**
Population growth rates in Bangladesh
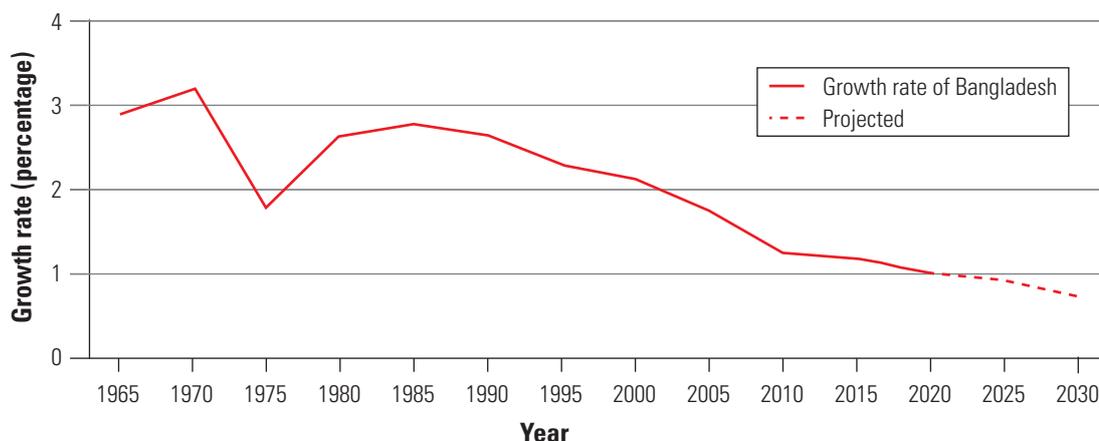
▶ **Figure 3.11**
Falling fertility rates in Bangladesh
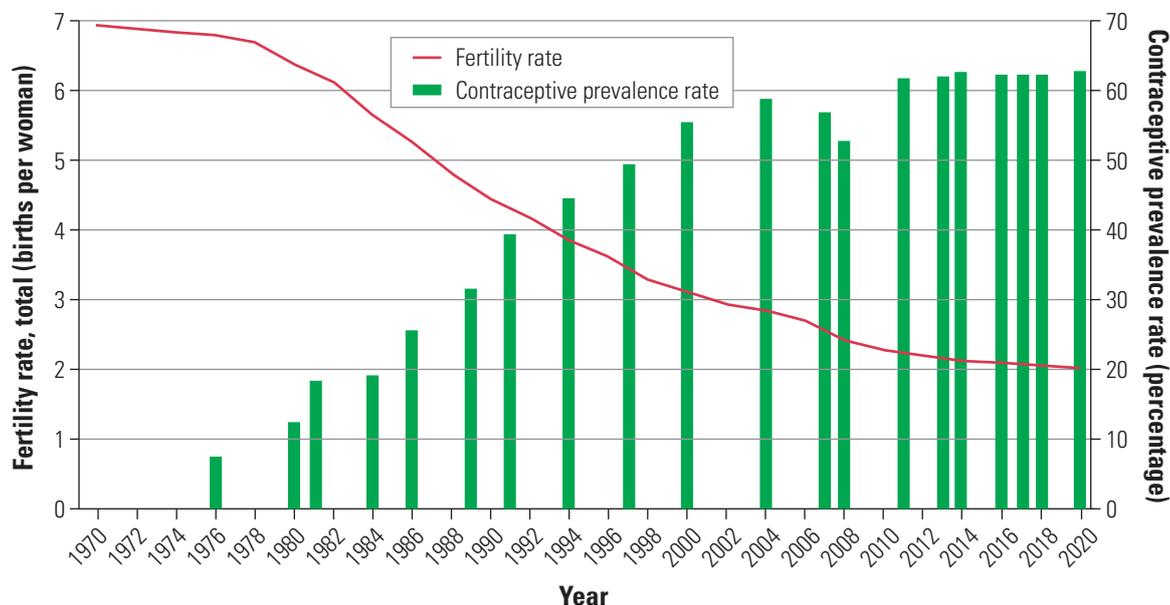
Changes in death rate and life expectancy

Figure 3.12 shows that life expectancy in Bangladesh is increasing. It has risen from 41.8 years in 1972 to 66.2 years in 2002 and by 2020 life expectancy had increased to 72.8 years. The current life expectancy is similar to the overall global average. In Bangladesh, males can expect to live to 71.2 years, while women live to 74.5 years on average.

This improving life expectancy reflects *changes* seen in the crude death rate which has fallen from 19.2 people per 1000 in 1972 to 5.1 people per 1000 by 2020 and is expected to keep falling. A lower death rate means that, on average, people live to a greater age. Lower death rates are explained by a range of factors such as improvements in living conditions including access to clean water and sanitation, as well as improved access to health services such as vaccinations. These factors have a positive impact across the population and are also reflected in decreasing infant and child mortality rates.

The Child Mortality Rate (CMR, number of deaths of children under five) for the world is 35 deaths per 1000 live births and Bangladesh has an under-five mortality rate of 31 per 1000 live births. As a comparison, Australia has a CMR of 5 per 1000 live births. Bangladesh has an Infant Mortality Rate (IMR, deaths of children under one year old) of 26 deaths per 1000 live births. By comparison, in Australia the IMR is 3.3 per 1000.

Infant and child mortality, shown in Figure 3.13, reflect a significant decreasing trend. The decline in these mortality rates, along with increased life expectancy, are the major factors that help to explain why Bangladesh has a growing population.
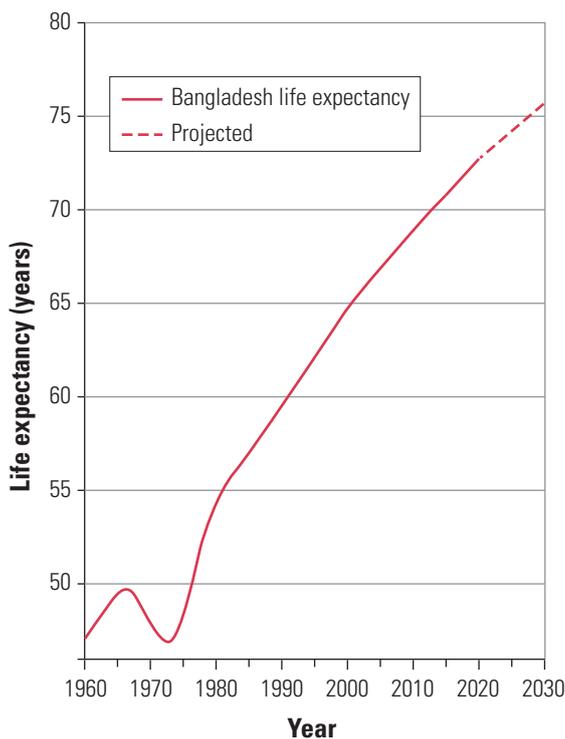
◀ **Figure 3.12** Life expectancy in Bangladesh
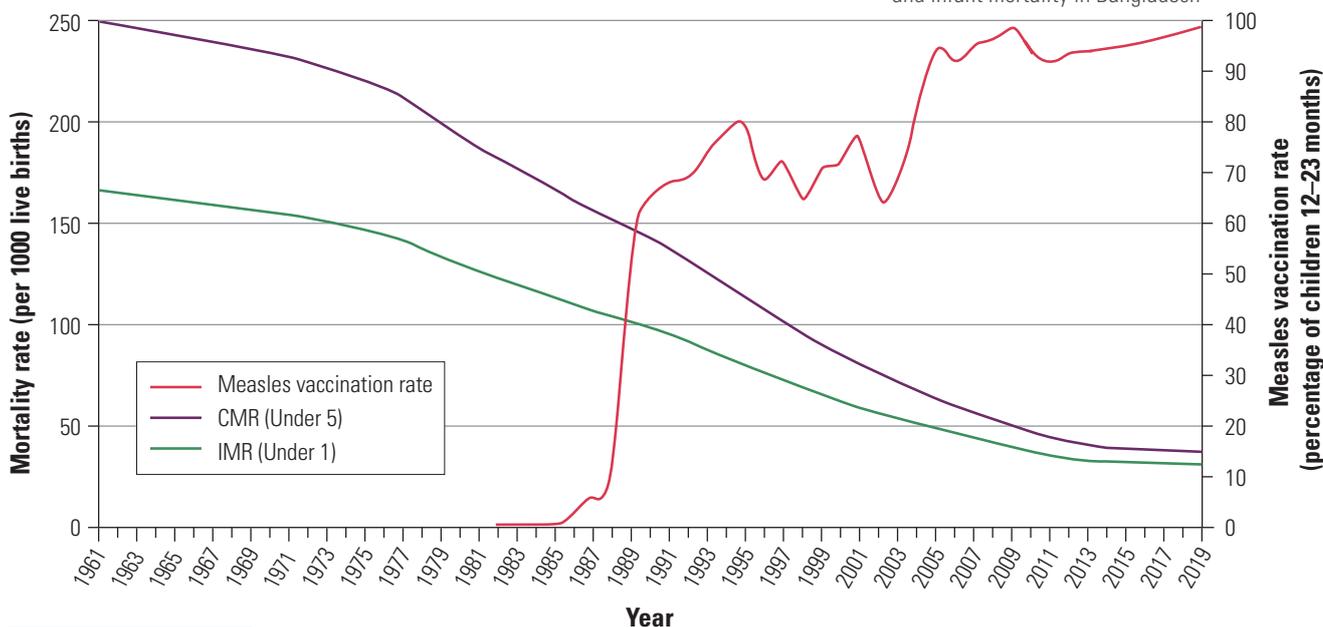
▼ **Figure 3.13** Rates of measles vaccinations, child mortality and infant mortality in Bangladesh

▶ ACTIVITIES

1. Refer to Figure 3.11.

   a. Describe the *change* in fertility rate from 1975 to 2020.

   b. Describe the *change* in contraceptive use for the same time period.

   c. Is the correlation between the two graphed lines positive or negative? Justify your answer.

   d. Suggest reasons to account for this relationship.

2. Explain the factors that cause life expectancy to increase over time.

3. Based on the trend shown in Figure 3.12, describe the future life expectancy in Bangladesh.

4. Refer to Figure 3.13.

   a. Describe the trends as shown in this diagram. Use data in your response.

   b. What impact do you think that the measles vaccination has had on child mortality rates over time?

5. Refer to Figure 1.10. Use this map to describe the location of Bangladesh in relation to other countries that have growing populations. How does Bangladesh compare to other countries in the *region* of South Asia in terms of the *scale* (rate and magnitude) of its growing population?
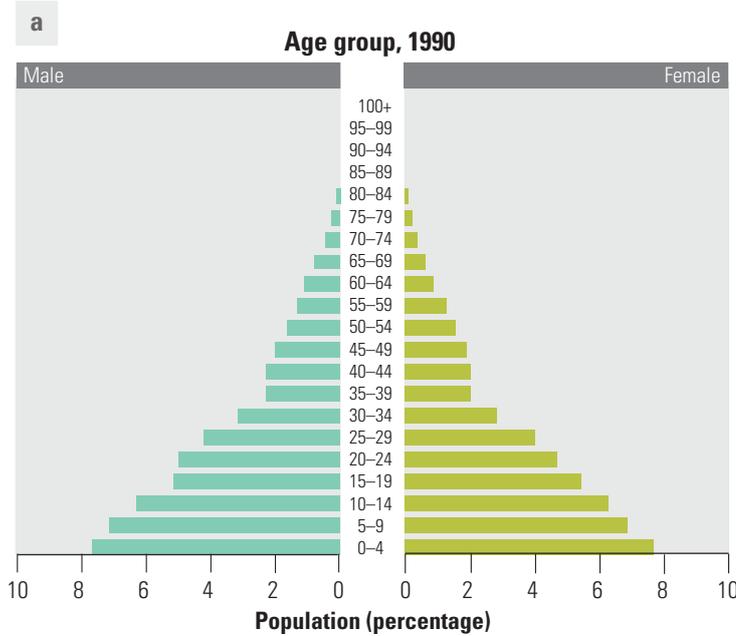
a

Age group, 1990

b

Age group, 2005

c
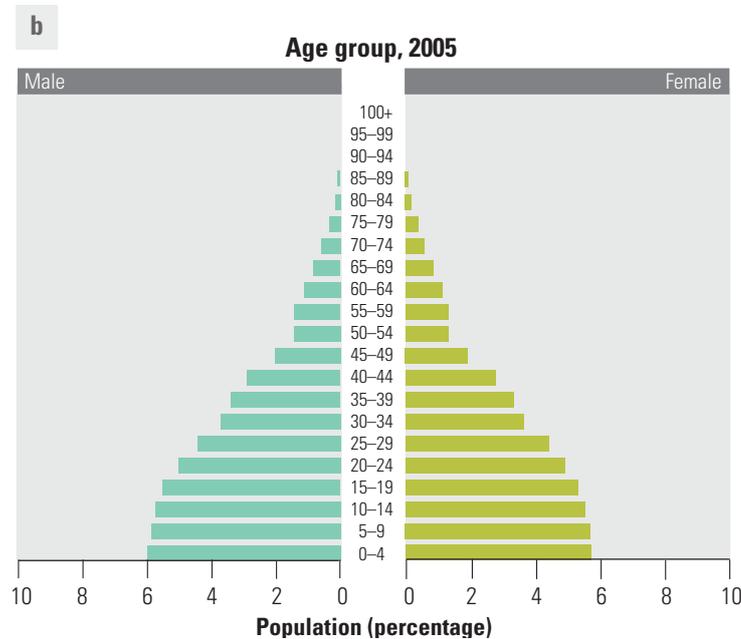
Age group, 2020
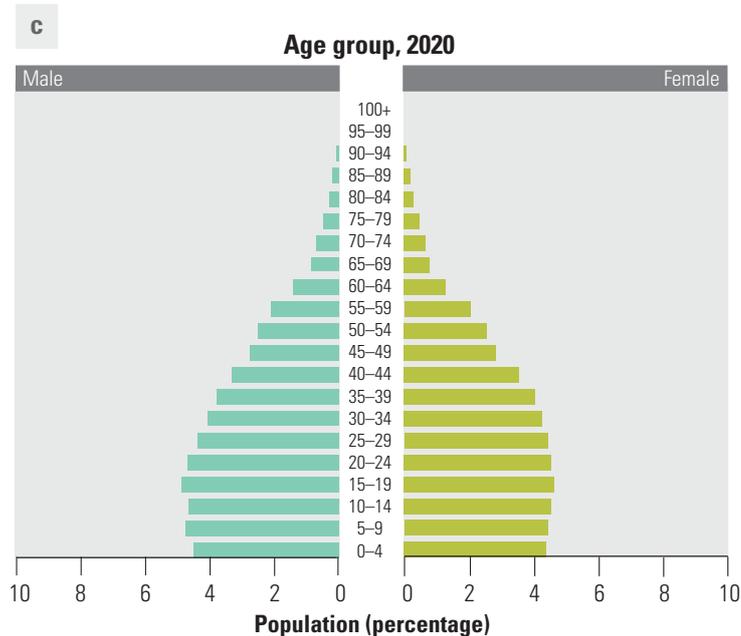
Bangladesh's population structure

Bangladesh is a young population with 27 per cent of the population younger than 15 years old and just over 5 per cent over the age of 65. Until 1990, a population structure diagram would have reflected the classic shape of a rapidly growing population. This is reflected in the population structure diagram for 1990 (see Figure 3.14 (a)). The population growth rate that had begun to slow in the 1980s and 1990s is reflected in the population structure diagram for 2005 (see Figure 3.14 (b)). It is evident that the base of the pyramid is beginning to narrow. By 2020 (see Figure 3.14 (c)) the structure of the population continues to reflect *changes* that are evident in the growth rate of the population of Bangladesh. In Figure 3.14 (c) it is evident that there is some narrowing in the base of the pyramid as each successive age cohort is smaller (showing a slowing of growth rates) and there is a widening at the apex of the pyramid (reflecting an increased life expectancy). The median age of the population of Bangladesh is currently 27 years.

▶ ACTIVITIES

1. Identify which age cohorts have the largest and smallest percentage, as seen in Figures 3.14 (a), 3.14 (b) and 3.14 (c).

2. Refer to Figures 3.14 (b) and 3.14 (c).

   a. Describe the *changes* that have occurred from 2005 to 2020 in each of the three major population groups: 0–14 years; 15–59 years; and over 60 years.

   b. Identify which cohort you think has undergone the greatest *change* over the 15 years shown in these diagrams.

3. Identify the characteristics of a growing population based on the population structure diagrams and what you know about growing populations.

4. Based on the trends shown, sketch a possible population structure for 2050 and explain why your structure appears as it does.

5. Search the internet for population pyramids of the world and Bangladesh. If you use populationpyramid.net, you can generate your own population pyramid of Bangladesh for any year you choose to research. Compare a world population pyramid to your chosen population pyramid of Bangladesh and discuss the similarities and differences that you find.

Factors contributing to population growth in Bangladesh

Social factors

Rapid population growth has been caused by high fertility rates and declining death rates although Figure 3.11 shows that fertility rates are decreasing, and the rate of population growth has slowed as a result (see Figure 3.10). Social factors affecting the growing trend include:

▶ the overall status of women. Traditionally women's role in society has been child-rearing, leading to high fertility rates. Recently the status of women has been improved, meaning more women are educated and have the option to work. Females are now staying at school longer and education levels are higher (see Figure 3.15).

▶ Early age of marriage causes high fertility rates. Currently, the legal marriage age for women is 18 years. This is currently under review – UNICEF noted in March 2021 that while there had been progress in reducing child marriage in Bangladesh, it is still in the top 10 countries in the world for child marriage rates. UNICEF also noted that the effects of school closures, economic stress, isolation from friends and parental deaths due to the COVID-19 pandemic have increased the likelihood of child marriage.
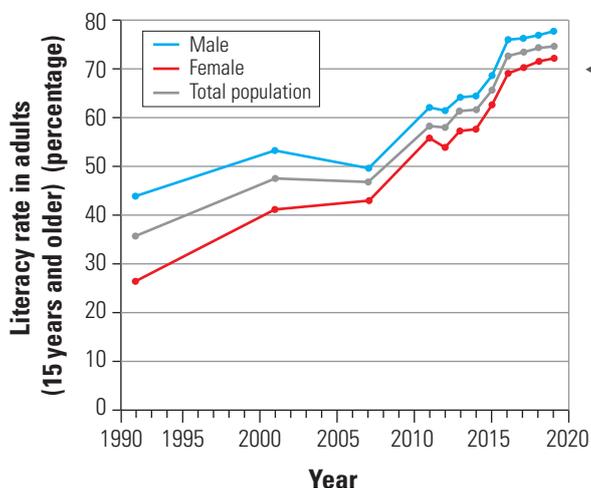
◀ **Figure 3.15**
Positive trend in education levels

The challenge for the government of Bangladesh is to ensure that the laws relating to marriage age are culturally accepted by the population and enforced by government agencies.

▶ Low levels of contraceptive use, although this is increasing due to greater cultural acceptance and support for females (see Figure 3.11).

▶ Vaccinations for children have increased resulting in a decrease in death rates. Vaccination rates have increased from a low of zero to an estimated close to 100 per cent of the under-five age group for the measles vaccine (see Figure 3.13). The *process* of achieving high vaccination rates has been aided by a cultural shift in attitudes.

Jane Bunn
Meteorologist, Seven News, Melbourne

In my work as a meteorologist and presenter, I analyse new weather model data and compare them with observations (and a little bit of gut instinct) to determine what is the most likely weather scenario. I then plan the best way to communicate this information to the public.

I studied a Bachelor of Science, Mathematics and Atmospheric Science at Monash University and then a Graduate Diploma of Meteorology with the Bureau of Meteorology. I apply a range of geography skills and knowledge in my work. It can be something as simple as looking out the window to see the first cirrus clouds ahead of a cool wind change – to scrutinising arrows on all the different weather models to determine exactly when that change will arrive and the impact it might have.

I was inspired to study Geography because I was always interested in the world around me,

CAREER PROFILE

particularly the weather. But after I went skiing for the first time, I was obsessed. I would spend hours finding out all the information about the next snowfall. Eventually my hobby turned into my career.

For geographers who have a keen interest in the weather, there are possibilities for careers in research, forecasting and the media. You could discover a new way to track the heat island effect of the city, and then tell everyone about it on the 6 PM news!

CHAPTER 3 ▲ Population trends and issues: growth in Bangladesh

- Pre-natal and neonatal care of women has improved significantly so that maternal mortality and neonatal mortality has also decreased. Fifty-nine per cent of births were assisted by a doctor or a skilled attendant. In 2014, this number was 20 per cent. This focus on the care of women is a feature of the *Progotir Pathey* (Road to Progress) report.

- High infant mortality rates result in higher fertility rates as families have more children in case some die. Figure 3.16 shows that, for various reasons, there was a strong correlation between higher child mortality rates and rural areas where people are poorer and have lower levels of education. CMR is lower in those *regions* of Bangladesh where people have greater access to urban facilities, a higher level of education and higher incomes.

Economic factors

Over time, Bangladesh has been able to improve its average income per person. Poverty tends to *interconnect* with high fertility rates as people in poverty tend to be less educated and may require children to help earn money and support the family. However, poverty rates are falling in Bangladesh.

In 1972 the Gross Domestic Product per capita was US$94; by 2000, it had risen to US$418 and was estimated to be approximately US$2000 in 2021. Women nowadays are able to find employment in the burgeoning textile industry, a result of the *process* of globalisation, and can make choices between employment and child-bearing, thus decreasing the fertility rate.

Large multinational companies have established factories nationally, employing many people. This *process* has led to an increase in the middle class with more money and more choices, resulting in a reduction in family sizes.

Political Factors

Political factors have been instrumental in *changing* the population growth rate of Bangladesh. After independence, the government's Five Year Plan began to implement policies relating to fertility levels, education and health, and more recently to encourage foreign investment.

It is evident that a government's priority is to improve the wellbeing of the population, and this, in turn, will impact its birth and death rates.

▼ **Figure 3.16** Under-5 mortality rates by background characteristics, Bangladesh 2012–2013
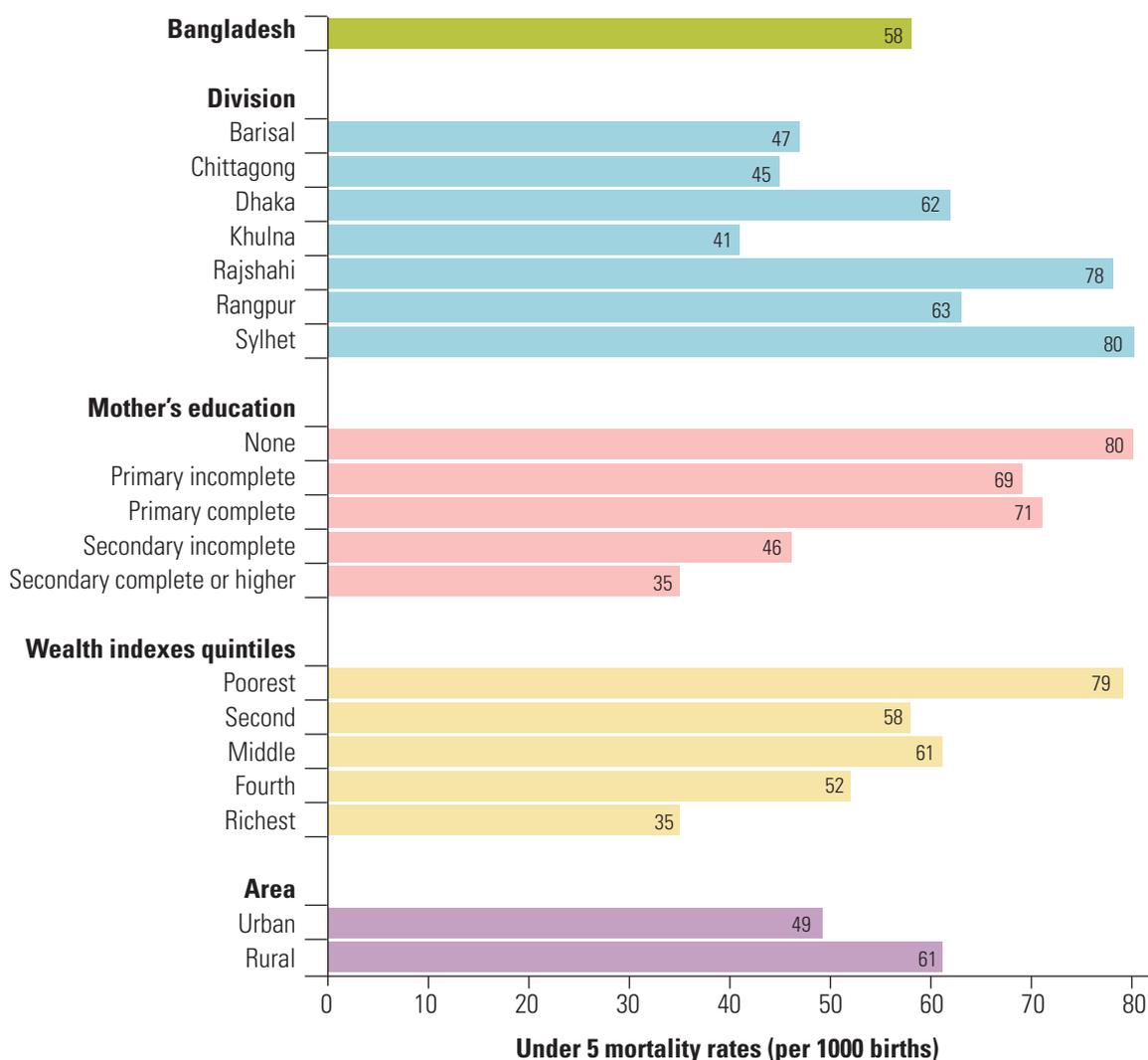
The Government of the People's Republic of Bangladesh and the Bangladesh Bureau of Statistics (BBS), together with the United Nations Children's Fund (UNICEF), conducted a Multiple Indicator Cluster Survey (MICS) in 2019 by sampling more than 60,000 households using a variety of indicators. Indicators used included health, nutrition, water facilities, sanitation, education, HIV awareness and access to Information and Communication Technology (ICT). A comprehensive report of the findings of this survey was published in 2019 in the *Progotir Pathey* (Road to Progress) report (Figure 3.17).

Improvements have been made in the areas of health, nutrition, water, sanitation and hygiene, education, and child protection since the last MICS in 2012–13. However, findings from the Bangladesh 2019 MICS show that more needs to be done if Bangladesh is to achieve its ambitious UN Sustainable Development Goals (SDGs) by 2030.

Figure 3.17
Progotir Pathey Bangladesh: Multiple Indicator Cluster Survey 2019

▶ ACTIVITIES

1. In small groups, discuss the issue of child marriage. Decide which social, economic, cultural and political factors have enabled this practice to continue over time.

2. a. How can Bangladesh bring about *change* to the acceptance of child marriage?

   b. Suggest strategies to facilitate the implementation of a policy to reduce child marriage.

   c. What impact will these strategies have on *changing* the population structure in the future?

3. Figure 3.15 shows a positive trend in education as reflected in literacy rates. Comment on this trend in relation to the increase in vaccination levels.

How does population *movement* contribute to structural *change* in population?

Emigration due to employment and study opportunities overseas has *changed* the structure of Bangladesh's population. There is a negative net migration in Bangladesh as there are more people who leave the country than arrive.

(a) Employment opportunities

This migration is difficult to report accurately as many residents leave the country as economic migrants heading to neighbouring countries in Asia and the Middle East, sometimes on a temporary basis. Countries that Bangladeshi workers *move* to include Saudi Arabia, the UAE, Oman, Qatar, Singapore, Bahrain, Jordan, Lebanon, Iraq and Mauritius.

It is estimated that seven million Bangladeshis are working overseas at any one time, contributing greatly to their families, communities and the country's economy through money being sent home as remittances.

The structure of the population is impacted by this *movement* as it is mainly young males who undertake these employment related journeys that leave rural villages and some urban areas with fewer males in the 20–40 age cohorts.

(b) Study

People view the opportunities overseas as a means of earning an income as there is a perception that life outside Bangladesh can be more beneficial in terms of earning an income. This psychological *distance* is also true for the well-educated graduates with estimates indicating that prior to the pandemic in 2020, over 5000 students travelled overseas annually to study medicine, engineering and teaching. As a result, up to 80 per cent of these people do not return to work in their country, thus contributing not only to a 'brain drain' within the country but also affecting the age and sex structure of the population.

What are the population issues and challenges in Bangladesh?

The population issues in Bangladesh are a result of the high fertility rates more than two decades ago, and these are exacerbated by increases in rural-to-urban migration, high population densities, natural hazards and the impacts of climate *change* on this small, low-lying country. While population growth has been reduced, fertility rates need to remain below replacement levels if the associated challenges are to be met successfully in the future.

1. Pressure on resources

A most significant issue for Bangladesh is the size of the population in a country of 144,000 square kilometres and the pressure this places on its natural and human resources. A population of 168 million people puts pressure on the *environment* in this predominantly agrarian country. With such a high population density and limitations due to *environmental* issues such as flooding, there is little capacity for expansion of agricultural land.

The challenge for Bangladesh is to provide food and adequate living conditions for the population. While the Green Revolution has provided new crops and improved techniques in agriculture, Bangladesh is at risk of reaching *unsustainable* levels of agricultural production. Growing two crops per year in some areas boosts the income of the poorer rural worker and provides additional food supplies. Fertilisers may improve yields but chemical additives to the soil can be expensive and there is the risk of *environmental* damage from the over-use of fertilisers. The challenge of providing food in a *sustainable* way for a growing population requires significant planning, and

Bangladesh lacks the technology and systems to do this on a large *scale*.

The effects of climate *change* further compounds this, with Bangladesh being at the forefront of the effects of sea level rise. In 2010, it was estimated that more than one million hectares of land had been seriously affected by salinity as a result of salt water inundation, reducing the long-term *sustainability* of the land. This phenomenon has resulted in many small-*scale* rice farmers selling their damaged farms to larger-*scale* shrimp farmers and moving to the larger cities in search of poorly paid jobs – thus increasing the slum populations. The increased frequency and intensity of cyclones will add an additional challenge to providing food for a growing population.

A further challenge lies in accommodating the thousands of refugees who have entered Bangladesh from Myanmar. In August 2017, hundreds of thousands of Rohingya Muslims left Myanmar due to persecution and violence. They fled across the border to Bangladesh where the majority of them were housed in the Kutapalong refugee camp that, with almost 600,000 occupants, has become one of the largest in the world. The refugees are not counted in the census as they are not citizens of Bangladesh, but a country with significant population issues is not well placed to deal with this influx of people. This *movement* of refugees became a significant crisis as they arrived exhausted, sick and hungry and in urgent need of humanitarian assistance. Despite enormous assistance from global aid agencies, the arrival of so many people puts a strain on Bangladesh's resources.

▲ **Figure 3.18** Loss of land due to flooding

2. Poor living conditions in urban areas

Bangladesh's population growth rate in urban areas is twice as fast as in rural *regions*. The search for better employment is the major attraction (or pull factor) for around 55 per cent of internal migrants who *move* to urban areas; a further 27 per cent migrate due to *environmental* reasons such as river erosion and soil salinity (push factors), as shown in Figure 3.18; and a further 10 per cent are known to migrate to reunite with family (pull factor).

The percentage of urban dwellers has been steadily increasing from 7.9 per cent in 1971 to the current estimate of 38.9 per cent (2021).

The increasing *movement* of people into urban areas affects the government's capacity to meet the challenges associated with having a growing urban population. This adds pressure to infrastructure in urban areas and is responsible for the development of slums as infrastructure cannot keep pace with the influx of people from rural areas. In the capital, Dhaka, more than one-third of the population lives in a slum area where there is overcrowding, insecure tenure of housing, higher rates of criminal and illegal activities and a lack of basic services such as access to clean water, sanitation and garbage disposal.

The growth of slums in Bangladesh's cities has seen the following issues associated with *place*:

▶ limited access to clean water. Two thirds of urban dwellers do not have piped water.

▶ sanitation (sewer connection) is unavailable to 80 per cent of urban dwellers.

▶ high levels of disease

▶ poor nutrition

▶ poor education attendance, with only 18 per cent of the eligible children attending school

▶ higher than average birth rates

▶ mortality rate of children under five years of age living in slums is nearly double the average urban rate and 50 per cent higher than the rural rate.

The challenge for the Bangladesh government is to improve living conditions in urban areas by ensuring access to safe water, education facilities, and the provision of infrastructure. The Urban Development Directorate (UDD) of Bangladesh aims to address urban issues by developing and implementing policies on urban development. Effective urban planning is required, along with an attempt to slow the pace of *movement* away from rural areas.

In addition, non-government organisations (NGOs) such as the Urban Partnerships for Poverty Reduction (UPPR) program which targets slum dwellers in 30 cities including Dhaka, WaterAid Bangladesh (WaSH) which addresses water, sanitation and hygiene in slums and the Coalition for the Urban Poor (CUP), all support community-based organisations in slum settlements (Figure 3.19). A lack of funding can present a challenge for NGOs such as these.

It has been estimated by the government Climate Change Strategy and Action Plan that more than 20 million people may be displaced if sea and salinity levels continue to rise over the next 50 years. These people would put further pressure on the larger cities as the *movement* of people becomes more large *scale* and there is a *change* to the overall population *distribution*.

3. Enhanced inequality

Social issues in Bangladesh include malnutrition among children, uneven provision of health services, poor drinking water supply and illiteracy among women.

Two examples that illustrate social inequalities and geographic differences are:

▶ In rural areas, 54 per cent of births have a skilled attendant compared to 73 per cent in urban areas.

▶ In rural areas, 29 per cent of children are considered to be underweight using a weight for age indicator compared to 23 per cent of children in urban areas.

These social issues will be further enhanced by population growth in Bangladesh.

The challenge is to identify areas of social inequality and to improve living conditions in all areas of health and education for the people of Bangladesh. In August 2014, the Bangladesh Bureau of Statistics (BBS), the World Bank and the World Food Programme (WFP) jointly published the *Poverty Maps of Bangladesh 2010* using data from the most recent (2011) census (see Figure 3.20). These maps have provided planning tools for the government and NGOs to identify poor areas more accurately and to understand the spatial inequalities of poverty indicators throughout Bangladesh.

According to the Multiple Indicator Cluster Survey summary already mentioned, the challenge of reducing inequalities is being addressed by the government of Bangladesh and a great deal of progress has been made

▶ **Figure 3.20**
Distribution of extreme poverty in Bangladesh, an example from *Poverty Maps of Bangladesh 2010,* published by Bangladesh Bureau of Statistics (BBS), World Bank and the World Food Programme (WFP)
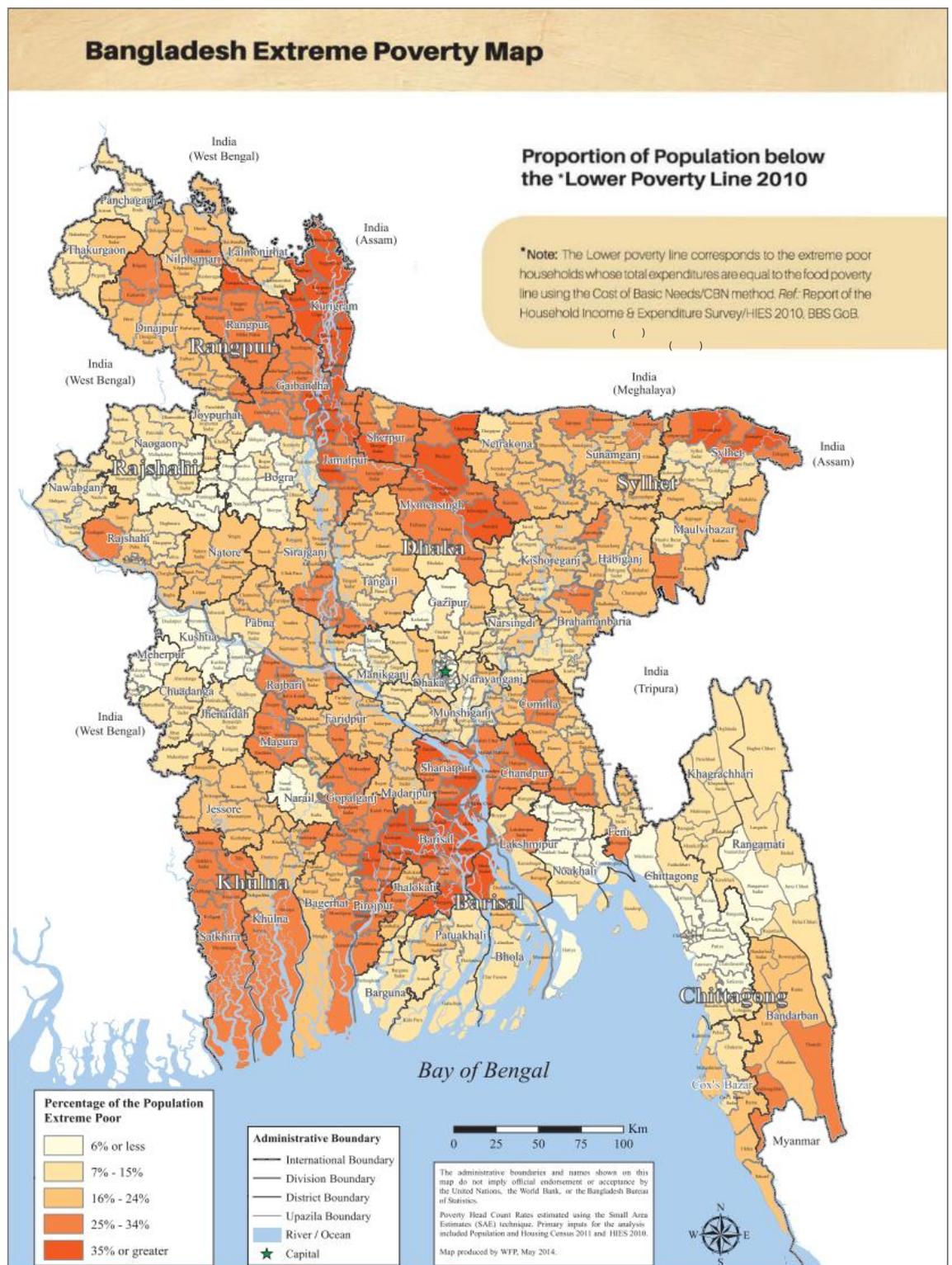
in improving children's lives between 2012 and 2019. Figure 3.15 illustrates the improvements in the literacy rate of population aged 15 and above. It has risen from 54 per cent for males and 40 per cent for females in 2000 to 74.7 per cent for males and 71.9 per cent for females in 2020. Figure 3.21 is further evidence of increasing education participation. Figures 3.21 (a) and 3.21 (b) show that there has been an increase in secondary education of females but only 20 per cent of females were enrolled in tertiary education in 2019, limiting the effectiveness of this strategy and presenting a further challenge for the government.

4. High Dependency Ratio

Bangladesh has almost 27 per cent of the population under 15 years old and just 5.2 per cent of the population over 65 years old. The total dependency ratio (a measure showing the number of dependents aged 0–14 and over 65, to every l00 working age people who are aged 15–64) is 47 in Bangladesh. The youth dependency ratio, meaning the number of people aged 0–14 years old who are dependent on 100 people in the working age group is 39. This high youth dependency ratio not only puts pressure on those of working age to provide resources such as food and shelter but there is also considerable pressure on the education system. UNICEF has noted that there is extreme overcrowding in schools and a lack of suitably qualified teachers. Other problems in schools include a lack of sanitation and the provision of facilities for children with disabilities. As a result, educational outcomes are limited, and the drop-out rate is high. Although 98 per cent of primary school age children are enrolled in school, the poor quality of education in Bangladesh means that many young workers lack the literacy skills to engage productively in a knowledge-based economy. The challenge for Bangladesh is to provide adequate education and training by improving all aspects of the education system.
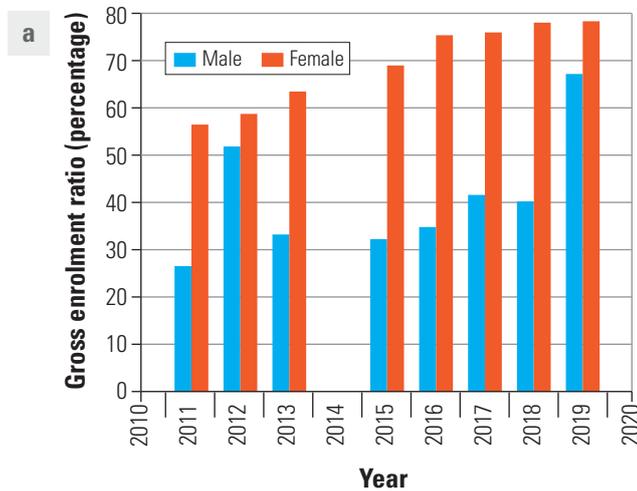
Figure 3.21
Changes in levels of participation in education.
(a) *Changes* in Secondary education levels
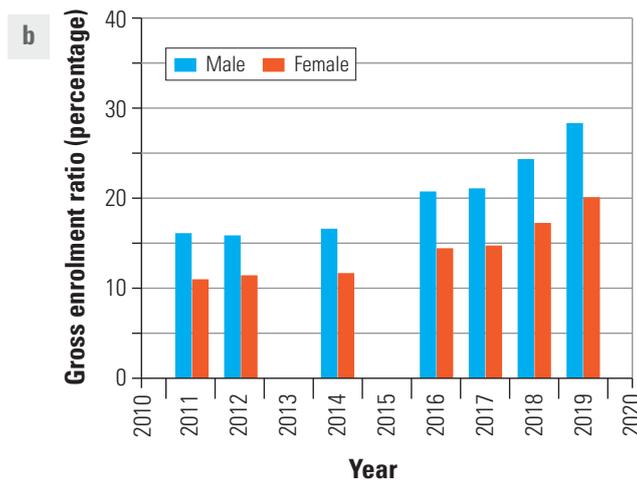
Figure 3.21
(b) *Changes* in Tertiary education levels

> ▶ **ACTIVITY**

1. Research the possible impact of climate *change* on Bangladesh. (A visit to the World Bank's report on *Bangladesh Disaster Risk and Climate Resilience Program* will provide some useful information). List the ways in which climate *change* may affect Bangladesh and its growing population.

What are the strategies in response to the issues and challenges?

Government sponsored family planning

The Matlab Project began in a specific local *region* in 1963. Matlab is a district 55 kilometres south-east of Dhaka. Initially a program to provide treatment for diarrhoeal diseases, the International Centre for Diarrhoeal Disease Research, Bangladesh, (ICDDR,B) later developed into a community based (local *scale*) maternal and child health and family planning (MCH-FP) program. This strategy involved advice from community workers (see Figure 3.22) to individual households and included the *distribution* of condoms and contraceptives (both oral and injectable) for females.

The Matlab Project found that families in communities where the program was implemented became wealthier and healthier than similar families who lived in other communities at the time the Matlab Project was begun. Contraceptive acceptance increased and the project expanded to more districts in Bangladesh in 1993 and has been a model also used by growing populations in other *regions* of the world.

▲ **Figure 3.22** Community workers discuss family planning

The Health and Demographic Surveillance System (HDSS) uses GIS technology to keep extensive records which, through evidence such as strong *spatial association*, demonstrate the positive effects of door-step services on contraception rate, vaccination coverage, fertility and death rates.

Lowering the fertility rate is seen as critical on a national *scale*. As a result, since 2018 the Family Planning Service employs women in villages to go door-to-door to promote the benefits of having only two children. The women, who themselves are mothers, offer advice, give moral support and offer women a range of suitable contraceptives. In 2020 the use of contraception was estimated by the World Bank to be over 60 per cent in Bangladesh and while the *distribution* pattern shows the use of contraception is uneven throughout the country, generally there is cultural acceptance of modern methods of contraception and widespread use. Contraceptive pills or injectables are most commonly used, but sterilisation, IUDs, implants, condoms and diaphragms are also available. Empowering women to make choices for themselves is seen as vital to the success of this strategy. In the 40 years of implementing this strategy, there has been an overall reduction in fertility rate from 7 to 2.5 children per woman.

The current population policy, formulated in October 2004, had a target of reaching replacement-level fertility of 2.1 by 2010, and to stabilise the population at 210 million around the year 2060.

Education for girls

The government sees the value in an increase in the current level of education for girls. An increase in the age at which girls have their first baby is also desirable as there are some *regions* in Bangladesh where up to 66 per cent of females have given birth to their first child before the age of 18. While the fertility rate is decreasing, a further reduction of the fertility rate is needed to make the population growth rate more *sustainable*.

To boost the achievability of this target, the government has implemented the following initiatives:

1. **Payment of cash incentives to families to keep girls in secondary level education**

The Female Secondary Stipend Assistance Program (FSSAP) was implemented in 1994 with the goal to increase female school enrolments. The program introduced a uniform stipend and tuition subsidy program for each girl attending a secondary school in rural areas. She was required to attend at least 75 per cent of school days, attain a minimum level of proficiency and remain unmarried. When a school participates in the program, all female students satisfying these criteria receive a specified stipend amount and other allowances, on a sliding scale for each year level, and the money is transferred directly to a bank account in the name of girls who attend the school.

The success of this program was assessed by the Asia Development Bank (ADB) in a report published in January 2021. The report states that the objectives of the FSSAP program were to (i) increase school enrolment among secondary-schooled girls, (ii) improve the secondary schooling completion rate for girls, and (iii) delay age at marriage for females. This program was well targeted and has been successful and it is seen to be cost effective and good value for the money that the government invests in it.

The ADB 2021 Report found that participation in the FASSP program increases a girl's schooling on average by more than three years, and secondary school completion by over 5 percentage points. The FSSAP is also found to affect social outcomes such as age at marriage, female's self- and nonfarm employment, spouses' education, labour force participation status, and contraceptive use and fertility.

It is evident that there has been an increase in the criterion of enrolment of girls in each year since 1994 (see Figures 3.21 (a) and 3.21 (b)). Girls now outnumber boys at secondary level.

On the criterion of age of marriage, the report noted that on average, the age of marriage has increased by one year since the FSSAP was introduced. Another report suggests that women who have completed secondary or higher education marry, on average, five years later than those with no education.

The *Dhaka Tribune* also reported in March 2021 that the FSSAP, which pays a stipend to 2 million girls per year, has been very successful in increasing female enrolments and deterring early marriage.

2. **Implementation of the Secondary Education Development Project (SEDP)**

This is a five year project (2017–22) funded by the government and supported by development partners such as the World Bank, other banks and UN agencies. The purpose of the SEDP is to achieve a more efficient, equitable, inclusive and quality secondary education system. It has a broad range of goals to target the quality of education and implement curriculum reforms. Included among those goals is the improvement of education for girls. In 2017, a report (Gender and Adolescence: Global Evidence (GAGE)) noted that only 12 per cent of girls had access to gender specific toilet facilities with soap and water, and only 3 per cent had access to sanitary pad disposal bins. Conditions such as this are a dis-incentive to adolescent girls to attend school so the SEDP attempts to ensure that there are separate toilet facilities for girls and also that there is improved knowledge about family planning, sexual and reproductive health and gender equality.

Other strategies to decrease the fertility rate and complement the education for girls include:

▶ Increasing employment opportunities for women, particularly in the textile industry.
▶ Reducing the incidence of child marriage by encouraging cultural *change*.

1. Evaluate the effectiveness of the current policy and strategies to reduce the overall fertility rate.

2. In what way, or ways, has the Matlab Project been successful?

3. What population strategy do you think has been the most effective and why?

4. Regarding the government strategies to increase uptake of family planning, which groups of people may be resistant to *change* and why?

5. At which *scale*, local or national, do you think the policy *changes* have been more effective? Justify your choice.

What is the role of geospatial technologies in developing and implementing strategies?

Health and Demographic Surveillance System

The extensive use of geospatial technology has been a key to the success of the maternal and child health and family planning (MCH-FP) program in controlling fertility, thereby addressing the growth of the population, and improving maternal, perinatal and child survival in a challenging *environment*.

The Matlab HDSS (Health and Demographic Surveillance System) has recorded births, deaths, migrations, marriages and divorces as well as maternal and child health information at a local *scale*. Field data is collated in local areas and exported to the digital database in Dhaka for longitudinal matching. Indicators such as fertility, age at marriage, population structure, mortality, cause of death, life expectancy at birth and population *movement* are recorded in individual Upazilas (local government sub-districts). This information is mapped and used as a basis for government and non-government agencies to continue to implement population strategies. From the HDSS routine annual reports, demographic trends in terms of *change* in population indicators can be monitored over the long term and used as a reference for health service planning and delivery.

Continuous updates of the database with individual-level information, in a geographically well-defined population, allows researchers to accurately assess populations at risk, compute rates at any point in time and test health, social and economic interventions.

As a result of the HDSS data, and the continuing success of the Matlab Project, fertility in Bangladesh has been reduced (Figure 3.11), maternal and perinatal survival has improved, female education is increasing (Figures 3.21 (a) and 3.21 (b)) and vaccination rates have increased (Figure 3.13).

Multiple Indicator Cluster Survey

Policy planning at a national level is dependent on geospatial data that is provided by the Multiple Indicator Cluster Survey (MICS). Sophisticated UNICEF software is used to collate and analyse data and to produce comprehensive tables, graphs and maps.

The MICS collects data using trained fieldwork teams to conduct face-to-face interviews in households. These periodic surveys inform government and non-government agencies of the success of a variety of programs in Bangladesh and are used as a basis for government reports. This data is vital in the measurement and quantification of the success of programs which target issues such as the use of contraceptives, fertility rates, maternal and early childhood programs and the achievement of UN Sustainable Development Goals (SDGs). Without the MICS, the improvements in demographic indicators which target the issues of a growing population would not be evident.

The report also identified that while 91 per cent of women surveyed use a mobile phone, only 37 per cent have access to the internet and just 14 per cent of women surveyed have used the internet. Sixty-seven per cent of women surveyed watch television but the percentage of women reading newspapers is very low. The use of technology to access data and disseminate information will therefore continue to be a challenge to the implementation of some programs until there is a wider use of technology in Bangladesh.

Improvement in living conditions as a response to high population density

Geographic Information Systems (GIS) are also used in integrated urban planning to better coordinate public infrastructure and services, and to regulate activities such as businesses.

Natural hazards and disasters

There are ample opportunities for geospatial technology implementation to improve the prediction, mitigation of, and adaptation to, natural hazards and disasters at various *scales*, from localised to *regional* and national *scale* erosion, soil salinisation, landslides and flooding (for example reliefweb.int). These are being incorporated into planning at local, *regional* and national government levels in Bangladesh. Government authorities are also increasingly using GIS systems to manage data, and make better decisions regarding the incidence of disease and provision of health care services in the growing population.

Population trends and issues: growth in Saudi Arabia

Saudi Arabia, officially known as the Kingdom of Saudi Arabia, has one of the fastest growing populations in the world and its population has more than tripled since 1980. The greatest contribution to this growth is migrant workers from countries such as India and Pakistan. Along with rapid population growth, *unsustainable* urbanisation, an uneven population *distribution* and a workforce dominated by foreign labour are causing a range of population issues and management challenges which Saudi Arabia is striving to overcome.

What are the geographic characteristics of Saudi Arabia?

Saudi Arabia is located on the Arabian Peninsula in the Middle East. Spanning 2,149,690 square kilometres, it is the largest country by land area within the *region* and the thirteenth largest in the world (see Figure 4.1). Its climate is harsh with average summer temperatures of 45°C and inland temperatures reaching up to 55°C. Desert-like arid conditions cover 95 per cent of the land, in which there are no rivers. The average annual rainfall is only 70 millimetres, with much of the country receiving even less. A lack of productive land limits agricultural production meaning that most food needs to be imported. Water for drinking is mostly generated using desalination plants or by utilising groundwater aquifers. These *environmental* factors strongly influence the *distribution* of the population.

Saudi Arabia is ruled by a royal family whose rule is based on teachings from the Islamic religion. Although the Kingdom of Saudi Arabia was only founded relatively recently, in 1932, it has a very rich history as the birthplace of Islam. Hejaz is a *region* in the western highlands containing Islam's holiest cities, Mecca (Figure 4.2) and Medina. This makes Saudi Arabia a major hub for international population *movement* with over seven million pilgrims visiting annually.

Saudi Arabia's economy is dominated by petroleum production and export. Oil fields to the east along the Persian Gulf contain more oil than any other country and around one-fifth of the world's known reserves. This resource has brought great wealth, a pull factor attracting foreign workers into the country and *interconnecting* Saudi Arabia with many *places* across the world.

▶ **Figure 4.1**
Regional location of Saudi Arabia, showing main settlements

What are the population characteristics of Saudi Arabia?

The population of Saudi Arabia reached 35 million during March 2021, a growth of 10 million since 2006. Over 60 per cent of the population, 21 million people, are Saudi nationals while the remaining are immigrants. Of these immigrants, 10.2 million are foreign workers. While 90 per cent of Saudi Arabia's population are of Arab ethnicity, 10 per cent are Afro-Asians, people of mixed Asian and African ethnicity. Overall, Saudi Arabia's population is small in comparison to its land size – the population density in 2020 was 16.19 people per square kilometre (see Figure 4.3). The *movement* of people from a tribal and nomadic rural culture to an urban lifestyle within Saudi Arabia has grown at an unprecedented rate. Figure 4.5 shows that the urban population has increased from just under 50 per cent in 1970 to 84.3 per cent in 2020. With an average annual urbanisation rate of 2.17 per cent from 2015 to 2020, the United Nations projects that 86 per cent of Saudi Arabia's population will be living

▲ **Figure 4.2** Densely populated Mecca, Saudi Arabia
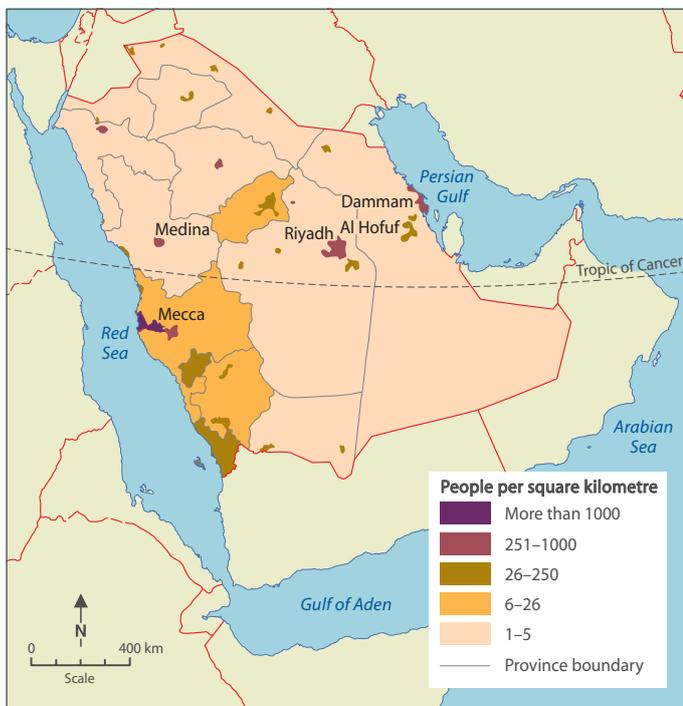
▲ **Figure 4.3** Population density of Saudi Arabia
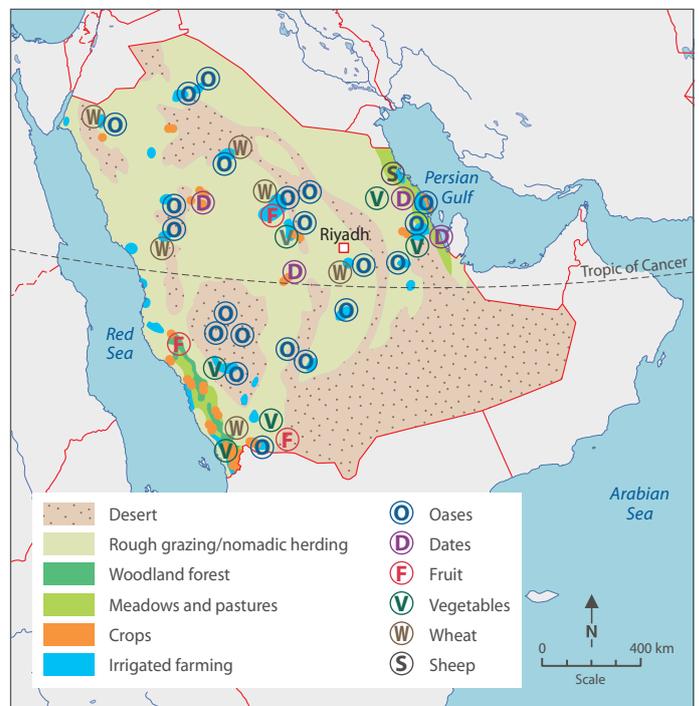
▲ **Figure 4.4** Land uses in Saudi Arabia

▼ **Figure 4.5** The rate of urbanisation in Saudi Arabia from 1960 to 2020
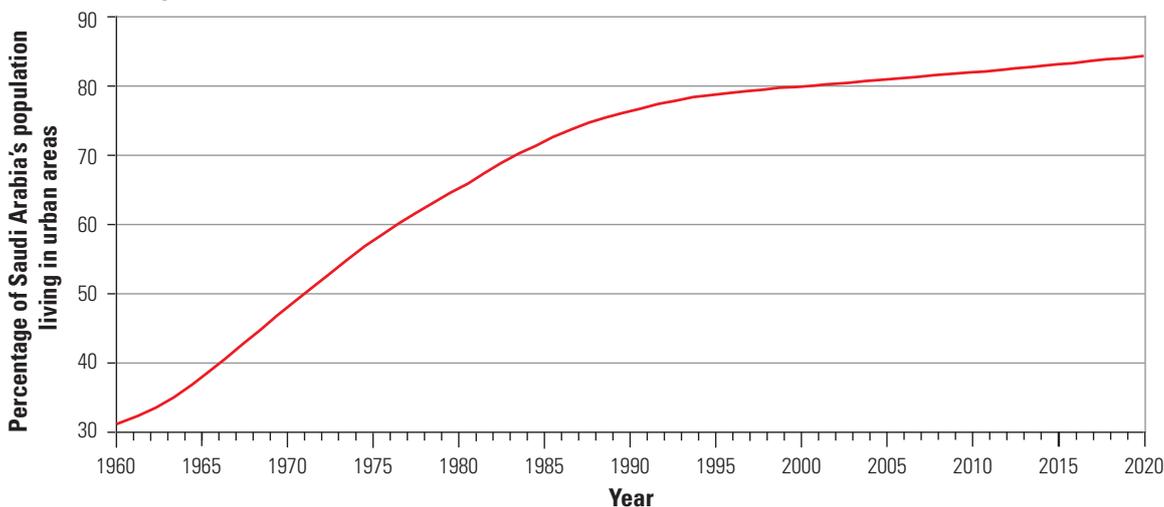
in urban areas by 2030 and up to 90 per cent by 2050, adding to the uneven population *distribution*.

Riyadh is the capital of Saudi Arabia and is a *place* of great national, archaeological and historical significance. With a population of 7.7 million, it is also the largest city in the country (Figure 4.6 (a)) accounting for 22 per cent of the total population. Riyadh is located centrally on a sedimentary plateau 600 metres above sea level. It has a very dry climate with limited rainfall (Figure 4.6 (b)). However, it has a reliable underground water supply making it one of the few naturally fertile areas in the kingdom outside the south-west, as seen in Figure 4.4.

▼ **Figure 4.6** A comparison of Riyadh's **(a)** urban and **(b)** desert landscapes

Lara Bowlt
Graduate Geologist

I think my childhood experiences of camping and exploring in the African bush, and seeing the interrelationships between people and the environment spurred me on to study Geography. This interest, coupled with an enthusiastic teacher, meant that Geography was my favourite and best subject at school. I completed my Bachelor of Science Advanced (Honours) at Monash University, where amongst others I studied Geography-specific units: global challenge, natural hazards and human vulnerability, and geographical analysis.

I work for a small gold exploration company based in the Central Desert, Northern Territory. During the field season, April to November, I work a two-week fieldwork/two-week office work (Perth-based) roster. Our team aims to make a gold discovery in a region which is one of the final frontiers for gold discovery and where we believe further world-class deposits remain to be found. A day in the office often involves prospect generation and desktop mapping/ basement interpretation, while on-ground mapping, rock sampling and drilling is conducted in the field.

My Geography skills are put to use on a daily basis. I use GIS software (MapInfo) to view, interpret and create maps. This software relies on multiple datasets including geophysics, satellite imagery, historic geological and topographic maps, geochemical datasets and tenement/sacred site

CAREER PROFILE

boundaries. Using MapInfo helps me to look at the spatial associations between different key features to determine which areas may be prospective for gold. For example, there appears to be a spatial association between elevated gold and particular stratigraphic (rock layering) units. I also use navigational skills when mapping and access bushfire and weather databases prior to fieldwork to assess risks. I am currently being introduced to social and environmental regulations that guide our work programs. I work with four other geologists, two environmental advisors and a tenement manager.

Geographers working as "economic" geologists can specialise in the fields of exploration geology (like me), mine geology, or academia and research. I love my job as I get to work outdoors and visit remote and beautiful parts of Australia, a privilege granted to very few people.

▼ **Figure 4.7** Traditional Bedouin Arabs

▼ **Figure 4.8** Typical housing in Saudi Arabia

The traditional lifestyle of the Bedouin Arabs is chosen by more than one million Saudi Arabians. Tradition dictates that the lifestyle of their ancestors is important and one that promotes the *sustainability* of the land. To reduce their impact on the *environment* and to obtain adequate resources in marginal desert *regions*, Bedouins *move* around rural areas with their herds following the seasonal growth of pastures. They live in tents and live a subsistence life off the land as much as possible (as seen in Figure 4.7). Many of these families may own houses in towns (Figure 4.8) but prefer to live the life of a nomad. The number of people practising this traditional lifestyle is decreasing due to the large-*scale movement* of people to settle more permanently in urban *regions,* in part because of government policy as well as from personal choice.

In 2019, Saudi Arabia's Human Development Index (HDI) ranking was 40 out of 189 countries. This indicates that Saudi Arabia has a higher standard of living compared to neighbouring countries such as Oman, ranked 60th, and Yemen, ranked 179th, and a lower standard of living compared to Australia, ranked 8th. Its HDI value of 0.854 puts it in the category of countries with very high levels of development, above the average of 0.703 for other Arab countries. The HDI is a ranking based on life expectancy at birth, mean years of schooling, expected years of schooling and gross national income per capita. Thus, Saudi Arabia is seen to be making good progress in relation to these indicators of development compared to other Middle Eastern countries but there is room for further improvement.

▶ ACTIVITIES

1. Describe the location of Saudi Arabia within its *regional* context.
2. Describe the relative location of Riyadh, the capital of Saudi Arabia, as seen in Figure 4.1.
3. Summarise Saudi Arabia's population characteristics using a series of dot points.
4. Refer to Figures 4.3 and 4.4.
    a. Describe the population *distribution* in Saudi Arabia.
    b. Describe the *distribution* of oases in Saudi Arabia.
    c. Based on this information, describe the degree of *spatial association* between population density and oases in Saudi Arabia.
5. Discuss the extent to which Saudi Arabia's geographic characteristics determine its population *distribution*.
6. Refer to Figure 4.7.
    a. Outline the major population issues faced by the traditional Bedouin.
    b. What difficulties might these traditional people encounter if they wish to *move* to urban areas in the future?
7. Explain whether or not urbanisation in Saudi Arabia is significant and suggest a factor contributing to its increase.
8. Read the latest Human Development Report for Saudi Arabia and summarise areas in which Saudi Arabia has improved and declined in its level of development.

What is the nature of the population trend in Saudi Arabia?

Saudi Arabia's population has grown significantly over time. In 1950, a census was held within the country and the population was recorded at 3,121,000. By the end of 2020, Saudi Arabia's population was estimated to be 34.8 million (see Figure 4.9). Growth has begun to slow from an annual growth rate of 2.95 per cent in 2015 to 1.59 per cent in 2020. Despite this decline in population growth rate, it is projected that Saudi Arabia's population will reach 39 million by 2030 and 45 million by 2050 followed by a period of stabilisation and decline as the population ages.

An increase in life expectancy is one of the major factors contributing to Saudi Arabia's growth. In 1960, the average life expectancy was 45.6 years compared with 75.2 years in 2020 (see Figure 4.10). This is projected to keep increasing to over 80 years by 2040. The increase in life expectancy is correlated with a decrease in the crude death rate. In 1960 the crude death rate (Figure 4.11) was at a high of 21 deaths per 1000 people, dropping to around 3.7 in 2000 and remaining relatively stable with a slight decrease to 3.5 in 2020.

One of the major factors linking both an increase in life expectancy and decrease in the crude death rate is a drastic reduction in the infant mortality rate. In 1970, around 110 out of every 1000 babies born died before their first birthday. This ratio fell significantly to less than 20 deaths per 1000 live births in 2000 and continued to around 6 deaths in 2020. It is expected to continue to decrease to around 4 deaths by 2050. This reduction is largely due to the Integrated Health Care Program implemented by the United Nations Development Programme (UNDP) which related to Millennium Development Goal 4, now part of Sustainable Development Goal 3. This program provides continuous monitoring of the health of children until the age of five using a health record system that covers registration of all health visits and follow-up stages during the natal and post-natal stage. Activities to control childhood diseases by promoting increased vaccination levels are being used with great success with the rate of vaccination for children under five rising to 98 per cent. Primary healthcare services within Saudi Arabia have also improved greatly in all population centres.

A reduction in infant mortality rate is often associated with a reduction in the total fertility rate because many parents decide to have fewer children if they think more of their babies will survive through childhood. This has certainly been the case in Saudi Arabia. Figure 4.12 shows a reduction in the total fertility rate from 7.2 babies born per woman in 1980 to 4.1 babies in 2000 and 2.24 babies in 2020 where it is expected to remain relatively stable for at least the next decade. The crude birth rate has also reduced from 37.47 births per 1000 people in 2000 to 14.7 in 2020. Despite this

▼ **Figure 4.9** Population growth of Saudi Arabia
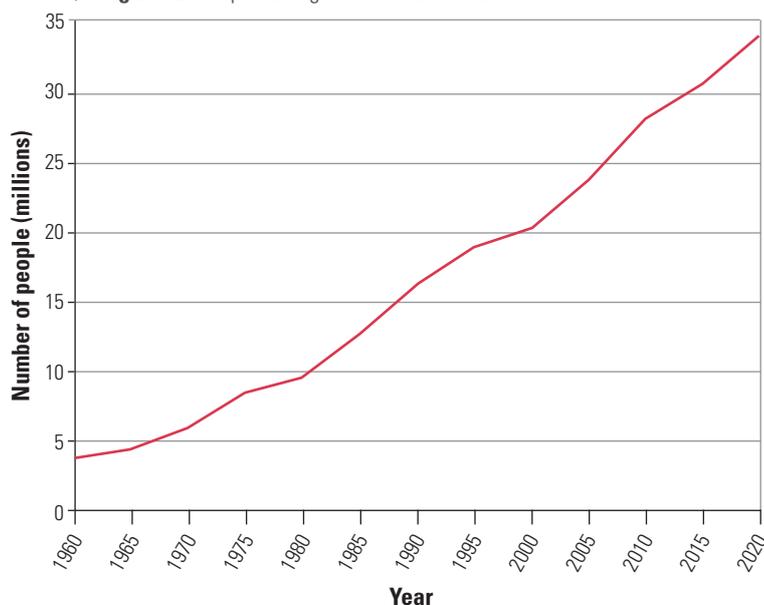
▶ **Figure 4.10** Life expectancy in Saudi Arabia
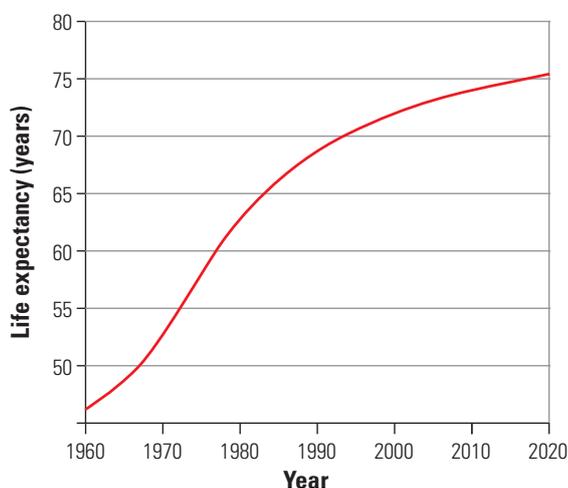
▶ **Figure 4.11** Crude death rate in Saudi Arabia
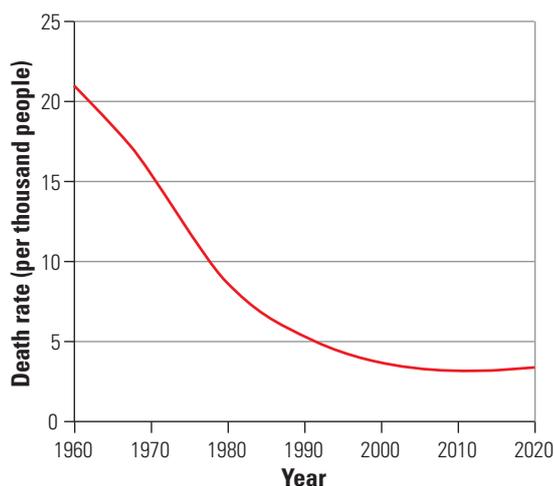
▼ **Figure 4.12** Total fertility rate in Saudi Arabia

Figure 4.13 Literacy rate in Saudi Arabia

Figure 4.14 Saudi Arabia's *changing* population structure (a) 2000, (b) 2020 and (c) 2030 (projected)
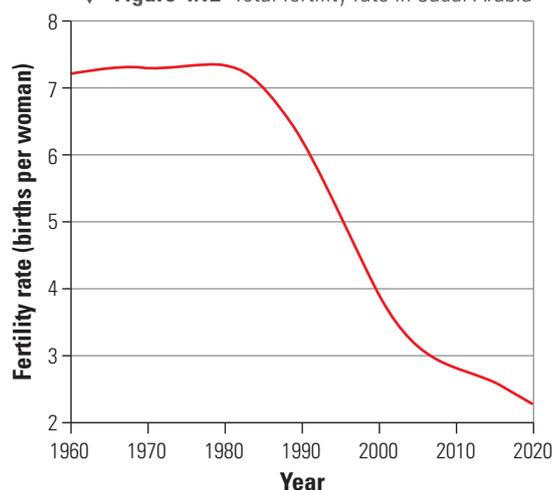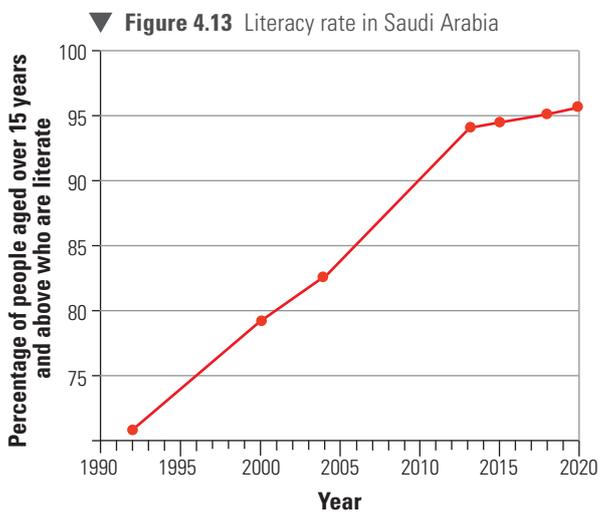
drop in the birth rate, Saudi Arabia is still experiencing a large natural increase with 585,170 births in 2020 compared with 123,170 deaths.

The level of education, especially amongst women, is another major factor influencing the reduction in the total fertility rate. As shown in Figure 4.13, the literacy rate in Saudi Arabia is improving. Approximately 97.6 per cent of the population aged 15 and over is literate, with the male population at around 98.6 per cent and the female population at around 96.1 per cent. With improvement in the female literacy rate over time, women are more empowered to make independent and informative choices in terms of taking advantage of career opportunities. This has led to an increase in the age that women choose to marry and a reduction in the number of children they choose to have. The use of contraception is also more prevalent among educated and employed women who wish to control the spacing between pregnancies. However, although contraception is providing women with more control over their pregnancies, cultural beliefs tied to the Islamic religion mean that many still desire large families of between five and ten children, reducing the impact that contraception has on the total fertility rate.

Changes in births, deaths and life expectancy have contributed to a *change* in Saudi Arabia's population structure. Figure 4.14 (a) shows that Saudi Arabia had a predominantly young population in 2000. Besides a significant bulge in middle-aged male cohorts, the structure follows a triangular (pyramid) shape, tapering inwards with only a small proportion in the 65 and over age categories. Figure 4.14 (b) shows that by 2020, the base of the structure had narrowed considerably, creating a more consistent structure in the 0–29 cohorts. The population is still quite young with 38 per cent of the population under the age of 25. By 2030, Figure 4.14 (c), the base of the structure is expected to continue to narrow while the middle cohorts will become more consistent. The population will age, represented by an expansion in the 65 and over cohorts.
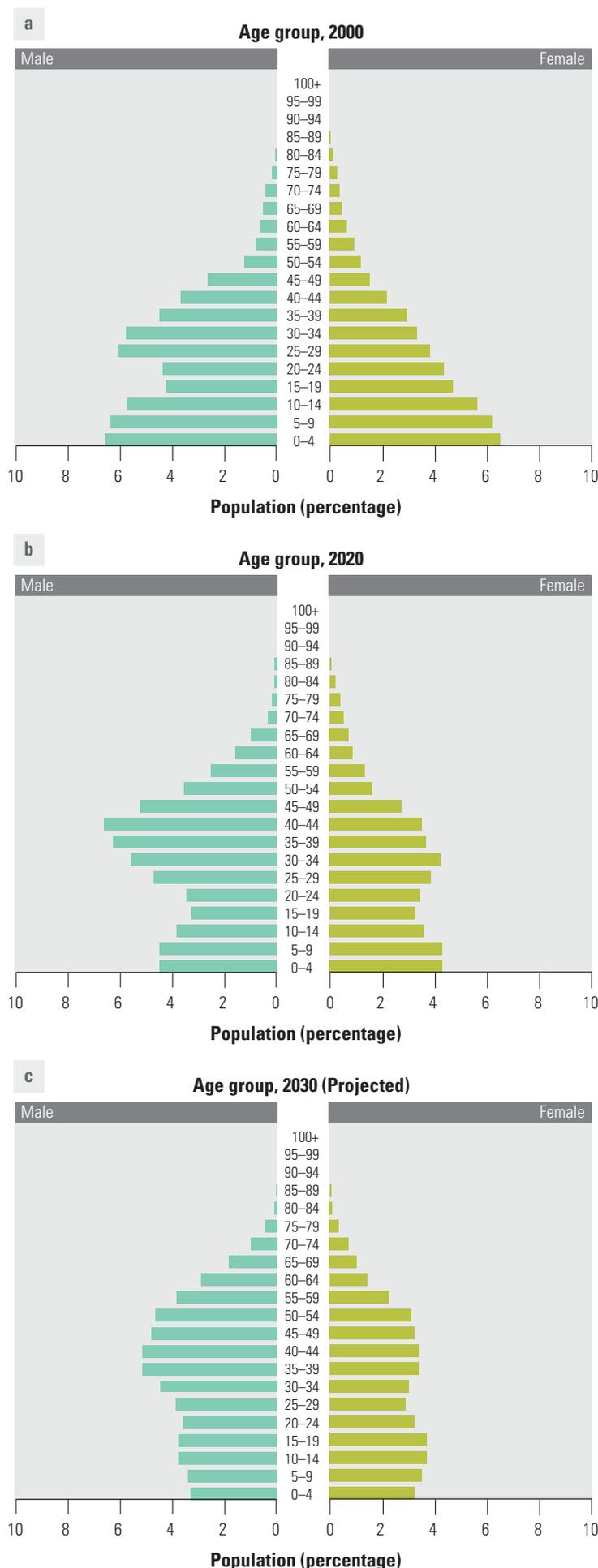
1. Using Figure 4.9 and the statistics within the text, outline and quantify the trend in the growth of Saudi Arabia's population from 1960 to 2020.

2. a. Choose one of the line graphs presented in Figures 4.9 to 4.13 and describe the trend including the overall *change* and reference to *changes* in the rate of growth or decline throughout various periods.

   b. Outline a factor responsible for the trend described in part a.

3. Summarise the reasons for recent *changes* to Saudi Arabia's population by referring to life expectancy, death rates, birth rates and fertility rates.

4. Compare the relative importance of three factors that have influenced Saudi Arabia's population dynamics.

5. Outline the *interconnection* between various causes of population growth in Saudi Arabia by referring to the correlations between the data presented in Figures 4.9 to 4.13.

6. Visit the Gapminder website and open the tools page.

   a. Explore the correlation between variables such as life expectancy, fertility rates, population density, child mortality and education.

   b. Observe the *change* in Saudi Arabia's population dynamics over time.

   c. Compare Saudi Arabia's population characteristics to other countries within the same *region*.

7. Refer to Figures 4.14 (a), 4.14 (b) and 4.14 (c).

   a. Describe each of the three population pyramids including their shape and the cohorts with the largest and smallest percentages.

   b. The first two pyramids show a sharp tapering in the 65 and over age cohorts. What does this represent?

   c. Describe the *changes* that have occurred from 2000 to 2020 and the projected future *changes*. Refer to the three major population cohorts: 0–14 years; 15–59 years; and 65 and over. Suggest reasons to account for this *change*.

   d. Which features of Figures 4.14 (a) and 4.14 (b) indicate that Saudi Arabia's population is growing?

   e. Which features indicate that this growth is likely to slow by 2030?

   f. Using your knowledge of the Demographic Transition Model (see Chapter 1, pages 23–25) and Saudi Arabia's population characteristics, state the stage that applies to each of the population pyramids. Justify your choice.

8. Suggest two reasons why Saudi Arabia's population continues to grow despite having a fertility rate that is below the replacement rate.

How does population *movement* contribute to structural *change* in population?

Immigration, particularly in the form of foreign workers, is a major factor contributing to Saudi Arabia's population growth. The United Nations World Migration Report 2022 ranked Saudi Arabia third behind the United States and Germany based on the number of resident migrants. During 2017, Saudi Arabia hosted around 12 million foreign workers. However, by 2019 nearly 2 million migrants had left due to new taxes introduced for foreign employees and declining economic conditions fuelled by the reduction in the price of oil and therefore declining revenue from oil exports. The social and economic impacts of the COVID-19 pandemic led to a further exodus of migrant workers throughout 2020, especially those working in hospitality, retail, accommodation and administration. By January 2021, around 10.2 million foreign workers remained in Saudi Arabia.

The significance of the *movement* of international migrants to Saudi Arabia is highlighted in its population structure. The gender imbalance shown in Figure 4.14 is primarily due to the influx of male workers aged predominantly between 25 and 45. In addition to its population structure, immigration is a major factor contributing to Saudi Arabia's population growth. The net migration rate in 2020 was 3.036 people per 1000 population, equating to around 105,000 people, which is below the five-year average of 134,979. This was a 14 per cent decline from 2019 and far lower than between 2011 and 2014 when the rate was above 10 people per 1000 population. It is expected to continue to fall to 1.457 people per 1000 population by 2030, contributing to the slowing of Saudi Arabia's total population growth rate.

Figure 4.15 shows the origin of migrants living in Saudi Arabia according to a 2018 study. Migrants predominantly originate from South Asia and the

► **Figure 4.15**
The origin of migrants to Saudi Arabia, 2018

Country of origin	Number of international migrants
India	2,270,000
Indonesia	1,550,000
Pakistan	1,340,000
Bangladesh	1,160,000
Egypt	870,000
Syria	750,000
Yemen	700,000
Philippines	580,000
Sri Lanka	480,000
Nepal	460,000
Afghanistan	440,000
Sudan	440,000
Burma (Myanmar)	240,000
Jordan	220,000
Ethiopia	150,000
Lebanon	140,000

Middle East including India, Indonesia, Pakistan, Bangladesh and Egypt. Most of these migrants are a mix of skilled and unskilled male workers taking advantage of economic opportunities that do not exist in their home countries. The amount of money sent home by these workers is significant, creating strong economic *interconnections* with other *places* at an international *scale*. According to the World Migration Report 2022, Saudi Arabia was ranked as the third highest remittance-sending country in 2020 (US$34.60 billion)

behind the United States (US$68.0 billion) and the United Arab Emirates (US$43.25 billion).

An estimated 2.5 million Syrian refugees have also entered Saudi Arabia since Syria's conflict began. Saudi Arabia offered these refugees access to free education, healthcare and employment opportunities to ensure their safety and maintain their dignity. Over this period, hundreds of thousands of Syrians have been granted legal residency status.

▶ ACTIVITIES

1. Outline a major factor leading to significant amounts of immigration in Saudi Arabia.

2. a. Quantify the gender imbalance shown in the three population structures presented in Figure 4.14.

   b. Explain the reason for this gender imbalance and suggest an issue that might develop as a result.

3. a. Discuss the significance of Saudi Arabia's net migration compared to its natural increase in 2020. Refer to relevant statistics in your discussion.

   b. Outline the impact that a declining rate of net migration is likely to have on Saudi Arabia's population growth.

   c. Undertake research to compare the rate of net migration in Saudi Arabia with surrounding countries and those in other world *regions*.

4. a. Using the data in Figure 4.15, draw a map representing the number of international migrants to Saudi Arabia by origin.

   b. On your map, use different sized arrows to show the *scale* of this *movement*.

   c. Using your map, describe the extent and *distribution* of international migration to Saudi Arabia.

What are the population issues and challenges in Saudi Arabia?

Saudi Arabia's rapid population growth, *unsustainable* urbanisation, geographic characteristics and constant influx of male expatriate workers have led to a number of population issues and associated challenges. These include unchecked urban sprawl, an uneven population structure and *distribution* as well as high levels of unemployment.

Uneven population *distribution*

Some of the biggest challenges that Saudi Arabia faces stem from the issue of the uneven *distribution* of its growing population (see Figure 4.3). Urbanisation has occurred predominantly in three provinces: Riyadh, Eastern Province and Western Province. Five metropolises within these *regions,* Riyadh, Jeddah, Mecca, Medina and Dammam, accommodate nearly half of the total population. These urban centres are commercial and business hubs, attracting internal and international migrants in search of paid employment and a higher standard of living.

The rapid growth experienced at these *places* has created issues that have threatened their *sustainability*. A housing shortage has driven up prices and, as a result, only around 50 per cent of Saudis own their own homes. Furthermore, to meet the demands of an increasing population, there is a need for new hospitals and educational facilities to ensure balanced access to essential services and utilities. Houses, hospitals, schools, healthcare centres, sporting clubs and labour offices are being built to ease this pressure at a great economic cost.

Saudi Arabia's geographic characteristics are a major factor determining the *distribution* of its population. Due to its location within a desert *environment*, only 0.7 per cent of Saudi Arabia's land surface contains fresh water. Given the amount of water per person is so limited in this *region*, cities such as Jeddah have to pipe water in. Other cities rely on desalination to meet domestic and industrial needs (see Figure 4.16). Ras Al-Khair, north-east of Riyadh, is the largest desalination plant in the world with a capacity to

▲ **Figure 4.16** *Distribution* of desalination plants in Saudi Arabia

treat more than one million cubic metres of water a day. A need for a reliable water supply forces the *movement* of people into cities close to this essential infrastructure. Despite desalination being a very costly *process* requiring an enormous amount of energy and associated CO_2 emissions, the amount of water used per person in Saudi Arabia is around 250 litres per day which is around twice the global average and higher than in countries with plentiful supplies. This *unsustainable* level of usage is largely because the government subsidises the production of water by 99.7 per cent making it very cheap and appear to be of endless supply. Increasing population growth and urbanisation are expected to drive the need for more water which could lead to supply shortages by 2025. To overcome this challenge, Saudi Arabia is investing a considerable amount of money in the reclamation and reuse of wastewater with the aim of achieving 100 per cent usage of treated wastewater by 2025.

▼ **Figure 4.17** The *distribution* of the unemployment rate in Saudi Arabia during 2020 by province

Unemployment

Saudi Arabia's total unemployment rate averaged 8.2 per cent in 2020, considerably higher than 6.1 per cent in 2019 (see Figure 4.18). The unemployment rate for Saudi nationals, not including migrants, was much higher at above 13 per cent. In the second quarter of 2020, the total unemployment rate averaged 9.0 per cent due to the challenges associated with managing the COVID-19 pandemic. As shown in Figure 4.17, the spatial *distribution* of the unemployment rate across Saudi Arabia is uneven. The age *distribution* of those unemployed is also uneven. Figure 4.19 shows that the youth unemployment rate for those aged between 15 and 24 reached 27.9 per cent in 2020, significantly higher than the national average.

▶ **Figure 4.18** Saudi Arabia's unemployment rate from 1991 to 2020

▶ **Figure 4.19** Saudi Arabia's youth unemployment rate (aged between 15 and 24 years) from 1991 to 2020

A major factor contributing to Saudi Arabia's unemployment issue is the large number of international migrants flooding the job market. Foreign workers outnumber Saudi workers in the private sector at a ratio of 3:1. This has had an enormous impact on Saudi Arabia's economy as foreign workers send a substantial portion of their income back to their countries of origin as remittances. The recent drop in oil prices and the decision to freeze oil output levels have forced authorities to cut subsidies and limit spending, which has led to fears of even further unemployment among Saudi youth. *Changing* economic conditions and balancing the workforce between Saudi nationals and migrants remains one of Saudi Arabia's biggest population challenges. The transition from fossil fuels, especially in the next three decades, includes both increasing government bans on the sale of internal combustion engines and increasing choice by many automobile manufacturers to *change* to only making renewable-powered vehicles. This threatens oil-dependent economies such as Saudi Arabia and challenges them to diversify their economies to ensure adequate employment and income creation.

The issue of a high rate of youth unemployment is not unique to Saudi Arabia. Many countries within the Middle East have a similar disparity in the total and youth unemployment rates (see Figure 4.20). This is particularly challenging given the low median ages and population structure of many of the countries within this *region* (see Figure 4.21) and therefore the possibility that this challenge could intensify in the future.

Another challenge that Saudi Arabia faces in its attempt to tackle high levels of unemployment is gender inequality. The female unemployment rate is considerably higher than for males, skewing the average considerably. In the second quarter of 2020, the female unemployment rate peaked at 25.3 per cent while just 15.8 per cent of the total workforce were female. This gender divide is largely due to the cultural

▲ **Figure 4.21** The median age in Middle Eastern countries

preference that women do not work outside of the home and because foreign nationals dominate work in the child-minding and domestic service industries. There is also still a large psychological *distance* prevalent between what women want in the future and what the government sees as appropriate for women. In 2014, this psychological *distance* was shown to the world when Saudi women began to demand that they be allowed to hold a driver's license, which was granted in 2018. To overcome this challenge, Saudi Arabia is aiming to provide jobs for one million women during the next decade as part of the Vision 2030 plan in which the empowerment of women will be a major priority.

1. a. Draw a table, summarising Saudi Arabia's two main population issues, their associated challenges and the range of contributing factors that have caused these issues and challenges.

    b. Rank Saudi Arabia's population challenges based on their significance. Justify your decision.

    c. Add another column to your table and suggest the impact that these issues may have in the future if they are not managed appropriately.

2. List the ways in which unchecked urbanisation and the associated urban sprawl is leading to population challenges in Saudi Arabia. Consider challenges such as access to housing, transportation, water, health services and employment opportunities. Undertake research to justify which of these challenges is the most significant.

3. Explain how an *environmental* factor has contributed to Saudi Arabia's uneven population *distribution*.

4. Justify whether water usage is a cultural, *environmental* or economic factor contributing to the challenge of the *sustainability* of Saudi Arabia's urban areas.

5. a. Describe the *distribution* of unemployment across Saudi Arabia using Figure 4.17.

    b. Suggest a reason to account for this *distribution*.

6. Refer to Figures 4.20 and 4.21.

    a. Describe the *distribution* of unemployment and median age within the Middle East.

    b. Research the population and economic characteristics of some of the countries within this *region* to see if they are facing similar population issues and challenges.

7. Explain how both cultural and political factors are contributing to Saudi Arabia's unemployment issue and associated challenges.

8. 'There is a significant *interconnection* between population dynamics and population issues and challenges.' Evaluate this statement in terms of Saudi Arabia's population situation.

9. Research Vision 2030 and explain how this plan is aiming to help overcome some of Saudi Arabia's population issues and challenges.

What are the strategies in response to the issues and challenges?

Saudization

During the Fourth Development Plan between 1985 and 1990, Saudi Arabia's Ministry of Labor developed Saudization, a strategy to increase the employment of Saudi citizens and reduce the issue of the high unemployment rate. Saudization was based on a national requirement whereby Saudi companies were forced to replace a percentage of their expatriate labour force with local Saudi nationals. In addition to decreasing the ratio of foreign to local workers, Saudization aimed to increase employment opportunities, particularly for Saudi women and youth. This involved establishing funds to assist Saudi entrepreneurs to establish companies, using training organisations to prepare young Saudis for technical jobs reserved for them and providing on-the-job training. It was also hoped that Saudization would provide an economic boost to Saudi Arabia as the majority of income from employment would remain in Saudi Arabia instead of leaving the country as remittances.

Since its inception, Saudization has undergone a number of *changes*. In 1995, private companies with over twenty employees were forced to reduce expatriate workers by 5 per cent each year. Penalties for companies that did not comply included a denial of access to governmental support and a freeze on applications for the hire of new foreign workers. In 2005, a fixed mandatory quota was set at 30 per cent for hiring Saudis in all private sectors in an attempt to increase the overall proportion of Saudi workers to 25 per cent.

By 2011, it was clear that Saudization was struggling to meet its targets as the number of foreign workers continued to increase and the unemployment rate did not decrease. This sparked a review of the program and the establishment of Nitaqat, a revised quota system for hiring Saudis in the private sector. The mandatory 30 per cent quota was replaced with more suitable quotas based on the size and economic activity of each company. Figure 4.22 summarises the required percentage of Saudi employees in different sized companies. The type of economic activity determined the required level of compliance for these companies. Greater incentives were provided for companies that met or exceeded their employment quota, giving them more freedom with how they manage their workers. Further sanctions and financial penalties were dealt to companies that did not comply. By determining quotas for Saudi employees, Saudization is demographically significant because it influences where migrant workers can be employed across the nation.

▼ **Figure 4.22** Percentage of Saudi employees required for different sized companies

Number of employees	Classification	Required Nationalisation
1–10	Micro Enterprises	Exempt
10–49	Small	5–24%
50–499	Medium	6–27%
500–2999	Large	7–30%
3000+	Conglomerates	8–30%

Has Saudization been effective?

Saudization has had mixed success in its attempts to nationalise the workforce and to create jobs and economic growth. While many industries such as transport and manufacturing were able to successfully nationalise their workforce, many sectors struggled to comply with quotas. For example, nearly half of all telecommunication stores failed to meet the quota, leading to heavy financial penalties and the closure of many stores. Overall, 200,000 private firms were shut down in 2014 for failing to meet Saudization conditions. Many companies that met quotas faced financial difficulties and a loss of efficiency as they were forced to hire Saudis for technical jobs that they were not qualified to perform. Furthermore, due to a culture of lavishness and a poor work ethic, especially among youths, many Saudis were unwilling to take on the unskilled labouring and service jobs that were made available to them.

Saudization has resulted in a cultural shift in the operation of companies in Saudi Arabia. In a desperate attempt to avoid penalties, many companies manipulated their employment statistics by hiring Saudis who did not actually perform any work. Other companies have been investigated for exploiting disabled workers to boost their Saudization ratios. Each disabled worker counts as four Saudi workers in the Saudization quota and many were hired purely to boost numbers so that companies could retain their foreign workers at a lower wage.

Low productivity, a lack of female representation in the workforce, manipulation of employment statistics, a mismatch between job opportunities and the qualification of young Saudis as well as continuing high levels of youth unemployment all sparked another review of Saudization in 2016. The Weighted Nitaqat was introduced which focuses less on quantitative quotas and will instead develop the skills of young Saudis, create fulfilling work opportunities, raise the salaries for Saudi nationals, increase job stability and encourage female employment. In this new system, Saudization compliance will be based on the following five criteria:

1. the total number of Saudi nationals employed in a company
2. the average salary paid to Saudi employees by a company
3. the number or percentage of Saudi female employees in a company
4. retention of Saudi nationals within a company
5. the percentage of Saudi nationals within the top 25 per cent of highly paid employees.

The overall goal of this revised policy was to reduce the unemployment rate of Saudi nationals from 12.1 per cent during the third quarter of 2016 to 9 per cent by 2020. Although the unemployment rate among Saudi women did reduce from 34.5 per cent

▼ **Figure 4.23** The unemployment rate of Saudi nationals from 2016 to 2020

Period	Percentage		
	Males	**Females**	**Total**
2016 Q2	5.4	33.7	11.6
2016 Q3	5.7	34.5	12.1
2016 Q4	5.9	34.5	12.3
2017 Q1	7.2	33.0	12.7
2017 Q2	7.4	33.1	12.8
2017 Q3	7.4	32.7	12.8
2017 Q4	7.5	31.0	12.8
2018 Q1	7.6	30.9	12.9
2018 Q2	7.6	31.1	12.9
2018 Q3	7.5	30.9	12.8
2018 Q4	6.6	32.5	12.7
2019 Q1	6.6	31.7	12.5
2019 Q2	6.0	31.1	12.3
2019 Q3	5.8	30.8	12.0
2019 Q4	4.9	30.8	12.0
2020 Q1	5.6	28.2	11.8
2020 Q2	8.1	31.4	15.4
2020 Q3	7.9	30.2	14.9
2020 Q4	7.1	24.4	12.6

to 28.2 per cent early in 2020, the total unemployment rate for Saudi nationals remained relatively stable ending 2019 at 12.0 per cent (see Figure 4.23). Furthermore, the unemployment rate for Saudi nationals soared during 2020 due to the COVID-19 pandemic reaching as high as 15.4 per cent before ending the year at 12.6 per cent.

▶ ACTIVITIES

1. Summarise the main features of Saudization using a graphic organiser.
2. What impact might a reduction in foreign workers within Saudi Arabia have on countries such as India or Bangladesh?
3. Outline two social and economic impacts of Saudization.
4. Using Figures 4.18, 4.19 and 4.23, justify whether or not Saudization has successfully managed Saudi Arabia's unemployment issues among the total population, the youth and Saudi nationals.
5. List three criteria that could be used to evaluate the effectiveness of Saudization.
6. Using an appropriate criterion, evaluate the effectiveness of Saudization in meeting Saudi Arabia's population challenges.

Figure 4.24 The nine objectives of the National Spatial Strategy (NSS)

Objective 1	Promoting a spatially balanced pattern of population *distribution* on national space.
Objective 2	Minimising the adverse consequences of the continuous increase in the population of large cities.
Objective 3	Ensuring the efficient utilisation of infrastructure and public services already in place.
Objective 4	Directing support to the overall growth of small and medium cities.
Objective 5	Intensifying efforts to diversify the economic base of different *regions* as to fully utilise their existing and potential resources.
Objective 6	Supporting selected settlements to act as growth centres capable of transmitting and coordinating development impulses toward surrounding areas.
Objective 7	Supporting new activities that contribute positively to the integration between rural and urban areas.
Objective 8	Improving the administrative structure of selected growth centres and defining accurately their service areas.
Objective 9	Fostering development within border cities due to their importance for national security.

National Spatial Strategy (NSS)

The uneven *distribution* of Saudi Arabia's population, resources and services has been a management issue for the past forty years, exacerbated by Saudi Arabia's growing population. In 2000, the Ministry of Municipal and Rural Affairs developed the National Spatial Strategy (NSS) in conjunction with the United Nations Development Programme (UNDP). This strategy aims to collect and analyse data concerning the demographic situation in Saudi Arabia and includes a long-term plan to spatially balance the uneven population *distribution*. The nine objectives of the NSS are listed in Figure 4.24. These will be achieved by building new cities to act as growth centres, a series of development corridors *interconnecting* these cities and supporting the growth of existing small and medium cities to absorb future population growth.

This will alleviate pressure on major cities and ensure future urbanisation is *sustainable*. According to UNDP, the NSS will introduce and manage the development of six new 'economic cities' across the country. These cities will attract foreign investment to enable the establishment of a new generation of high-tech and knowledge-oriented industries while spreading public services more evenly across Saudi Arabia.

The proposed new cities will be located in areas that were previously rural (see Figure 4.25) and together will accommodate 4.8 million people. Intra-urban migration will slow the growth in existing urban centres and promote a more balanced population *distribution*. New transit corridors will help to decentralise the population and integrate rural and urban areas, spreading public services more evenly and equally across the country. Each of the new cities will focus on a different economic sector and will aim to develop specialised technologies and knowledge-oriented industries. Jobs created will significantly reduce youth unemployment while it is projected that new industries and both private and foreign investment will provide a significant boost to Saudi Arabia's Gross Domestic Product (GDP). In the long term, it is hoped that this development will help diversify the economy. Moving from an economy dependent almost solely on oil production towards a culture of knowledge-based industries and new forms of manufacturing. Similar strategies have been implemented in China, Germany, Morocco and South Korea where specialised *regions* of new cities have been turned into economic clusters to facilitate polycentric urban development.

Located on the coast of the Red Sea, a *distance* of 100 kilometres north of Jeddah, the King Abdullah Economic City is one of six new cities being built. Announced in 2005, the city is designed to promote industrial expansion and provide housing and job

▲ **Figure 4.25** The location of the six new economic cities

opportunities for a young population. It will have the capacity for two million people and will be a similar size to Washington DC. It will feature a large industrial zone, the largest seaport in the *region*, an educational precinct, central business district, parks, green spaces and public amenities. Hundreds of thousands of jobs will be created in manufacturing, research and development, business, services, hospitality, education and community services. A high-speed rail network will *interconnect* the city with Jeddah, Mecca and Medina. Construction is currently underway, providing tens of thousands of construction jobs. Although it was originally planned to be completed by 2020, the latest estimates suggest it is likely to be completed by 2035 at a cost of US$100 billion.

In January 2021, Saudi Arabia's Crown Prince Mohammed bin Salman announced a plan to build Neom, a smart city located in the Tabuk province in the north-west. It is intended to be a model for future urban societies, run by artificial intelligence and completely powered by renewable energy. It will feature a 170-kilometre stretch of communities that will have no roads or cars. One million residents will have access to schools, health centres and green spaces within a five-minute walk and via public transport which will include drone-powered taxis. The total cost of the project is estimated at US$500 billion and the first section is expected to be completed by 2025. The design will preserve 95 per cent of the surrounding landscape with the aim of maintaining an *interconnection* with the natural *environment*. The project has been met with opposition from the Huwaitat tribe, a Bedouin tribe who have lived in the *region* for hundreds of years. An estimated 20,000 members of the tribe face eviction from their homes and their land due to the construction without any information about what their future holds, and could result in a potential loss of their Bedouin culture. There have been reports of abductions, arrests and violence against those who oppose the development. As a result, the Huwaitat have appealed to the United Nations to stop the development, claiming it is a violation of their human rights.

Is the NSS likely to be effective?

A review of the NSS in 2016 raised some concerns regarding its current and future effectiveness. Balancing the *distribution* of the population on a national *scale* is the first objective of the NSS. The new cities were expected to accommodate 4.8 million people and create 1.3 million jobs by 2020 to help achieve this. However, as demonstrated by the King Abdullah Economic City, the most advanced of the new cities, these projects are far from complete and have yet to have any significant impact. As of 2019, the city was just 40 per cent complete and housed just 10,000 residents among rows of empty villas and large constructions sites. Meanwhile, data from the Future Saudi Cities Programme reveals the percentage of Saudi Arabia's population living within its existing five largest metropolises actually grew from 43 per cent in 2000 to 48 per cent in 2020 and is projected to reach 50 per cent by 2035, largely driven by growth in Riyadh and Jeddah. As a result, the proportion living in small and medium-sized cities has dropped. Although these figures represent a worsening of the primary problem the NSS is trying to solve, the 2016 review also highlighted that the NSS has managed to reduce the rate of growth that would have otherwise occurred in these older urban centres.

Concerns have been raised about the social and economic *sustainability* of the NSS. Although a balanced population *distribution* and associated infrastructure is likely to increase social *sustainability*, this may come at the cost of economic efficiency, which relies on dense concentrations of populations that reduce the *distance* travelled by consumers and workers. The *environmental sustainability* of the NSS has also been questioned in terms of managing biodiversity, natural resources, disaster risk management and mitigation and adaptation to climate *change*. The dependence on finite groundwater and desalination, a lack of arable land and problems with soil salinisation and degradation also pose risks for the *sustainability* of Saudi Arabia's growing population and associated developments. While the NSS aimed to diversify the economy, 90 per cent of Saudi Arabia's export earnings still come from oil production which also makes up 42 per cent of Saudi Arabia's GDP.

▶ ACTIVITIES

1. Summarise the main features of the National Spatial Strategy (NSS) using a graphic organiser.
2. Research one or more of the 'economic cities' (refer to text and Figure 4.25) and record its location, size, major industries and progress.
3. Outline some of the difficulties in implementing the NSS based on Saudi Arabia's geographic and population characteristics.
4. In a table, list the *environmental*, economic, social and cultural impacts of the NSS on people and *places*.
5. List three criteria that could be used to evaluate the success of the NSS.
6. Using an appropriate criterion, evaluate the effectiveness of the NSS in meeting Saudi Arabia's population challenges.

What is the role of geospatial technologies in managing Saudi Arabia's population growth?

The nature of Saudi Arabia's population *distribution* and its rapid rate of population growth, particularly in large urban areas, has led to a challenge of ensuring adequate access to public infrastructure, services and utilities for all residents. The second objective of the National Spatial Strategy (NSS) is to minimise the adverse consequences of the continuous increase in the population of large cities while the third objective is to ensure the efficient utilisation of infrastructure and public services already in place (Figure 4.24). In the case of Riyadh, this involves monitoring and controlling the spatial expansion of the city to ensure that the establishment of residential areas does not exceed the provision of essential services and utilities such as health facilities. A key component in ensuring the success of these aspects of the NSS has been an enhancement in the quality, accuracy, validity and availability of geospatial information.

A 2016 study from Wuhan University explored the use of Geographic Information Systems (GIS) to analyse the spatial *distribution* of health facilities throughout Riyadh's municipalities to assess the level of access for residents. In order to enable this analysis, population data was gathered from the Central Department of Statistics and Information which manages national census data. This was overlayed with point data containing the location of health facilities and polygon layers containing administrative boundaries of Riyadh's districts and municipalities. Results revealed a clustered concentration of health facilities towards the centre of Riyadh. ArcGIS' zonal statistics tool was used to map the accessibility to health facilities

from Riyadh's municipalities (Figure 4.26) and a buffer tool was used to identify which districts had access to a health facility within a radius of one kilometre (Figure 4.27). The analysis found that health services were less accessible for those living in districts within the western, southern and north-eastern municipalities and that access to health facilities increased significantly towards the centre of Riyadh. Furthermore, less than half of Riyadh's population was found to have access to a facility within a one-kilometre *distance*.

In this case study, GIS has been an efficient geospatial tool used to analyse the current accessibility to health services across Riyadh. The resolution of the data was appropriate allowing the ability to compare data from individual districts and municipalities. This information can be used to assist policy-makers with determining the optimal locations for the construction of future facilities to improve the equity in access, particularly given the urban growth on the outskirts of Riyadh.

Despite its success, the study acknowledged some limitations. Health facilities currently under construction were not taken into account meaning that the data used would be considered out-of-date soon after publication. Similarly, population data used was from the 2010 census and although it was the most recent data available at the time, it may not have been an accurate representation of the current population *distribution* and density. The data used was also limited in the detail that it provided. The study focused primarily on the location of facilities rather than considering the size of facilities in

▼ **Figure 4.26** The spatial accessibility of health facilities within Riyadh's municipalities
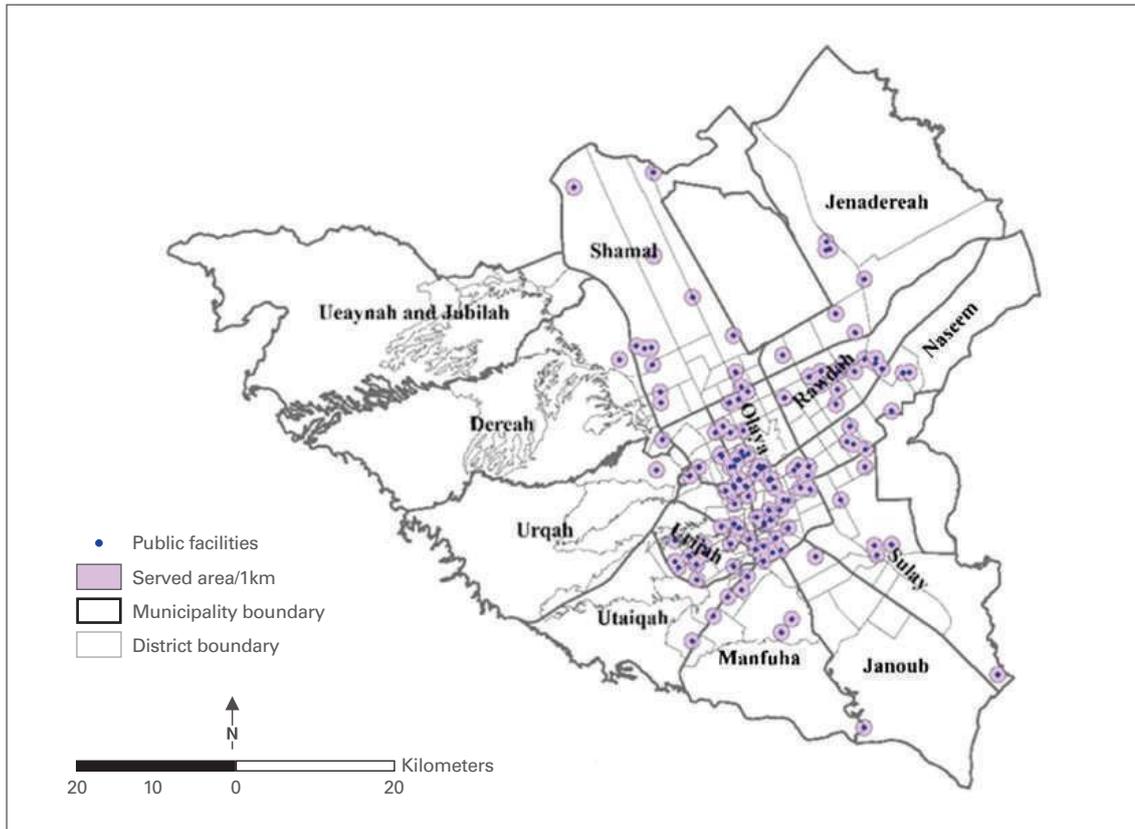
terms of the number of hospital beds, physicians and nurses. There was no qualitative consideration as to whether or not the sizes of facilities were appropriate for the population that they serviced. Similarly, although *distances* to health facilities were used to determine accessibility, travel time data based on the *distribution* of road networks and typical traffic conditions was not available and would have potentially provided a more accurate measure of accessibility. Therefore, although GIS is useful in assessing and managing urban demographic challenges, future improvements in the accuracy and accessibility of spatial data will improve the accuracy of these kinds of applications.

► **ACTIVITIES**

1. Using Figure 4.26, describe the *distribution* of Riyadh's health facilities (shown in green) and the variation in accessibility across the *region*.

2. Explain how geospatial technology has been used in the implementation of Saudi Arabia's National Spatial Strategy (NSS).

3. Evaluate the effectiveness of GIS in the development and implementation of strategies in response to Saudi Arabia's growing urban population.

Population trends and issues: growth in Niger

What are the geographic characteristics of Niger?

Niger is a landlocked country in central north Africa. Its people are called Nigeriens, not to be confused with the country Nigeria which is located south of Niger. Niger's neighbours are Chad to the east, Benin and Nigeria to the south, Burkina Faso and Mali to the west and Libya and Algeria to the north (see Figure 5.1). It has a medium-*scale* land area of 1,267,000 square kilometres and much of the land is desert.

▲ **Figure 5.1** Niger is a landlocked country in Western Africa

Niger's *environment*

Eighty per cent of Niger is covered by the Sahara Desert, which is located mostly in the country's central and northern *regions*. The Sahel, or semi-arid zone, extends through the southern section of Niger (see Figure 5.3). Over 90 per cent of Niger's population live on just one-third of the land area. Most of the population lives in the more arable areas along the southern border, where the climate is wetter and more seasonal, and soils are more fertile. This *region* includes the south-western areas in which the capital, Niamey, is located (see Figure 5.4). There is an *interconnection* between arable land and population density, with their *distributions* showing strong *spatial association*.

Niger's *environment* is characterised by highly variable and very unreliable rainfall. People face droughts and other climate-related hazards including floods, sandstorms and locust invasions. Over the past 40 years, the country has experienced periodic episodes of drought causing crop failure, food insecurity and famine. In times of drought, people in affected areas depend on imports of foreign food aid. During recent drought in 2011, agricultural output fell to 14 per cent below average and malnutrition affected one-third of the population. The effects of drought are often disastrous for people who already face food insecurity.

◀ **Figure 5.2**
In Niger, a woman carrying her young daughter collects water from the village pump. Access to fresh water is critical to survival in this semi-arid area

> ▶ **ACTIVITIES**
>
> 1. With reference to Figure 5.1, describe the relative location of Niamey, Niger's capital.
>
> 2. Refer to Figure 5.3. Describe the physical characteristics of Niger.
>
> 3. Describe how the physical characteristics of Niger may influence population *distribution* using Figures 5.2, 5.3 and 5.4.

Annual precipitation (mm)
- 601–800 The Sahelo-Sudanian zone
- 301–600 The Sahelian zone
- 151–300 The Sahel-Saharan zone
- 0–150 The Saharan zone

Population Density (persons/square kilometre)
- 0–10
- 11–50
- 51–100
- 101–250
- 251–500
- 501–750
- 750 and more
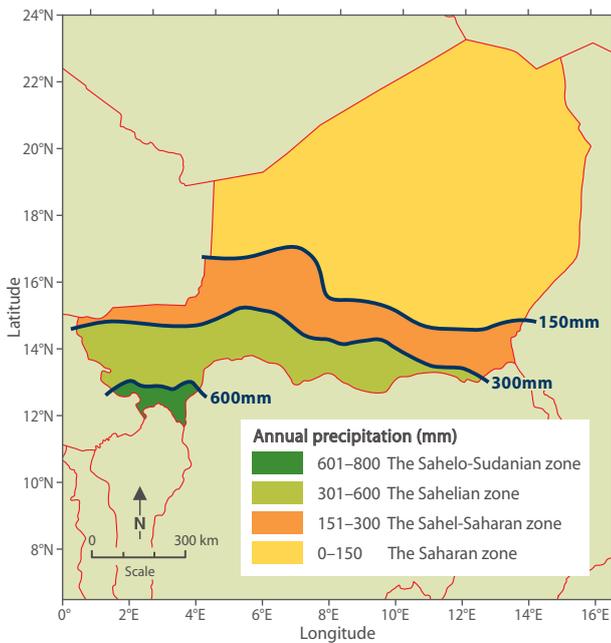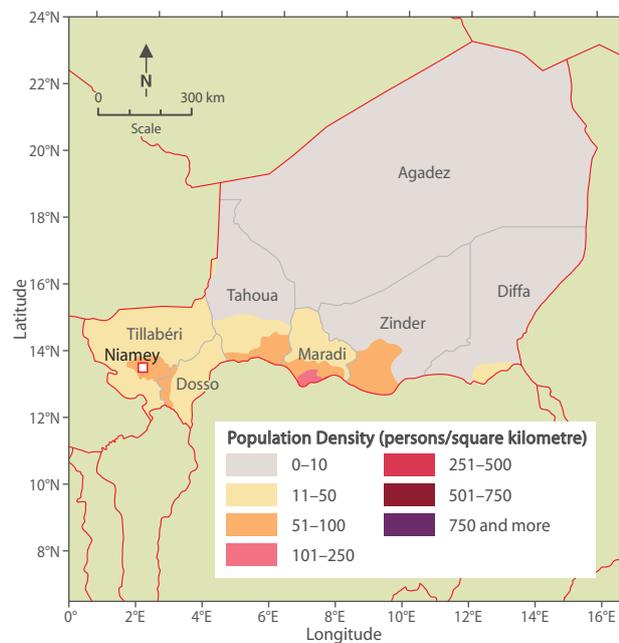
What are the population characteristics of Niger?

The population of Niger was 3.4 million in 1960 and in 2020 it was 24 million (see Figure 5.5). More than four-fifths of Nigeriens live in rural areas which is one of the lowest urbanization rates worldwide. The average population density of Niger is 19 people per square kilometre of land area. In 2020, life expectancy in Niger was 60.7 years for males, 63.0 years for females and the average total life expectancy was 61.8 years.

In 2020, Niger ranked last out of 189 countries on the United Nations Human Development Index (HDI). Niger is one of the world's poorest nations with 41.4 per cent of its people living in poverty and a per capita income of US$553.90. Agriculture is the main economic activity supplemented by export earnings mainly from uranium mining.

▼ **Figure 5.5** Population *change* in Niger, 1950–2020
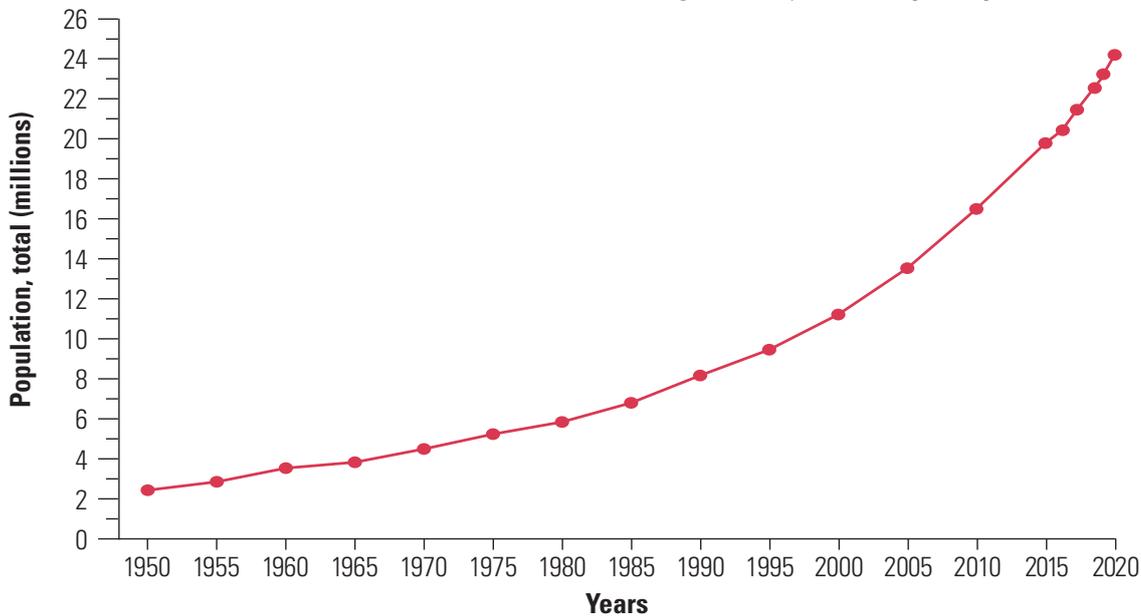
▶ ACTIVITIES

1. Refer to Figure 5.5. Describe the *changes* in Niger's total population from 1950 to 2020.
2. Use World Health Organisation (WHO) data to compare Niger's male, female and total life expectancy to other countries in the Sahel *region*.

What is the nature of the population trend in Niger?

▶ **Figure 5.6**
On average, a woman in Niger will have seven children if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates

Niger has one of the highest population growth rates of any nation in the world – its rapidly increasing population is growing annually by 3.84 per cent. Niger's population of 24,206,644 ranked it the fifty-sixth most populous country in the world in 2020. The United Nations predicts a population of 70 million in 2050, a remarkable threefold increase from 2020.

Fertility is the most important factor in determining future population growth in Niger. A total fertility rate (TFR) of 2.1 babies per women is needed to replace a population over time. In 2019, Niger's TFR was 6.8 babies per women (though some sources put this as high as 7) which ranked Niger as the country with the world's highest TFR (see Figure 5.6). Statistically, a Nigerien mother's median age at first birth is 18.1 years. Niger's population growth rate is high due to this higher fertility rate.

The death rate for Nigeriens has steadily declined in the last five decades and in 2020 the crude death rate (CDR) was approximately 7.8 per 1000 people. This is a very common trend among economically less developed countries and is illustrated in the theoretical Demographic Transition Model (see Chapter 1, pages 23–25).

In Niger net migration is very small when taken as a five year-average, although migration *movements* can rapidly vary during periods of drought or conflict.

The key population trend for Niger is a high population growth rate. Its high birth rate of 45.2 births per 1000 people, combined with the comparatively low death rate of 7.8 deaths per 1000 people has led to a high rate of natural increase of 37.4 per 1000 people, contributing to the rapidly growing population.

Niger's population structure

In 2021, over 70 per cent of Niger's population was under the age of 25 (see Figure 5.8). The *interconnections* between high numbers of youth, the early age of marriage and the preference to have large families are social and cultural factors that will lead to continued population growth. The population pyramid, showing Niger's age-sex structure for 2020 with its broad base and narrow top illustrates a rapidly growing population (see Figures 5.7 (a) and 5.7 (b)). The United Nations predicts that in 2050 Niger will be the only country with a fertility rate higher than four births per woman.

▼ **Figure 5.7** Niger's *changing* population structure **(a)** 2020 and **(b)** projected 2050
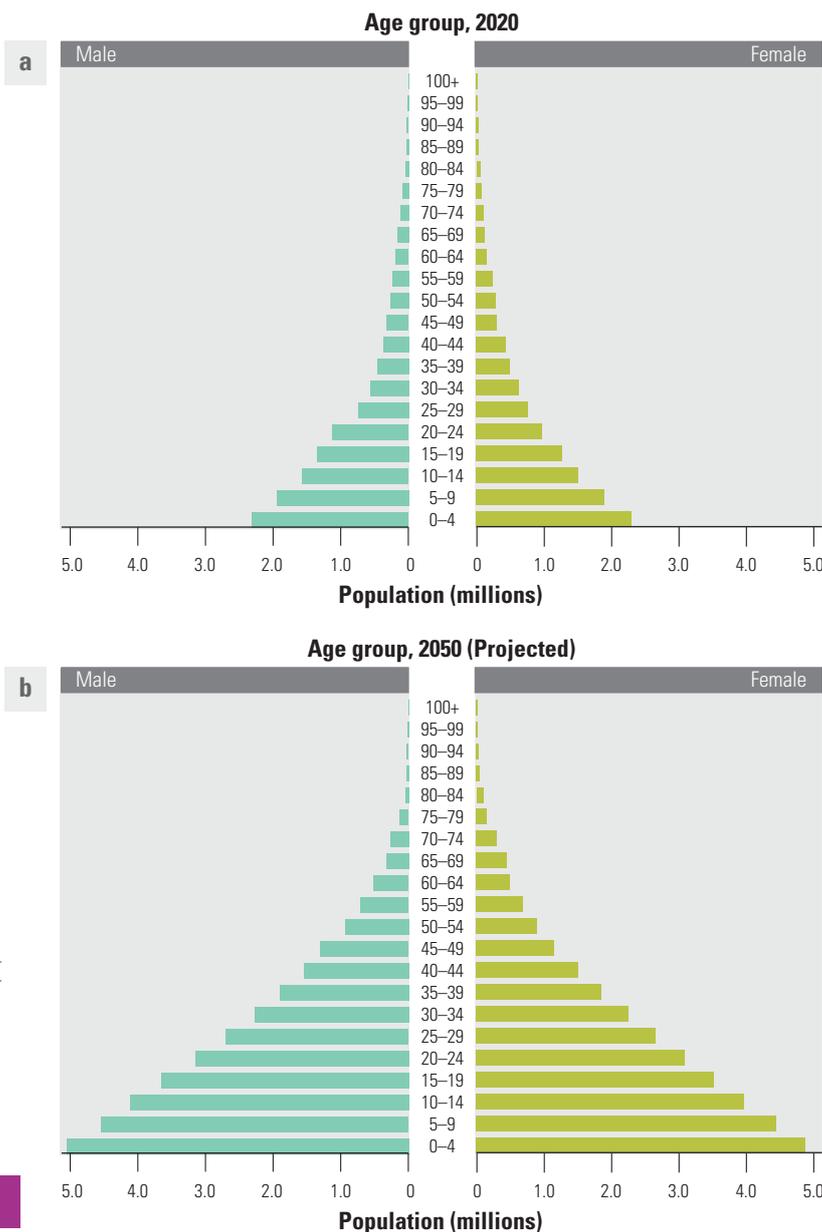
▼ **Figure 5.8** Age structure, 2021

Years	Percentage	Population	
		Male	**Female**
0–14	50.58	5,808,102	5,713,815
15–24	19.99	2,246,670	2,306,285
25–54	23.57	2,582,123	2,784,464
55–64	3.17	357,832	364,774
65 and over	2.68	293,430	317,866

UNIT 4 ▲ Human population

1. What was Niger's population growth rate in 2020?

2. Compare the population structures of Niger and China using Figures 5.7 and Figure 6.11 (page 92).

3. With reference to the data provided, identify the stage of the Demographic Transition Model which Niger is in.

4. Refer to Figures 5.7 (a) and 5.7 (b). Describe the two population profiles. Account for the *changing* population characteristics of Niger's population structure.

5. Suggest opportunities that may arise from Niger's median age of 15.8 years.

6. 'Demographically, Niger is a nation of children.' Write a response of two to four paragraphs that evaluates this statement.

7. a. Predict what socioeconomic issues Niger faces because of its youthful age structure.

   b. Suggest one response that might alleviate an issue that you have identified.

Factors that affect population *changes* in Niger

Niger's high TFR is largely affected by cultural norms that contribute to gender inequality. These include marriage at an early age and the lack of education opportunities for women and girls.

Cultural norms in Niger

Niger's birth rates are affected by the prevalence of a conservative type of Islam that encourages large families. Approximately 90 per cent of Niger's population is Muslim. Most people want large families. In Niger, the social norm is that couples marry young and become pregnant soon after, often having many children. "In Niger, we have a national characteristic which is pro-birth where having children is considered a traditional sign of wealth and power," said Dr Hassane Atamo, head of the government's family planning division. Families hope that many children will lead to economic prosperity – although a child is another mouth to feed, they will have more people to work for the family. Only 17 per cent of couples used a method of contraception in 2020.

Early age of marriage

Niger is the country with the highest rates of marriage of girls in the world. UNICEF reports that, in the past 20 years, 28 per cent of the girls in Niger are married before they are 15 years old and 76 per cent are married by age 18 – and this trend is not *changing* very much. In some *regions* of the country girls of less than 15 years are married at a higher rate, including Maradi (89 per cent) and Zinder (87 per cent). Most women who married as children have little education. The legal age of marriage for girls in Niger is 15 years. A law has been proposed to *change* the age to 18 for girls but is yet to be legislated. UNICEF classifies marriage before the age of 18 as child marriage, and the 'Girls Not Brides' movement is a global partnership working to end child marriage (see Figure 5.17).

The strong *interconnection* between low education levels and the high prevalence of child marriage is clear in Niger. For example, in 2019 UNICEF reported that 81 per cent of 20–24 year old married women in Niger had no formal education. In comparison, of girls who attended and finished secondary school, only 17 per cent were married by 18 years old. Of those who had been schooled and married at age 18, almost two-thirds had only completed primary school levels. The link is also evident in the strong *spatial association* between *regions* with low education levels among their population and high prevalence of child marriage.

Education

Education is a key factor affecting population growth. In Niger, it is estimated by the World Bank that 35.05 per cent of the adult population (aged 15 years and above) are able to read and write. Over half of all children aged 7 to 16 are not enrolled in school, with school attendance lower for girls than boys. Only 60 per cent of all girls complete primary school and this is lower in rural areas. Fewer than one in 10 girls attend secondary school according to UNICEF. Literacy rates are very much lower for girls than boys (see Figure 5.9).

Within the *region* of west Africa, Niger is distinctive because of its low adult literacy levels (see Figure 5.10). Being able to read and write is important to enable individuals to contribute to the economic development of a country and it also empowers individuals and their communities in areas such as health care and politics.

Literacy in Niger

► Literacy rate for adult male population is 43.6 per cent. 3,138,800 persons are illiterate.

Literacy rate for adult female population is 26.6 per cent. 4,151,800 persons are illiterate.

► Youth literacy rates are 51.1 per cent and 35.6 per cent for males and females accordingly. The overall youth literacy rate is 43.5 per cent. Youth literacy rate definition covers the population between the ages of 15 to 24 years.

◄ **Figure 5.9**
Literacy rates, 2018
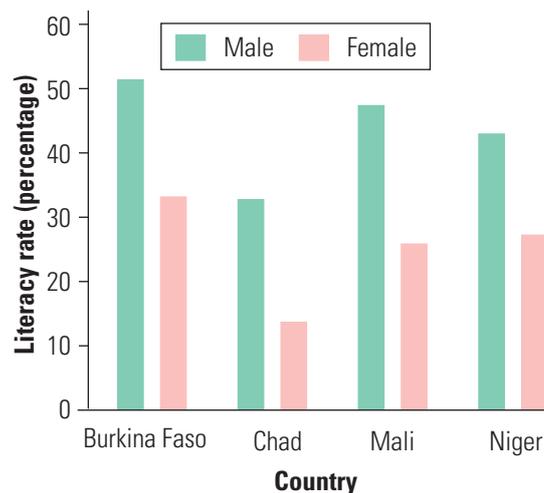
◄ **Figure 5.10**
Adult literacy rates in selected West African countries, 2018

▼ **Figure 5.11** Child mortality rates, 2019
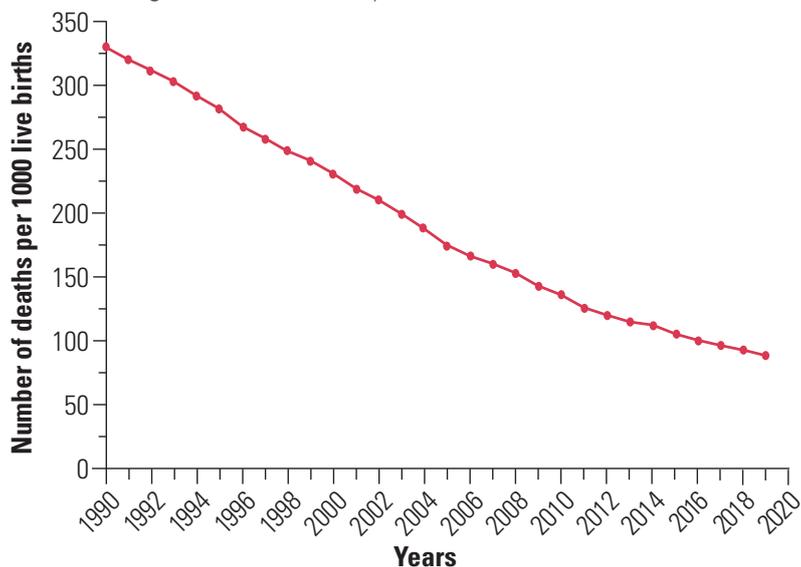
Trends in Infant and Child Mortality Rates

Niger has a relatively high under-five child mortality rate of 80.4 deaths per 1000 live births, shown in Figure 5.11. Not every mother can access high quality and affordable health care to ensure that her children survive and thrive. Pneumonia and diarrhoea top the list of infectious diseases in Niger, and these claim the lives of millions of children aged under-five. Child deaths can be reduced through better access to clean water and sanitation, increasing the number of skilled health-professionals across the nation and increasing immunization rates. Even when medical services are available, poverty sometimes prevents people accessing some of this assistance. These high infant and child mortality rates lead to a high TFR, as families attempt to compensate for any child deaths.

Other factors that affect population *changes*

As well as the effects of low rates of education, particularly for girls, the high population growth rates in Niger are influenced by a range of other factors:

▶ conservative religious teachings that encourage followers to have as many children as possible to grow the community

▶ having many children is a cultural ideal in Niger in a similar way to the prevailing belief that smaller families are preferred in Australia

▶ children can share the work in a farming society as they are said to come with two hands to work but only one mouth to feed

▶ early marriage and low rates of contraceptive use result in early childbirth and increase the opportunity to have many children during childbearing years

▶ the government spends only a tiny proportion of its budget on family planning.

▲ **Figure 5.12** Niger is gearing up to provide free education for every child up until the age of 16 – and will need more school rooms, materials and teachers

▶ ACTIVITIES

1. Predict how early marriage and a 17 per cent contraception prevalence rate might affect future fertility trends.

2. Examine Figure 5.10. What *regional* variations in literacy levels does it depict?

3. Examine Figure 5.12. How will the projected population *changes* affect schools?

4. Niger's national government wishes to increase family planning education and needs to consider the best strategies because literacy levels in the country are low. Rank and justify the following recommendations:

   a. as radio is a key source of news, use this to provide family planning information

   b. hold workshops for women of childbearing age in all villages

   c. distribute pictorial leaflets in all villages

   d. use television broadcasts

   e. use twitter messages to raise issues.

5. Describe the *changes* in under-five infant mortality rate using Figure 5.11, and compare it to Australia's rates using Figure 9.6.

How does population *movement* contribute to structural *change* in population?

Niger is not a popular *place* to migrate to – this is likely because it has a low level of economic development and high levels of vulnerability to civil unrest and *environmental* variability. With poverty affecting many Nigeriens, along with the climatic challenges that Niger faces, this is not surprising. In 2015–20 there was slightly more immigration than emigration with a net migration rate of 0.2 per 1000 inhabitants. Overall, UNICEF reports that the level of net migration is minimal and predicted to remain around zero. Therefore, net migration will have no significant effect on population *change* (see Figure 5.13). More recently, Niger has increasingly become a major country of transit for migrants from throughout Sub-Saharan Africa who are seeking a better life in another country. These migrants represent short-term *movements* through Niger as they journey further afield to Europe and the Middle East.

Emigration from Niger

The government does not collect accurate data on emigration from Niger, but intergovernmental bodies such as the United Nations International Organization for Migration (IOM) gather relevant information. It is estimated that 3 per cent of the total population

▼ **Figure 5.13** Net migration rates for Niger, 1985–2050

Legend:
- Net migration rate
- Annual rate of natural increase

y-axis: per 1000 inhabitants
x-axis: Years (1985–1990, 1995–2000, 2005–2010, 2015–2020, 2025–2030, 2035–2040, 2045–2050)
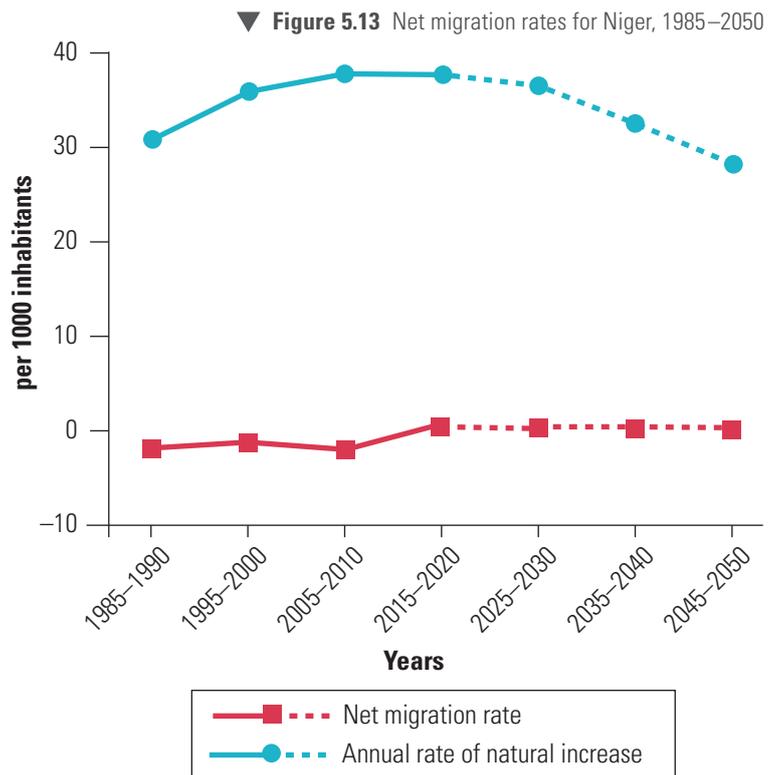
John Roney
Urban Planning Consultant

As an urban planning consultant I provide advice to a range of clients regarding the growth and development of cities. Throughout my 30-year career, I have been responsible for major planning and development projects involving site analysis, environmental and heritage considerations, economic impact assessment, community infrastructure planning and urban design.

I have always been interested in how cities work and the inter-relationship between various land uses. At high school I studied Geography and was fascinated by urban settlement. I remember projects requiring us to plan new towns and having to think about all

of the various components that a new community should enjoy. This inspired me to complete a Bachelor of Town and Regional Planning at university.

Geographic skills have provided an important platform in my work. The spatial analysis of the urban and rural landscape is fundamental in helping to understand where future growth should be directed. I regularly analyse geographic data such as demographic trends, topographic information, environmental mapping, subdivision patterns and journey-to-work data. This information is important in helping to understand the form and function of the city.

In early 2019, Melbourne's population was close to 5 million people. By 2051, it is anticipated that this will increase to around 7.7 million residents. Where will all these new people live, work and play? How will they move around the city? What will Melbourne look like in 2051? These are the questions that I get involved with in my work.

Geographers and urban planners have an important role to play in helping to shape the future of our towns and cities. As our population grows it will be important to ensure that our communities are economically productive, environmentally sustainable and socially equitable. Geography provides critical insights into these and many other important considerations for our future.

of Nigeriens do emigrate outside their country, with these being mostly male. Most destination countries for Nigerien migrants are in the Western African *region* and include Mali, Nigeria and Burkina Faso. They migrate for work hoping to improve their living conditions and that of their family. Nigeriens who have migrated and get regular work often send remittances back to Niger and the transferred funds are generally used for household expenditure. This is an important flow of income for Niger.

Migration into Niger

From the scarce data available on migration into Niger it seems that immigration is very small. Most immigrants come from West African countries bordering Niger: Nigeria, Benin and nearby Côte d'Ivoire. In the past, Niger has not generally received many asylum seekers and refugees although more recent conflict and disasters in neighbouring countries has led to a surge in refugee *movements* into and through the country.

Niger must adjust to the fluctuating population growth caused by transit migrants. Two factors contribute to

the number of migrants who are temporarily in Niger: transiting asylum seekers; and those people who are fleeing conflict in nearby countries. Niger is a country of transit in the so-called Central Mediterranean route for West Africans seeking asylum in Europe. Between 2011 and 2019 about 900,000 people used the Central Mediterranean route to reach Italy, although the rate has decreased in recent years. They most commonly make their way to Libya and are mainly from Nigeria, Eritrea, Guinea, Côte d'Ivoire, Gambia, Senegal, Mali and Somalia. In 2018, of the 23,400 migrants who disembarked in Italy, 76 per cent were men and 24 per cent were women and children. As much as 92 per cent of children were unaccompanied by parents or separated from parents. As the transiting population is predominantly young men, this affects the population structure of Niger by temporarily increasing the number of young males in the population.

Conflict and violence within Niger and in surrounding sub-*regions* contributes to displacement. Niger currently hosts over 180,000 refugees and displaced persons who have fled conflict in neighbouring countries. During the Chad Basin crisis in 2017, in which Boko Haram attacks and counter responses led to the *movement* of around 17 million people seeking safety, the general *distribution* pattern of migration for Niger shifted. Niger received 252,305 displaced people who had fled the violent conflict with non-state armed groups in nearby areas. Refugee camps are concentrated in the south-eastern *region* of Diffa and the northern and north-western *regions* of Tahoua and Tillaberi (see Figure 5.14). The Nigerien government has a US$40 million emergency plan and has called for assistance from development partners to cope with immediate humanitarian needs.

Internal migration

Internal migration is common in Niger. People are often forced to *move* due to natural disasters, including drought and flood, leading to a shift in the population dynamics of rural communities. During long periods of drought, families who can no longer support themselves because of the low *sustainability* of marginal farming are required to *move* taking their children with them. This has led to school closures and a lack of people in the workforce in pastoral *regions* further putting pressure on the availability of food. People displaced by natural disasters are predominantly *moving* to other rural *regions* with the urbanisation rate only increasing from 16.23 per cent in 2009 to 16.66 per cent in 2020.

▼ **Figure 5.14** Refugees in Niger, 2018
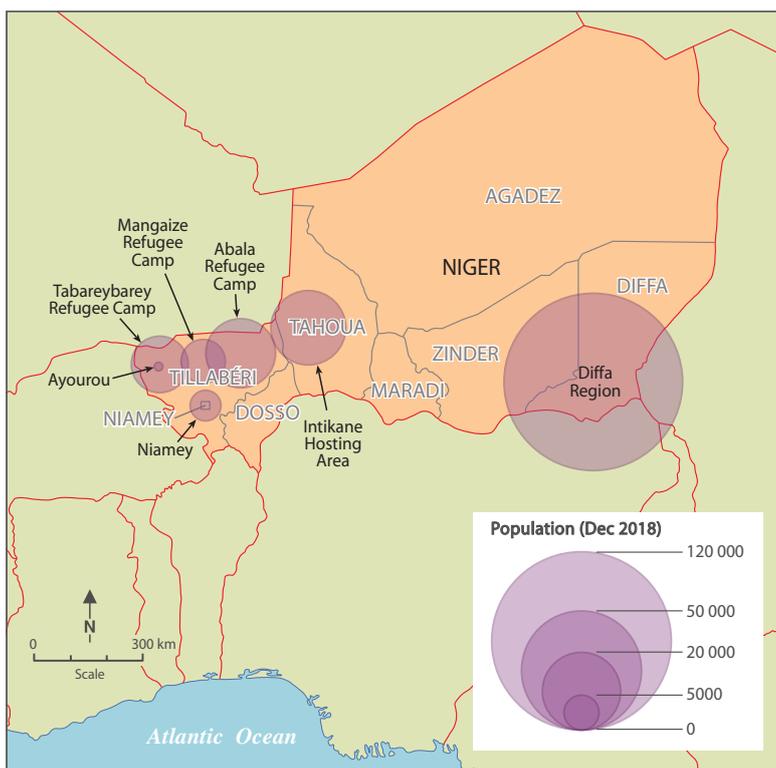
▶ ACTIVITIES

1. Examine Figure 5.13. Describe the overall trend in net migration.
2. Examine Figure 5.14. Describe the location of the largest refugee camp.
3. 'The North African sub-*region* is primarily a migrant transit area.' Evaluate this statement by examining the UN Displacement Tracking Matrix (DTM) website for Niger (https://displacement.iom.int/niger). This is a tool to monitor global displacement and migration.
4. If proposed economic developments in Niger go ahead, including oil, uranium and gold mining, predict how this could affect the nation's immigrant population.
5. Describe the impacts of migration to Niger on people and *places*.

What are the population issues and challenges in Niger?

The rapidly growing population in Niger causes many issues and challenges. These are generally *distributed* in the south-west of the country where over 90 per cent of the population live (see Figure 5.4) as other parts of the country are rendered economically unproductive and uninhabitable by the desert landscape and its climate.

High dependency ratios increase infrastructure demands

Niger faces various challenges of a very youthful population. The median age in 2019 was 15.8 years – this compares to 48.4 years in Japan, 38.4 years in China and 24.4 years in Laos. Dependency ratios measure the proportion of the population who are not typically in the workforce compared to those who are. The United Nations Population Division (UNDP) estimated that in 2020, Niger's total dependency ratio was 110 dependents for every 100 people of working age (with a youth dependency ratio of 104.1 and an elderly dependency ratio of 5.4). A high dependency ratio means that employed people have to support more non-working people.

The challenges resulting from the issue of a high dependency ratio include the need to increase the basic educational and health care infrastructure to service the rapidly increasing numbers of youth. Furthermore, it is difficult for the formal sector of the economy to ensure there are enough jobs, and therefore *sustainable* incomes, for upcoming workers.

The issue of temporary migration that Niger faces adds to these challenges. Immigration can drive positive economic growth and job creation, yet this is not reported for Niger. Transiting migrants don't stay long enough to contribute much to economic activities, however, expenditure from international aid workers who come to work in refugee camps does contribute to the local economy. The flood of refugees in times of conflict has a negative impact because providing for refugees' basic needs is a drain on the tax base of the national economy. While the government maintains an open border policy and does not keep national records of migration, most data comes from international organisations such as the UN Refugee Agency (UNHCR), who also organise support for refugees.

Rapid growth in population increases food insecurity

The issue of a rapidly growing population, and resultant need for additional food resources, has caused the challenge of ensuring *sustainable* food supplies for the entire population. As the population increases, the cost of food also increases with demand and, without adequate supply, the availability of food declines. The World Food Programme estimated that approximately two million Nigeriens were food insecure in June to August 2020, an increase of almost half a million people since 2017. In addition, the World Food Programme also found that 10.3 per cent of children under five years are acutely malnourished and do not consume the recommended vitamins and minerals. This is made worse by the *environmental*

▲ **Figure 5.15** Crops on the fertile banks of the Niger River, close to Niamey, can be prone to flooding and impact Niger's food security

problems Niger faces. For example, drought leads to crop failures and the death of livestock, resulting in periods of increased hunger and famine. Communities are being displaced from their land, putting more pressure on the remaining agricultural land to feed the rapidly increasing population.

For vast *regions* of Niger, drought is a major issue, yet the capital city of Niamey, on the banks of the Niger River is prone to flooding, further affecting Niger's food insecurity (Figure 5.15). Floods in Niamey have increased in frequency in the last ten years and are predicted to increase further, partly as a result of climate *change*. Therefore, flood management research is needed in Niamey to determine the best risk reduction strategies and to ensure adequate land is available to produce food for Niger's population.

A longer-term challenge of the need to produce more food for the growing population is that *environmental* damage is caused by more intensive agriculture. Most notably, since 1975 cultivated land areas *changed* from 12.6 per cent of the total land area in 1975 to 24.5 per cent by 2013. However, the increasing risk of desertification and flooding, both worsened by climate *change*, are leading to a loss of this previously productive agricultural land and an increase in food security risks for the population. Although agriculture in Niger is predominantly subsistence, export crops are encouraged to earn revenue from foreign trade, but this income isn't always returned to local communities.

Increased demands on the *environment*

Niger loses 100,000 hectares of arable land every year through land degradation. The major causes of land degradation include land clearance, poor farming practices and overgrazing which is driven by the desire to provide fuel and food for a rapidly growing population.

The natural *environment* is essential to survival and economic welfare, and more so for rural people in less developed countries who rely on their local area for water, food and shelter. Existing *environmental* problems such as desertification are intensified by refugee inflows that may exceed the *sustainable* carrying capacity of local *environments* and resources. In the Diffa *region* of Niger, vulnerable displaced people cut down trees for to use to construct shelters and as wood fuel for cooking, leading to soil erosion and land degradation (see Figure 5.16).

▲ **Figure 5.16** Men pray in a shelter built with local materials at the Assaga camp in Diffa, Niger. Deforestation from fuelwood use increases soil erosion thereby worsening desertification in the Sahel

Niger's world *regional* context

Niger is surrounded by countries facing a similar population growth issue. Countries with a similar population growth rate to Niger include Angola (3.2 per cent), Burkina Faso (2.8 per cent), Chad (3.0 per cent), Equatorial Guinea (3.5 per cent), Mali (3.0 per cent) and Uganda (3.6 per cent). All these countries are located within Sub-Saharan Africa – some like Burkina Faso, Chad and Mali are located nearby in the desert Sahel *region*, whereas others are more *distant* such as Equatorial Guinea and Uganda in tropical moist central Africa. These countries are also facing similar issues and challenges with their high population growth rate, including issues with a high dependency ratio and a lack of economically active people. However, Niger and its Sahelian neighbours additionally have the added *environmental* pressures of desertification and the associated challenges of ensuring food security for the population.

> ▶ **ACTIVITIES**
>
> 1. Draw a concept map to illustrate the *interconnections* or links between migration issues and challenges.
>
> 2. Identify and describe the social, economic, *environmental,* cultural and political factors contributing to the impacts of population *change* in Niger.

What strategies are used in response to the issues and challenges?

Globally, most population structures are *changing*: their demographic trends can provide data to predict what may happen in the future. As well as planning for a growing population, however, Niger faces other population fluctuations that are less simple to predict and account for. These include the effects of conflict, disease or an *environmental* disaster. For Niger, an economically less developed country, the resources that the national government can draw upon to manage unanticipated *change* are limited and these shortages can reduce the money, labour and expertise available to schemes like family planning and education. Therefore, international organisations have an important role to play in helping all Nigeriens experience a good quality of life. For example, in recent years Niger has required foreign assistance to help manage hundreds of thousands of people seeking refuge from conflict in the *region* as well as to control the illegal trade of smuggling migrants through the Sahara to southern Europe.

Reducing child marriage and increasing female education

Later marriage and increased schooling for girls are key strategies that are targeted in response to the issues of overall population growth and high dependency ratios. Ending child marriage is a target under the United Nations Sustainable Development Goals (SDGs) as a means to increase opportunities for women

globally. It will reduce early child-bearing which will lower population growth. Keeping girls in school is a related key strategy to respond to high population growth in Niger as higher levels of female education are associated with more awareness of birth control measures. Education can result in girls having a better chance to take on a wider range of roles in society, to understand their reproductive health and to make their own life choices and decisions (see Figure 5.17).

In Niger, family planning decisions are usually made by the husband. To *change* these cultural attitudes, the United Nations Population Fund (UNPFA) has implemented a program called 'Husband School' where community meetings are held for men to discuss the importance of family planning and to provide practical information about contraception options. Holding meetings for girls and women enables discussion on related issues such as contraception, marriage age and the benefits of leaving a longer gap between each birth. Education of men and women is a vital part of the strategy to reduce the rate of population growth in Niger and is a vital strategy to *change* some of the cultural beliefs affecting many of Niger's population challenges.

Ending child marriage will improve the educational attainment of girls thereby reducing the rate of population growth by delaying childbirth and increasing women's participation in family planning. It will also have positive economic outcomes for Niger as young women will gain better employment income and, in the

- Child marriage robs girls of the opportunity to thrive. A human rights violation, child marriage denies girls their health, education and the choice of when and whom to marry.

- Child marriage directly hinders progress on 8 of the 17 Sustainable Development Goals. Unless the international community tackles child marriage, it will not fulfil its commitments to reduce global poverty.

12,000,000

12 million girls are married every year before they reach 18

1 in 5 girls globally are married before 18

1 in 8 girls in least developed countries are married before 15

What does child marriage mean for girls?

POVERTY

Child brides do not receive the educational and economic opportunities that help lift them and their family out of poverty. **THEY ARE MORE LIKELY TO BE POOR AND REMAIN POOR.**

EDUCATION

Child brides are likely to **DROP OUT OF SCHOOL,** hindering their personal development, preparation for adulthood and reducing their earning potential.

INEQUALITY

Child brides normally have **LITTLE SAY IN WHEN OR WHOM THEY WILL MARRY.** Marriage often ends girls' opportunities for education, better paid work outside the home and decision making roles in their communities.

HEALTH

Child brides face high risk of death or injury: girls who give birth before the age of 15 are **MORE LIKELY TO DIE IN CHILDBIRTH** than women aged 20-24. Their children are less likely to live beyond their 1st birthday.

HIV/AIDS

Child brides are exposed to frequent, unprotected sex in part due to the pressure to demonstrate their fertility, and lack the knowledge or power to negotiate safer sexual practices. Child brides often marry older husbands, **WHICH IN TURN INCREASES THEIR RISK OF HIV.**

VIOLENCE

Child marriage puts women and girls at increased risk of violence throughout their lives. Child brides are **MORE LIKELY TO DESCRIBE THEIR FIRST SEXUAL EXPERIENCE AS FORCED.**

END CHILD MARRIAGE TO HELP GIRLS FULFIL THEIR POTENTIAL

www.GirlsNotBrides.org   **#EndChildMarriage**

GIRLS NOT BRIDES | The Global Partnership to End Child Marriage

medium term, fewer children means that fewer new or expanded schools are needed. The International Centre for Research on Women (ICRW) and the World Bank calculate that, by ending child marriage, Niger could save more than US$25 billion over the 15 years between 2014 and 2030.

Reducing rapid population growth can slow negative *environmental* impacts, improve economic opportunities, and increase women's life choices. *Changing* marriage age and traditional beliefs about the importance of having many children require cultural *changes* that are challenging to influence. This is especially so in conservative communities such as in rural *regions*, and there are associated cultural and social issues where age-old traditions and authorities are challenged by modern, and often foreign, ideas.

Government family planning policy

The government of Niger committed to the FP2020 (Family Planning 2020) from 2012 and updated their pledge in 2017 by increasing their financial commitment to fund an expanded program delivery to meet their targets for family planning. Niger's strategy includes six specific commitments. They will:

▶ increase health spending to fund free maternal and child health care and family planning

▶ train 2500 workers to teach reproductive health issues, including family planning

▶ create 2120 new contraception distribution sites

▶ equip 2700 health centres to support reproductive health education

▶ make the legal age of marriage 18 years

▶ improve female literacy.

Effectiveness of key strategies

Increased use of contraception

Niger's target measure in FP2020 was to increase contraceptive use from 12 per cent in 2012 to 25 per cent in 2015 and to 50 per cent in 2020. There is progress being made but the use of contraceptives was only 17 per cent in 2020. The government has acknowledged that reaching 50 per cent contraceptive use by 2020 was ambitious, and data has not yet been released to show whether it was effective. However,

in 2019 it was reported that the use of contraceptives in Niger has prevented over 230,000 unintended pregnancies and avoided 930 maternal deaths. A range of implementation challenges exist in providing family planning education as recruitment of qualified health workers and supplying products has been difficult to deliver, especially for isolated populations – and further disruption to the programs have been caused by the COVID-19 pandemic. Whether all these challenges are overcome will determine the final success of the policy.

All young people in school up to age 16

Not all children complete primary school in Niger. In 2012 only 28 per cent completed primary school. Niger is making some progress, especially since 2012, in increasing access to education, particularly for girls and adolescents. Being able to go to school has now become a reality for more children in Niger with increased enrolment rates and with completion rates of 35 per cent in 2020 but there is a long way to go. Early in 2018, Niger's then President Issoufou Mahamadou pledged free and compulsory education for everyone up to the age of 16, because this can reduce underage marriages and pregnancies. However, the regular attendance rate is still low today. School attendance in Niger is variable, with many students missing school because of food insecurity and extreme poverty. Poverty is one of the greatest barriers to education for the country. Increasing education levels will improve literacy rates which can provide girls with more options and lead to later marriage, and delay childbirth, an example of *interconnection* between education, literacy rates and birth rates.

Evaluating the effectiveness of the strategies in Niger is difficult as data is scarce.

▶ ACTIVITIES

1. Investigate the economic, social, political and *environmental* impacts of ending child marriage on people and *places* in Niger.

2. Drawing on internet sources, including FP2020, examine the progress of Niger's FP2020 commitment after 2020.

What is the role of geospatial technologies?

Using geospatial technology to support infrastructure development

With the rapid increase in population in some of Niger's *regions*, the government has started to monitor population and existing infrastructure to reduce the risk of flooding in Niamey, the capital city. The increased population has meant that more people are at risk of death and displacement during the wet season, particularly in areas without the required drainage infrastructure.

The program, in collaboration with the World Bank and the Global Facility for Disaster Reduction and Recovery (GFDRR), first involved a team of volunteers

from the OpenStreetMap community in Niger who gathered georeferenced data about the households, infrastructure and flood risk in Niamey. This team gathered up to 15,000 digital data points by mid–2019. The Drone Africa Service company now trains this team of volunteers in the use of drones to gather higher resolution images of the city to model flood risk and determine the required infrastructure.

The georeferenced data and drones will continue to be used to determine areas of high flood vulnerability due to the increasing population of the city. This will then be used to improve drainage infrastructure to reduce the numbers displaced by flooding in the future.

Using geospatial technology to monitor people *movements*

The UNHCR is using drone technology to monitor the *distribution* of displaced people in the Diffa *region*. Up until mid–2016 displaced people mainly settled in existing towns and villages. This *distribution changed* with over 50 unplanned sites of informal settlements being temporarily established along the main road in the *region* (see Figure 5.18).

UNHCR have partnered with REACH, an organisation that collects humanitarian data, to map the villages and towns hosting refugees and provide information about infrastructure and how it supports the rapidly *changing* population. Freely available satellite imagery has been used and has also been supplemented with imagery captured by drones (see Figure 5.19) equipped with cameras to provide up-to-date data of these areas. The images are combined with other GIS-referenced information to produce accurate maps of settlements, mapping people, water systems and sanitation facilities to better respond to people's needs. The drone images have provided data on the reduction of trees as displaced people use wood for cooking fuel and shelter. Furthermore, there is significant need to monitor the effects of flood water on the increased *distribution* of water-borne and vector-borne diseases such as malaria, bilharzia and cholera with which there is a strong *spatial association*.

Effectiveness of geospatial technologies

The use of geospatial technologies to respond to the issues of population growth is still a growing field, although initial reports into the various uses described above have shown there to be a high level of success. The OpenStreetMap program has increased its participation, leading to more University students and young professionals being trained in the data collection program. This has led to more robust data about the

Figure 5.19
Aziz Kountche, Nigerien drone expert in Diffa *region* Niger

vulnerability of the growing population to flood risk in Niamey. This initiative can only be considered a partial success as Niamey suffered severe floods in September 2020 destroying houses and disrupting transport. Geospatial technologies can provide important data to make decisions about flood mitigation. However, Niamey authorities and individuals do not have the funds to implement the recommendations for infrastructure developments. The use of drone technology in Diffa has also been very successful at collecting data and mapping refugee villages, leading to UNHCR planning to use the tool again in Diffa and elsewhere in Niger.

Using geospatial technologies can be expensive, and access to supporting electronic devices and data services may be restricted in some *regions*. In both these examples international organisations have provided resources. Niger would unlikely be able to afford these initiatives.

> ▶ **ACTIVITIES**
>
> **1.** Outline the role and effectiveness of geospatial technologies in the development and implementation of strategies in response to population issues in Niger.

6 Population trends and issues: growth to ageing in China

With over 1.402 billion people in 2020, China's population is the largest in the world (Figure 6.1). Its growth since the 1950s was unprecedented and it is currently home to 17.9 per cent of the world's total population. However, its growth is slowing significantly, reaching a growth rate of only 0.53 per cent in 2020. This is largely due to its well-known 'One Child Policy' and associated social trends. In addition to managing such an enormous population, China currently faces issues relating to its gender imbalance, uneven population *distribution* and its transition into a rapidly ageing population.

What are the geographic characteristics of China?

China is located in East Asia (Figure 6.2). It has a land area of 9,569,901 square kilometres, characterised by varied *environments* that include grasslands, deserts, mountains and coastline. The alluvial eastern plains and southern coasts of the nation are more fertile and consequently are the site of most productive agricultural enterprises. To the north and west, the Gobi and Taklamakan Deserts are challenging *places*

▼ **Figure 6.1** Ten most populous countries in the world, 2020

2020	Country	Population (millions)
1	China	1402.4
2	India	1400.1
3	United States	329.9
4	Indonesia	271.7
5	Brazil	211.8
6	Pakistan	220.9
7	Nigeria	206.1
8	Bangladesh	169.8
9	Russia	146.7
10	Mexico	127.8

for people to live. The mountainous ranges that surround the high-altitude Tibetan Plateau in the south-west of China are also inhospitable. China's climate varies considerably, ranging from subarctic in the far north to tropical in the far south.

▶ **Figure 6.2** China's location in Asia

What are the population characteristics of China?

China's population has experienced rapid growth. The Chinese population increased from 552 million in 1950 to over 1.3 billion by 2001. During this period life expectancy improved from 44 years to over 71 years. This *change* reflects the improvement in the wellbeing of the population. According to the World Bank, the population of Chinese in extreme poverty fell from 756 million to 25 million between 1990 and 2013 – an extraordinary and unprecedented economic achievement. Today China is regarded as an upper middle-income country, although this level of development is highly uneven. China's major cities and coastal areas are far more prosperous compared to rural and interior *regions*. Similarly, China's population is unevenly *distributed* and population density varies considerably (Figure 6.3). The majority of the population are concentrated along the eastern coast while the population is most sparse in the mountainous, desert, and grassland *regions* of the northwest and southwest (Figure 6.4).

Approximately 64 per cent of China's population live in urban areas and its cities are among the most densely populated *places* in the world (Figure 6.5). Although China contains 56 ethnic groups, 92 per cent of the population are Han Chinese, who are generally concentrated in the eastern *region*.
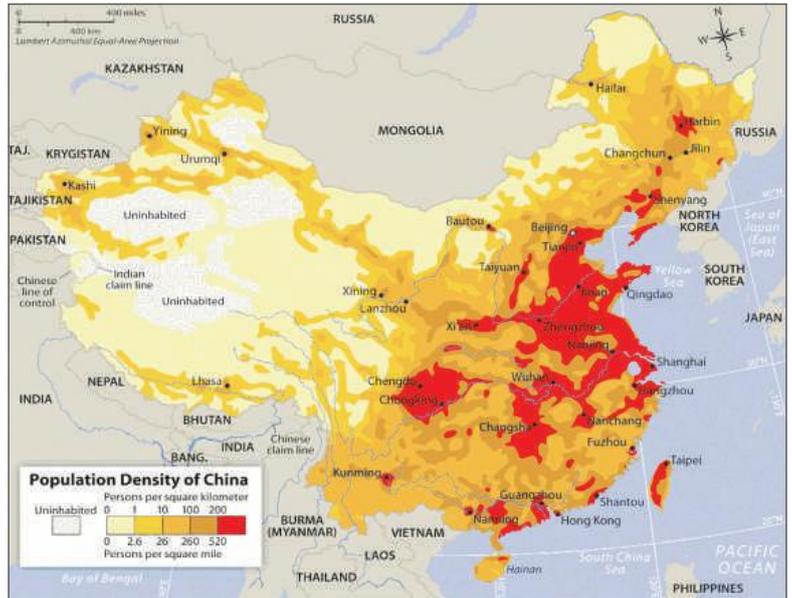
▲ **Figure 6.3** China's population is unevenly *distributed*

▲ **Figure 6.4** A sparsely populated area of China

▲ **Figure 6.5** A fishing village just a few decades ago, Shenzhen is now a bustling megacity with 12.7 million people

▶ ACTIVITIES

1. Refer to Figure 6.1. It is commonly predicted that India will overtake China as the world's most populous country by around 2026. What demographic factors are likely to explain this prediction?

2. Refer to Figure 6.3.
   a. Describe the *distribution* of China's population.
   b. Account for this *distribution* by referring to China's physical characteristics.
   c. What physical characteristics might lead to an area being uninhabitable?

3. Refer to Figure 6.5. Estimate the average number of levels in buildings shown in this photograph. Suggest why urban areas tend to have taller buildings.

What is the nature of the population trend in China?

China's population has grown significantly from 552 million in 1950 to 1.402 billion in 2020 (Figure 6.6). Although China's population has continued to grow, the rate of growth has slowed, and the country is transitioning into an ageing population. It is best to view population *change* in China in terms of different time periods.

Apart from a short-term drop in population in the late 1950s due to famine, from 1949 to the mid 1970's China experienced rapid population growth. A political factor that encouraged this growth was that the leader, Chairman Mao, believed that a large population provided economic strength. A large number of workers were relied on to achieve Mao's political goals, and children were traditionally seen as an important source of labour. At the time the communist government also condemned birth control and banned imports of contraceptives. These factors contributed to a high birth rate. As shown in Figure 6.7, there was a natural population increase from 1962 as a result of the large difference between the birth and death rates. Figure 6.8 shows the initial increase in China's total fertility rate (TFR) in the mid 1950's rising to a peak in 1965 of 6.384 children per woman. In addition to a high fertility rate during the 1960s, China's population growth is *interconnected* to a reduction in the infant mortality rate (IMR) and an increase in life expectancy. Since the 1950s, China's IMR decreased

▼ **Figure 6.6** Population growth in China from 1950
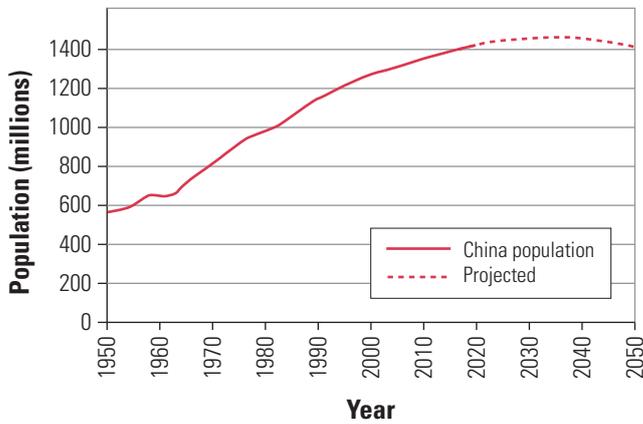
▶ **Figure 6.7** China's demographic transition
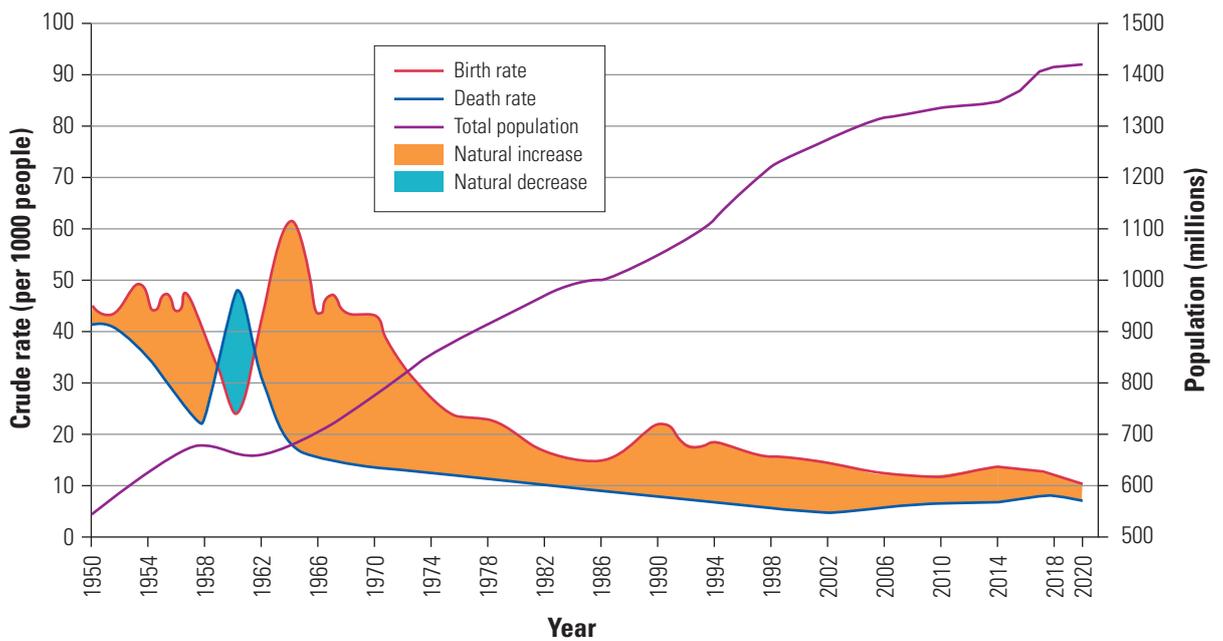
▶ **Figure 6.8** *Changes* in China's fertility rate over time
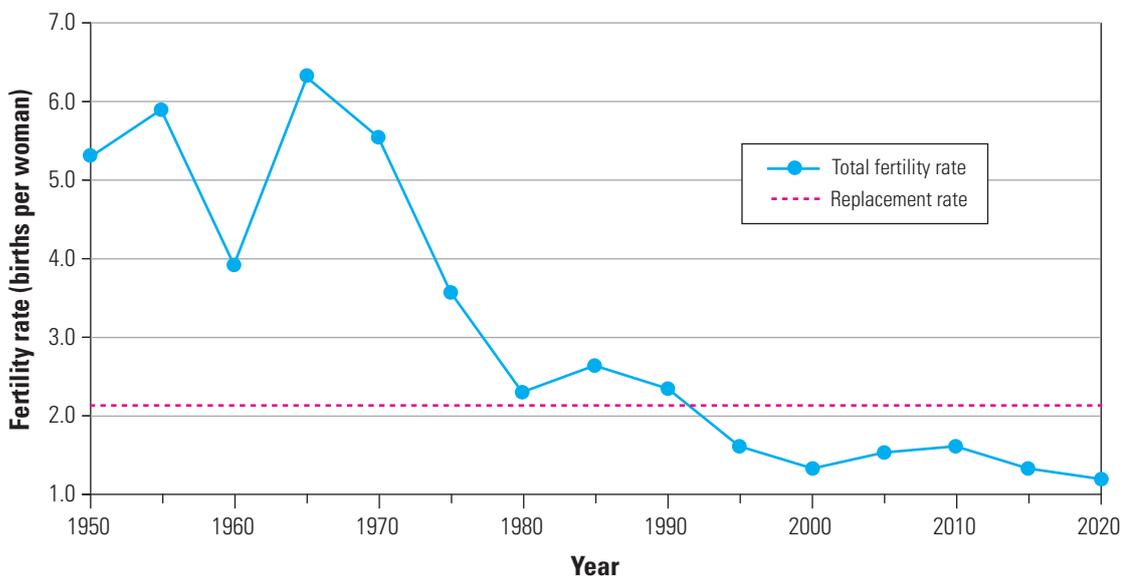
significantly due to improved public health services and an increase in food availability. Figure 6.9 shows a reduction from 84.3 deaths per 1000 live births in 1969 to 60 deaths per 1000 live births in 1975. Over a similar period, China's life expectancy increased from 44 years in 1950 to 62 years in 1975. The total population expanded to over 800 million by 1970.

From 1970 onwards China transitioned from rapid to slower growth. The difference between the birth and death rate narrowed (Figure 6.7) reducing the rate of natural increase. The TFR declined (see Figure 6.8) reaching 1.3 children per woman by 2020. The reduction in China's population growth (Figure 6.10) correlates with this reduction in fertility. Accompanying this *change*, there was continued improvement in the decreasing infant mortality rate to 1.5 deaths per 1000 live births in 2020 and increasing life expectancy to 77 years in 2020. To keep a population stable, the

TFR needs to remain at the replacement rate of 2.1 children per woman. China is now well below this level and the population is predicted to decline in the future (Figure 6.6). The reason the population hasn't yet declined is due to population momentum. Momentum is the tendency for population growth to continue beyond the time that replacement-level fertility has been achieved because of the relatively high concentration of people in the childbearing years, even if each family is bearing fewer children.

China is currently one of the fastest ageing countries in the world. This is mainly due to the rapid fall in birth rates which has accelerated this *process*, together with rising life expectancy. Figure 6.11 shows how the population structure of China has *changed* over time and its prediction for 2050. The narrowing of the 0−4 age group over time coincides with China's falling TFR while the broadening of the older age groups

▼ **Figure 6.9** *Changes* in China's infant mortality rate over time
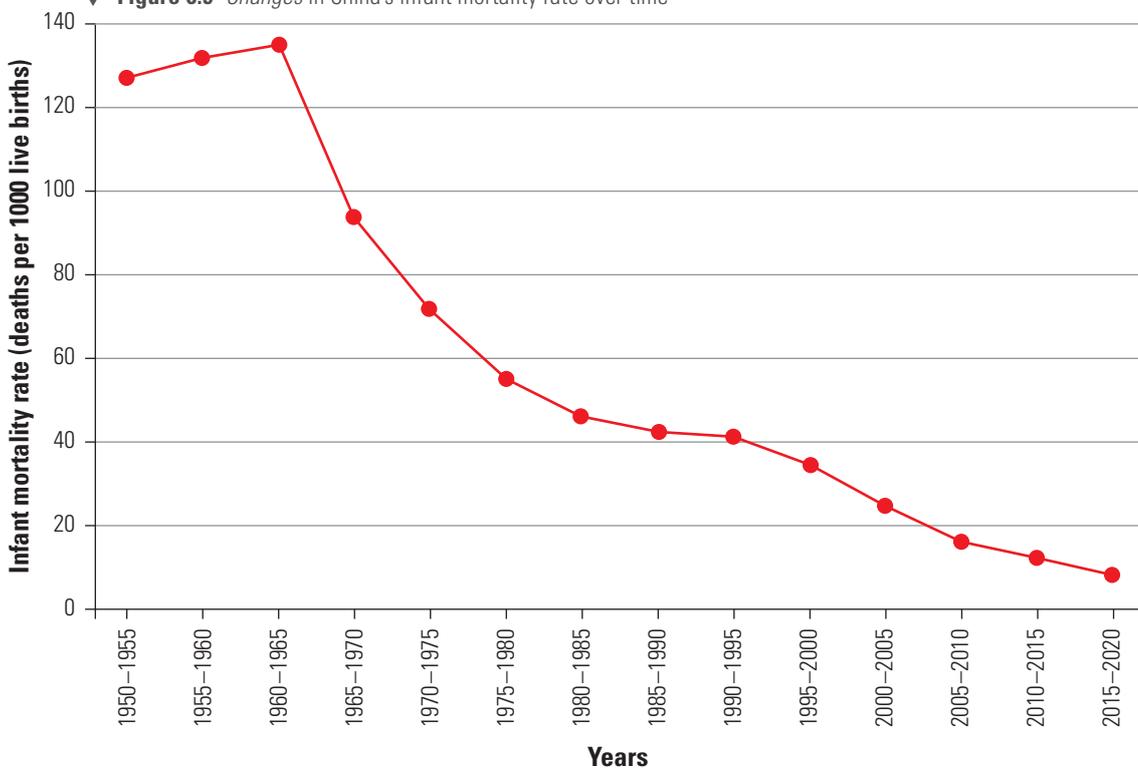
▼ **Figure 6.10** Population growth rate 1960−2020

a

Age group, 1950

| Male | Female |

Population (percentage)

b

Age group, 2020

| Male | Female |

Population (percentage)

c

Age group, 2050 (Projected)

| Male | Female |

Population (percentage)
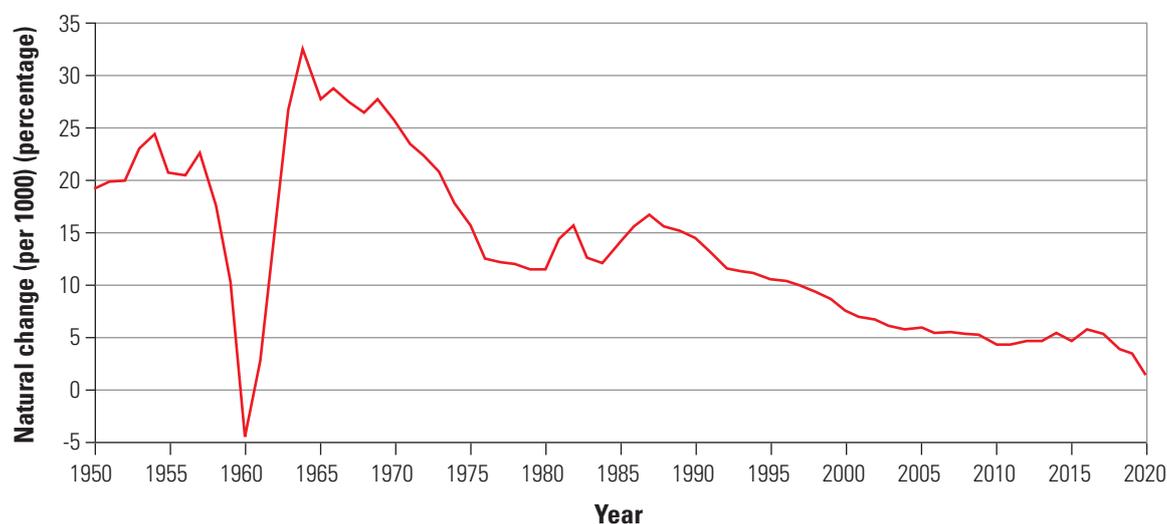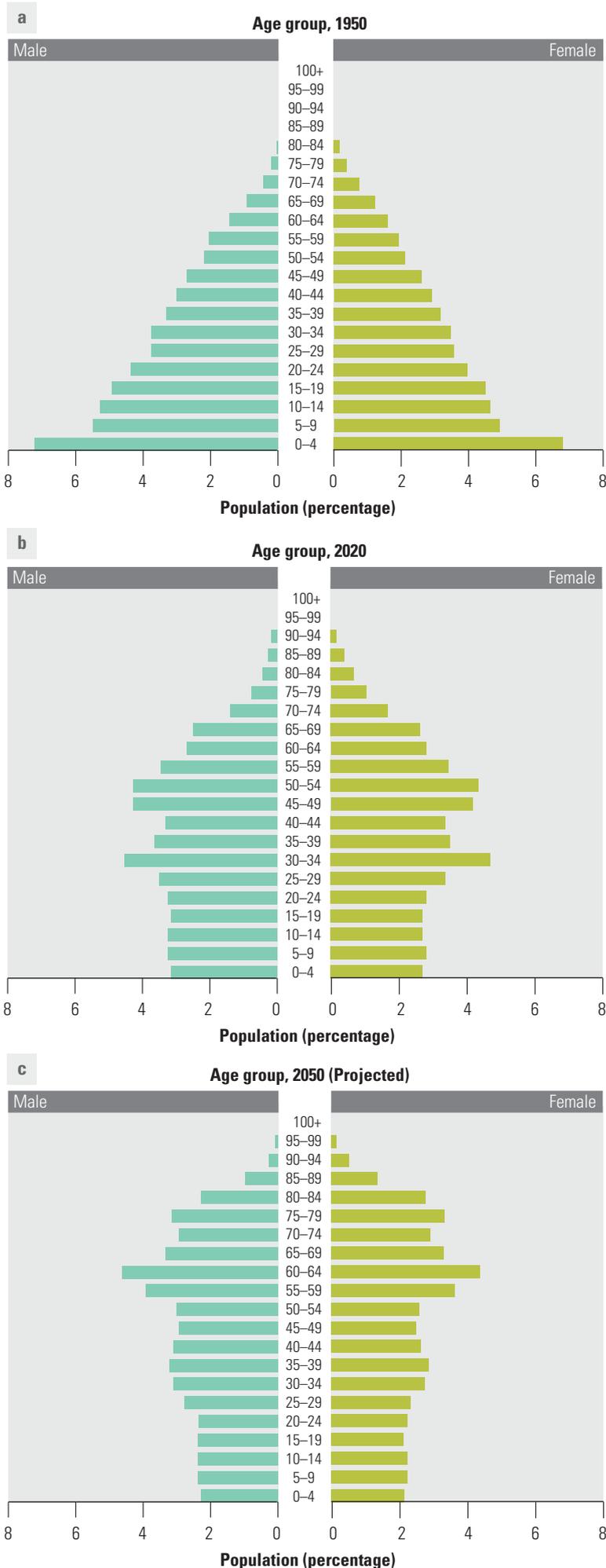
indicates a fall in death rate and rise in life expectancy. Note that in Figure 6.11 (b) bulges appear a generation apart (30–34 years and 45–54 years), showing the long-term impact fertility rate *changes* can have on population structures. Baby booms can also lead to secondary booms when these babies subsequently reach their childbearing years.

In 1960, 6.2 per cent of the Chinese population were aged 65 or over and by 2020, 13 per cent of the population were aged over 65 years. The United Nations projects this percentage to reach 27.5 per cent by 2050. The TFR peak of 1965 baby boomers (Figure 6.8) will be aged over 65 years in 2030, swelling the numbers of elderly in China.

▶ ACTIVITIES

1. Using Figures 6.6 and 6.7, describe the *change* in China's population since 1950 and the rate at which it has *changed*.

2. Figure 6.8 shows that China's TFR fell below the replacement level during the 1990s. Suggest a reason why China's population continued to grow despite having such a low TFR.

3. a. Describe the *changes* in China's IMR from 1969–2016 using Figure 6.9.

   b. List two factors that were responsible for this *change*.

4. Research China's population characteristics such as TFR, IMR, life expectancy, crude birth rate and crude death rate and compare these with some other Asian countries. Summarise your findings in a table.

5. Refer to Figure 6.11.

   a. Describe each of the three population structures in terms of their shape and any significant features.

   b. State whether the shape of each pyramid indicates a growing, stable or declining population.

   c. Based on the bulges of the 2020 pyramid, predict and sketch what the 2030 pyramid might look like. Compare your predictions with the projected pyramid at www.populationpyramid.net.

   d. Identify China's past baby booms. What impact did these have on the age structure of the national population?

   e. Based on the *change* in the population structure between 2020 and 2050, what demographic challenges might China face in the future? In your answer, refer to specific age groups and their proportion.

   f. Using Figure 6.7 and your knowledge of the Demographic Transition Model (see Chapter 1, pages 23–25) name the stage that applies to each of the population pyramids. Justify your choice.

How does population *movement* contribute to structural *change* in population?

China is predominantly a migrant donor country, with more people emigrating than immigrating. In 2020, there were 10.7 million emigrants and 1 million immigrants, representing a large net loss of people from China. Only 0.1 of China's population is international migrant stock. The total net migration is –0.4 migrants per 1000 of the population.

Since international migration to China is very small relative to the overall population, internal migration is having a much larger impact on the nation's population structure and *distribution*. Rural-to-urban migration in China constitutes the largest internal *movement* in the world, and is a major influence on the widening gap between urban and rural populations (Figure 6.13). Between 1985 and 2015, China's urban population increased by over half a billion people – accounting for more than a fourth of all worldwide urban growth over those decades but also well over twice as much urban population growth as the next largest contributor, India. Between 1958 and 1983 the *movement* of people from rural areas was constrained by a residential registration system (the hukou) that classified each person as a rural or urban worker and regulated who could migrate between rural and urban areas. The hukou restrictions have recently been relaxed, largely to stimulate economic growth and reduce political unrest.

Three-quarters of all internal migrants aged 15–44 involved relocation *movements* from rural to urban areas. This creates challenges in urban areas to ensure that internal migrants have accommodation and access to services that they need. The rapid growth of cities has benefited from migrants who work in the construction, manufacturing and service industries. *Interconnected* with this *change*, the rural population is decreasing in size due to the departure of young adults. Some couples depart to find work, thereby leaving their children to be raised by grandparents. Elderly people in rural areas are traditionally cared for by their children. However, rural out-migration has impacted on this cultural tradition, as their urban-dwelling offspring are unable or unwilling to provide day-to-day care from afar.

▶ ACTIVITIES

1. Referring to China's internal migration, describe how internal migration has affected China's urban and rural populations.
2. List the push and pull factors responsible for China's internal population *movement*.
3. What issues and challenges do you think might result from urbanisation in China?

◀ **Figure 6.12**
This market vendor has emigrated from rural China to settle in Hengdian, China. Frequently, migrants become street vendors because the start-up investment is small and the skills required are often easily learned

▼ **Figure 6.13** *Changes* in rural and urban populations
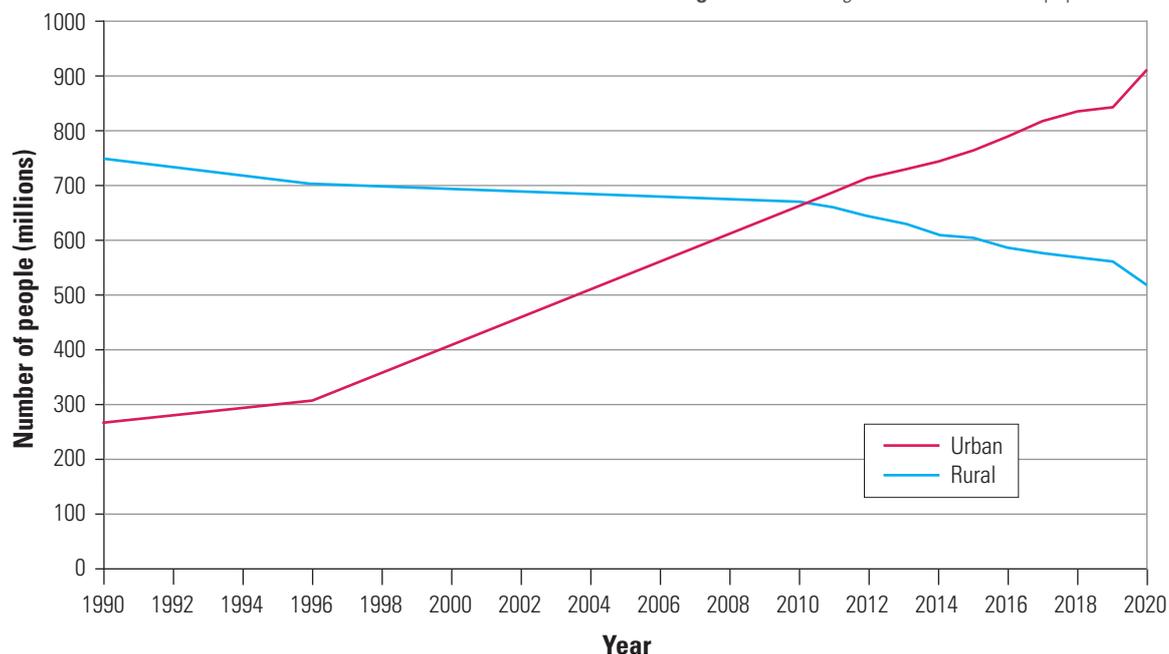
What were the population issues and challenges in China in the 1970s?

The People's Republic of China was established in 1949 when the Chinese Communist Party took power. Rapid population growth followed as a large population was favoured for political and economic strength. During the 'Great Leap Forward' between 1959 and 1961, all energies were directed to industrial development while farming activities were neglected resulting in a disastrous famine. It is estimated that between 16.5 to 29.5 million people died during this period. Figure 6.10 shows a significant drop in the growth rate during this period as the death rate (due largely to famine) temporarily exceeded the birth rate. By 1964 the fertility rate began to recover as people felt more secure about their future. As the growth rate recovered throughout the 1960s, China was faced with huge population growth projections and the Chinese government authorities feared that the country would not be able to provide sufficient resources for its population – the threat of a future Neo-Malthusian crisis.

What were the strategies in response to the issues and challenges of the 1970's?

In 1972, the Chinese government began the 'later, longer, fewer' family planning campaign at a time when women in China had an average of almost six children. By delaying marriage, women would have babies when they were older, with a longer gap between pregnancies and fewer births per woman. While the birth rate fell, the population continued to grow at an average of around 15 million people each year. This continued population momentum prompted a national-*scale* response to family planning: the One Child Policy.

China introduced the One Child Policy in 1979. It is known as an anti-natalist policy, which is a policy that discourages birth. The policy set a minimum age of marriage and regulated the number of children that each couple could have. Couples were discouraged from having more than one child while the values of one-child families were promoted to the nation (Figure 6.14).

The One Child Policy was enforced using a complex system of rewards and penalties. Those couples with one child who pledged that they would not have a second child were given a certificate, which provided benefits including cash bonuses, longer maternity leave, preferential treatment in housing allocation and better maternal health care. Children from one-child families received preferential treatment in education, health care and job assignment. Penalties for those parents who had a second child included fines, demotions and lack of access to education for their children.

The policy was effective in reducing the population growth rate (Figure 6.10) and TFR (Figure 6.8). Chinese officials have long claimed that the One Child Policy – in place from 1980 to 2015 – averted some 400 million births. However, it must be noted that the One Child Policy coincided with major economic *changes* in China. The *changes* in economic policy, including the expansion of private enterprise, led to an improvement in economic prosperity as China opened up to the world. Consequently, this greatly decreased poverty rates, meaning more people were educated, received health care and the wellbeing of the population improved. These social and cultural factors, coupled with urbanisation and women's greater participation in the workforce, led to a decline in birth and death rates. Thus, the combination of the One Child Policy and improved living standards reduced the rate of population growth.

By 2015, the One Child Policy had undergone considerable modifications to prevent too severe a drop in the birth rate. Parents were allowed to have a second child when:

▶ one or both parents were only children
▶ the first born was severely disabled
▶ parents were part of an ethnic minority.

Exemptions also existed when a first pregnancy results in twins and for families in rural areas. Although the One Child Policy was applied strictly to urban-dwelling Han Chinese, since 2008 Han Chinese rural families could apply to have a second child if their first child was a girl. This was because children were seen as an essential part of the rural labour force. Consequently, the policy enjoyed much greater success in urban than in rural *regions*. Although the policy significantly reduced birth rates in cities, many households prospering from China's market economy decided that they could afford the fines imposed on them and they often chose to have a second child regardless of financial penalties. The policy was abolished in 2016, although it was initially planned to continue for a much longer period. In 2021 the Chinese government announced that couples were permitted to have three children.

▶ **Figure 6.14**
This type of artwork was displayed in China to support the One Child Policy

▶ **Figure 6.15**
The number of boys born for every 100 girls between 1980 and 2020

Year	Number of boys
1980	107
1985	108
1990	111
1995	116
2000	117
2005	119
2010	117
2015	116
2020	113

A number of impacts arose as a result of the One Child Policy.

Since the 1980s, China has experienced an abnormally high sex ratio at birth (SRB). By 2000, China had an SRB of 116.9 (Figure 6.15), the highest figure among the countries of the world and considerably higher than the normal sex ratio, which ranges between 103:100 and 107:100 (where the denominator of 100 represents the number of female live births). Factors contributing to this gender imbalance include increased deaths of female babies due to infanticide, neglect or abandonment. Furthermore, though it is now illegal, many couples practiced sex-selective abortions after an ultrasound during pregnancy. The cultural preference for boys is linked to the fact that it is the sons that look after their parents when they get older, whilst a daughter would marry into a new family and look after her husband's parents. This desire for a son was heightened by the One Child Policy and has led to a marked gender imbalance. In some areas, the imbalance has led to an excess of bachelors, with approximately 30–50 million more men than women across the nation.

China's gender imbalance is more prominent in low-income rural areas. Figure 6.16 shows the *distribution* of this phenomenon. The demographics of some remote Chinese villages are *changing* as young women are leaving poor rural villages and relocating to cities where they have better opportunities to live, work and marry in higher-income areas. They are leaving behind growing numbers of bachelors, presenting challenges for government due to drastic *changes* in local-*scale* population structures. One small village of 300 residents has no young women of marriageable age. This so-called 'bachelor village' of Banzhushan in Hunan province is the most extreme example of the conundrum where girls born in this poor area have left and potential immigrants stay away. This phenomenon is significantly *interconnected* to China's rapid urbanisation.

There were other social impacts on families. Generations of single children were growing up with devoted parents and grandparents with a desire for their child or grandchild to experience the benefits they had been denied. This led to the phenomenon of little emperors or empresses who were indulged by their family. However, this was more common in urban than rural areas, especially amongst the modern upper class and wealthier Chinese families. Associated with this phenomenon was an increase in childhood obesity. One study reported that between 1975 to 2016, the overweight and obesity rate among Chinese children and adolescents aged 5–19 increased from 4 per cent to over 18 per cent. Other impacts on families were psychological and social problems associated with large numbers of children being raised during their formative years without their absent parents' care, usually in rural areas. There was also an impact on the elderly due to the so-called 4–2–1 conundrum where one offspring is responsible for the care of both parents and four grandparents (Figure 6.17), placing them under extreme social and financial pressure. In the future the elderly will be less able to rely on their children to care for them. The One Child Policy has *changed* the traditional Chinese family structure and attitudes – a huge cultural shift in a short period of time.
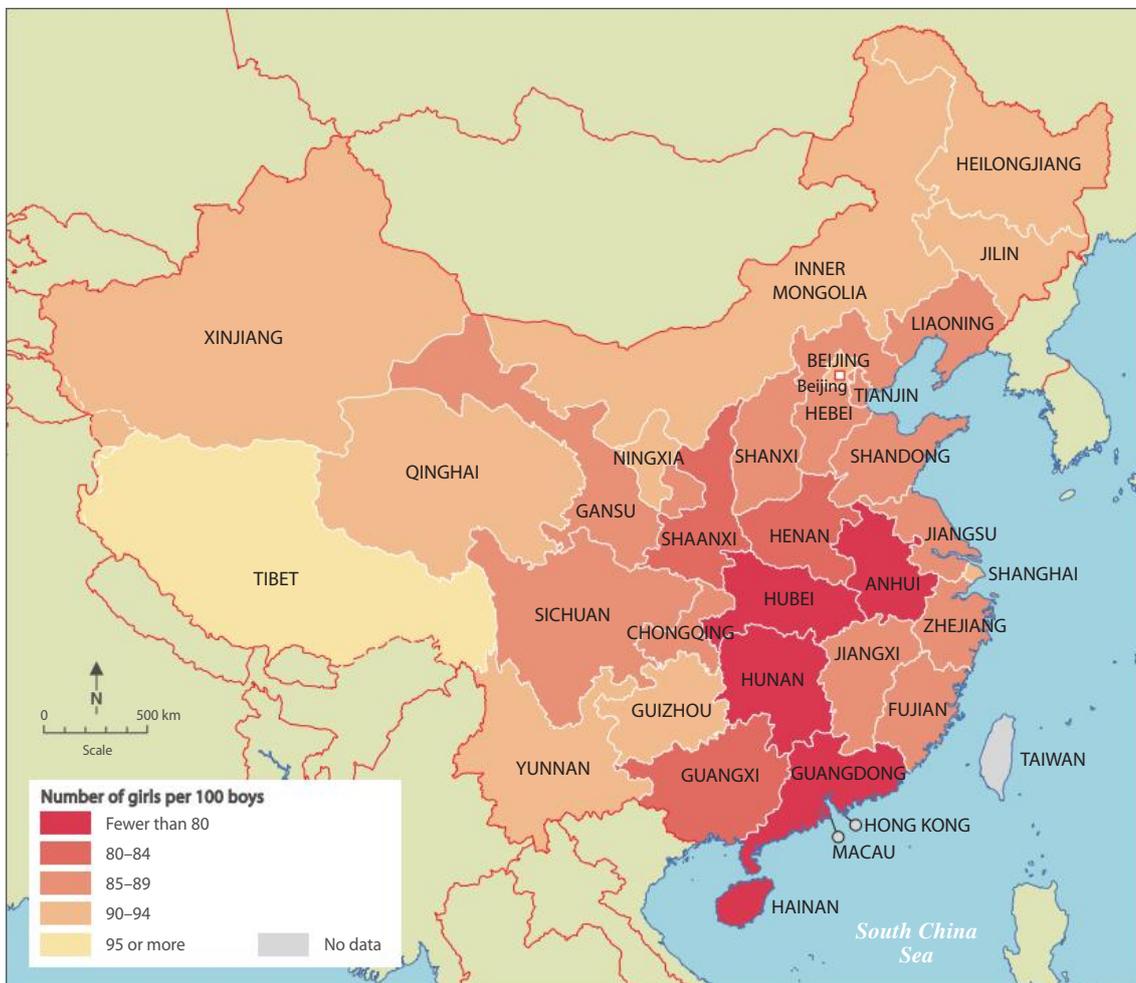
◀ **Figure 6.16**
China's gender imbalance, 2015

Number of girls per 100 boys

- Fewer than 80
- 80–84
- 85–89
- 90–94
- 95 or more
- No data

▲ **Figure 6.17** A typical Chinese family – one child with parents who are only children and one set of grandparents

Human Rights groups were critical of the loss of personal freedom imposed on people who were not able to choose the size of their family as a result of the One Child Policy. These critics considered the strategy draconian in nature. When examining China's One Child Policy, it is essential to remember the Chinese government's perspective, which is that human procreation and material production must be in balance – a Neo-Malthusian approach. The One Child Policy avoided a Malthusian catastrophe by reducing the birth rate and enabling economic growth to at least keep pace with population growth so that economic growth per person remained positive. Population planning is considered a social decision at the national *scale* rather than an individual one. In China private and public interests are considered *interconnected* and inseparable.

▶ ACTIVITIES

1. Summarise the population issues and subsequent challenges that China was facing prior to the introduction of the One Child Policy.

2. What does the slogan 'later, longer, fewer' refer to?

3. Summarise the main features of China's One Child Policy.

4. a. Suggest three factors that may have contributed to the abolition of the One Child Policy.

   b. Explain why China's population did not boom following the abolition of the One Child Policy.

5. Discuss the following statements about China's population policies as a class:

   a. The One Child Policy was more difficult to enforce in rural areas than in urban areas.

   b. The One Child Policy was not necessary; other influences such as urbanisation would have reduced birth rates.

   c. Personal freedom of choice has been sacrificed for the national good.

6. An initial aim of the One Child Policy was to limit China's population to 1.2 billion by 2000. Did it manage to achieve this aim?

7. a. Evaluate the success of China's One Child Policy using two named criteria.

   b. Suggest three issues or future challenges that might have developed due to this policy.

8. a. Using Figure 6.16, describe the *distribution* of China's gender imbalance.

   b. What challenges does China face due to this imbalance?

   c. Investigate India's gender imbalance issue. How is it similar or different to China's situation?

9. Using a table, list the positive and negative social, economic, *environmental* and cultural impacts of the One Child Policy.

10. Explain why the 4–2–1 phenomenon is a significant issue.

What are the current population issues and challenges in China?

China faces a unique demographic challenge as its population continues to grow while ageing rapidly. In 2020, 12 per cent of China's population was aged 65 and over. This could reach as high as 34 per cent by 2050 (Figure 6.18). The *distribution* of this older population is uneven with approximately 60 per cent living in rural areas. Despite China's strong economic growth in recent decades, many rural *regions* remain poor, and their elderly population are more vulnerable due to a lack of savings and a reliance on family support.

Environmental issues and challenges

A sustained period of Chinese population growth, together with huge economic development, has come at a massive cost to the *environment* through high levels of land-use *change*, consumption of resources, and pollution. For example, in 2021 *Time Magazine* reported that air pollution alone caused more than 49,000 deaths in Beijing and Shanghai in the first half of the year. Other reports indicate that 750,000 annual deaths in China are attributable to respiratory diseases associated with poor air quality. While air

pollution is a major *environmental* and health problem, water and soil pollution may pose a greater threat. The impact on the *environment* is made worse by the growing affluence of China's urban middle class, who are now adopting Western-style consumer patterns. Although China occupies only 7 per cent of the global total land area, it feeds about 20 per cent of the global population. The increase in population has led to *unsustainable* utilisation of land resources which has contributed to the issue of desertification and the challenge of feeding China's population into the future. The growing population trend, combined with rapid industrial growth fuelled by a dependence on coal, are significant drivers of climate *change*. This presents a challenge for the government as it seeks to develop its economy whilst also dealing with the pressure to improve its *environmental sustainability*. China represents more than a quarter of global carbon emissions and in 2020 President Xi Jinping announced that China will reach peak emissions before 2030 and aim to achieve carbon neutrality before 2060, a significant challenge for the government.
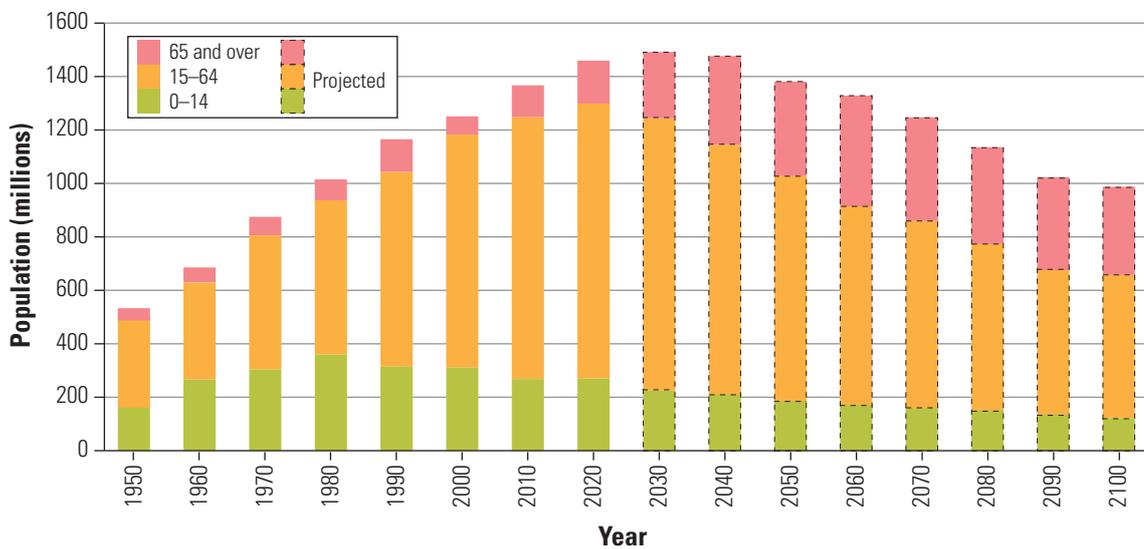
Figure 6.18
Changes in China's age structure

Social and economic issues and challenges

Traditionally, retirees in China relied on family-based care, living in households containing two or three generations. However, Chinese households are now small at a statistical average of 2.62 in 2020, less than the 3.10 persons in 2010, partly due to the One Child Policy. According to the 2020 census, family households have continued to downsize because of increasing population mobility and the fact that young people after marriage now live separately from parents with improved housing conditions. This *change* from large extended families is a huge cultural shift in the way Chinese have traditionally lived for centuries and has occurred in the space of only a few decades.

In 2020, China's total dependency ratio was 42.2 per cent, meaning there are 42.2 dependents for every 100 people of working age. This ratio is made up of a youth dependency ratio of 25.2 per cent and an elderly dependency ratio of 17 per cent. By 2033, the dependency ratio is projected to increase to 52 per cent as a result of an ageing population. Figure 6.19 shows that similar trends towards a higher dependency ratio are occurring throughout Asia.

Abolishing the One Child Policy should have helped reduce the size of the elderly dependant population; however this is unlikely since the abolition of the policy in 2015 did not lead to an immediate increase in fertility (Figure 6.8).

Chinese socialist culture has no history of saving for retirement and the government faces a significant challenge to provide income and specialist aged care services for the growing elderly population. China is one of only a few countries worldwide in which the population has begun to significantly age before becoming a high-income country. As a middle-income country, the challenge of supporting an ageing population with an increasing dependency ratio is especially significant.

> ▶ **ACTIVITIES**
>
> 1. Define dependency ratio.
> 2. a. Referring to Figure 6.19, describe the trend in China's dependency ratio.
>   b. Compare this trend with other countries within Asia.
> 3. What challenges is the issue of a high dependency ratio likely to lead to in the future?

▼ **Figure 6.19** As population growth slows, China's dependency ratio is starting to increase similar to many other Asian countries
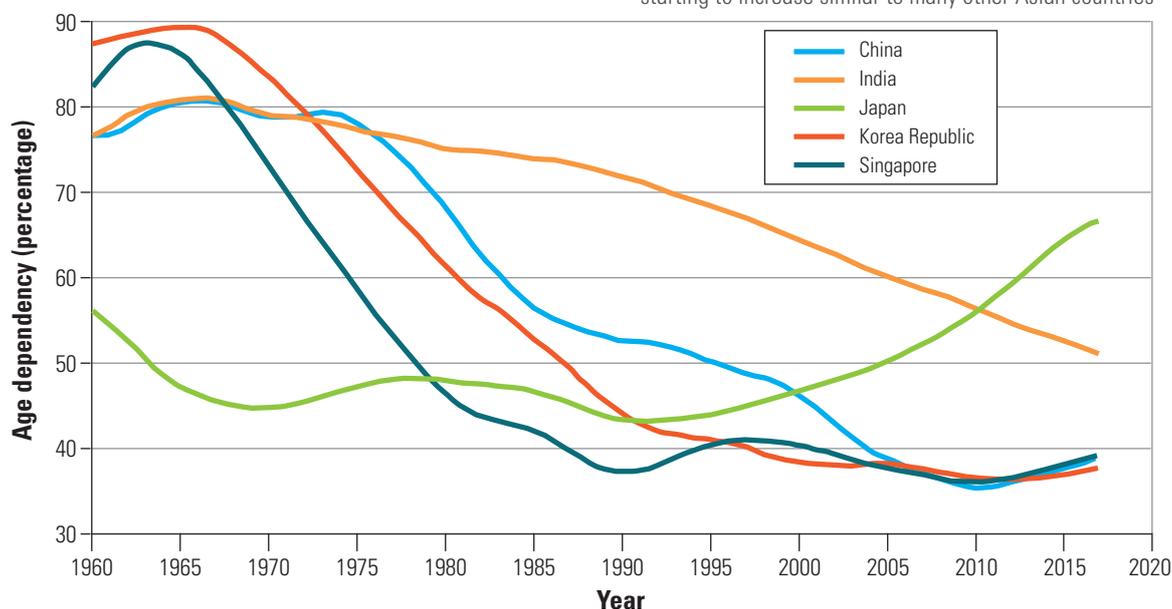
What are the strategies in response to the current issues and challenges?

Abolition of the One Child Policy

In October 2015, the Chinese government announced that all couples would be allowed to have two children from 2016 onwards, thus abolishing the One Child Policy. Then in 2021 couples were allowed to have three children. Many demographers were not expecting a rapid and sustained return to higher birth rates and higher fertility rates and as shown in Figure 6.8, the TFR has remained relatively constant since the 1990s. Although there was an initial rise in China's birth rates following the policy *change* with 17.9 million births, by 2018 the baby boom had declined. In 2020, China registered 10.035 million births, the lowest number since 1961. Demographers believe the desire for large families has lessened nationally due to a cultural *change* in the priorities of young women towards careers and an increase in the cost of child rearing. This social *change* has occurred across Asia with other countries following a similar trend in the reduction in fertility rates, as shown in Figure 6.20. Despite the policy being abolished in 2016, many features of the One Child Policy remain. Contraception, including sterilisation and abortion, was, and still is, freely available, while permission is required to endeavour to conceive a child. By mid–2018, Chinese authorities were debating ending their population control policies altogether to avoid negative population growth *interconnected* with harmful social and economic impacts, such as a rapidly ageing population.

Responding to the gender imbalance

To control the imbalanced sex ratio the Chinese government has taken some effective measures. Since 1986, the Chinese government has implemented several strategies to try to reduce the prevalence of its male-skewed gender ratio. Initial steps involved forbidding doctors from telling pregnant women the gender of a foetus. This led to an official national-*scale* ban in 1994. While this strategy reduced sex-selective abortions, many doctors continued to perform these procedures illegally. In addition, boys were often given better medical treatment and therefore a better chance at survival.

A major flaw with these early attempts to reduce the gender imbalance was that they focused on preventing the immediate cause of the imbalance rather than the underlying fundamental cause – a cultural preference for sons over daughters. In 2000, the Chinese National Population and Family Planning Commission initiated the 'Care for Girls' campaign. It was a national policy aimed at protecting the basic rights, survival, development and participation of women and girls as well as promoting gender equality. A survey in 2007 showed that son preference had decreased in participating areas and the sex ratio at birth in the rural of Shanxi province fell from 132 boys for every 100 girls down to 116 boys. However, the success of this strategy was unevenly *distributed*. Gender imbalance remained high in provinces with strong traditional cultures such as Anhui where there were still 130 boys for every 100 girls. Nevertheless, there is growing evidence that son preference in China is declining. In recent interviews, many young Chinese adults expressed the view that they do not care about the gender of their future child, even though son preference was common in their parents' generation. The Chinese government is paying more attention to women's legal rights, especially their economic development, such as regulations for women's economic status, education opportunities and inheritance of family property.

Surprisingly, the implementation of the two-child policy has created an unexpected benefit to the challenge of gender bias at birth. The policy *change* has taken pressure off parents to participate in sex-selective abortion or even avoiding registering female babies at birth, as they now have room for two children. Since the policy has been enacted, 261.4 million unregistered people who have lived at their residence for at least six months were found.

▶ **Figure 6.20**
The drop in fertility rates is widespread throughout Asia
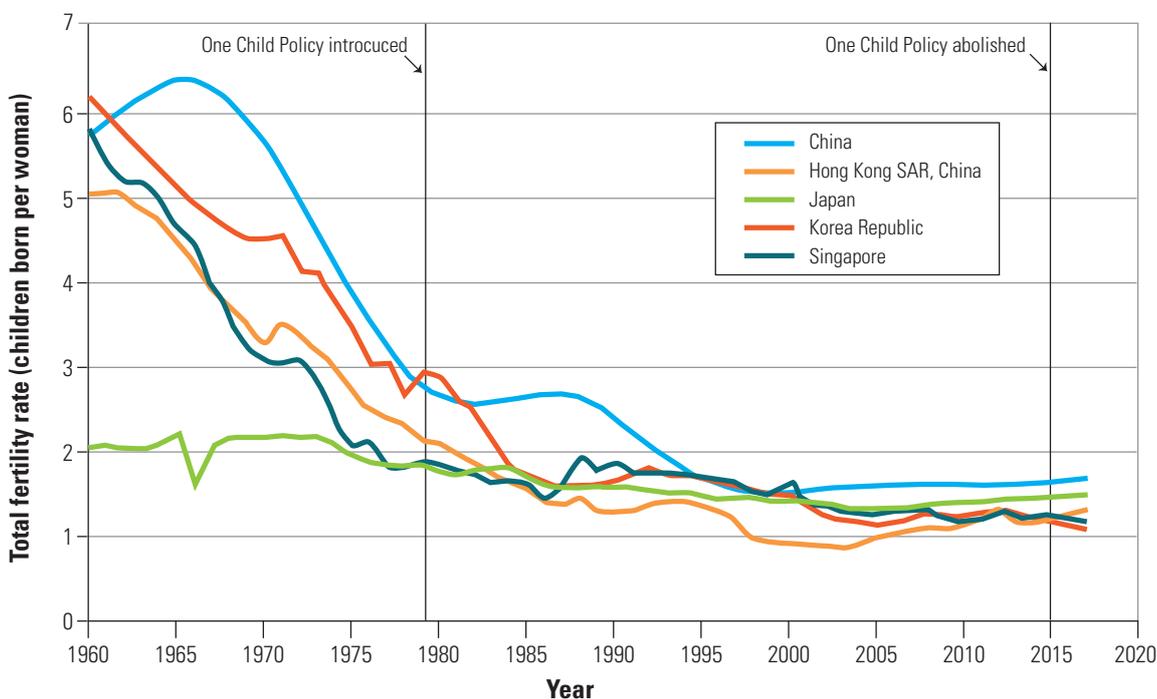
Pension and aged care reform

With shrinking family sizes, a need has developed for elderly Chinese people to be able to live independently and to be able to support themselves financially. Older people have little paid employment and therefore generate little income, spend sparingly, whittle down savings and require expensive healthcare, while drawing pensions – a national economic burden when there are fewer workers per retiree.

This raises the issue of how to provide pensions for a growing number of pensioners.

China's pension system has been continuously developed since its launch in 1951, with a focus mainly on public pensions (Figure 6.21). There are two major public pension schemes:

▶ The mandatory Basic Old Age Insurance (BOAI) with 402.9 million participants in 2017.
▶ The voluntary Resident Pension System (RPS) with 512.6 participants in 2017. (This fund was formed from the merging of the Urban Resident Pension and New Rural Resident Pension in 2014).

Both schemes receive substantial direct financial subsidies from the government. There are other forms of pension with limited participation. In 2019 public pension schemes had over 960 million participants accounting for nearly 70 per cent of the total population.

China's public pension systems are managed by local governments. Contribution rates are different across *regions* – workers in east coast provinces earn much higher incomes that those in inland provinces. There is also a significant gap between the pension benefits of the BOAI and those of the RPS. A number of officials and economists worry about the financial *sustainability* of the current state-dominated system, warning that it might soon run short of funds. As the number of workers able to pay their taxes to add to the pension fund declined, the number of elderly people aged 65 and over has risen. There were 254 million people in China aged over 60 at the end of 2019. The issue is that the current level of government spending on social services and security is *unsustainable*. The International Monetary Fund believes China will have to increase public spending on pensions by an amount equivalent to over 100 per cent of Gross Domestic Product (GDP) in total over the next 30 years based on current plans.

There are also problems with the operation of the pension system. The highly fragmented nature of the social security system has both enabled and perpetuated tax evasion. Employer contributions in China are high and employers – in both state-owned and private enterprises – often do not pay their due. Central and local authorities have taken a number of steps to respond. For example, they have attempted to increase penalties for corporate tax evasion and made the system more user-friendly with digital guides and instantly replaceable social security cards. However, these efforts have made little impact. Short of a serious overhaul and reform, the chronic issues plaguing the system are only likely to worsen.

One way to sustain the pension system is to enhance labour productivity. If worker productivity is rising, the wealth created by the younger generation can, in effect,

▼ **Figure 6.21** Comparison of the various pension schemes in China
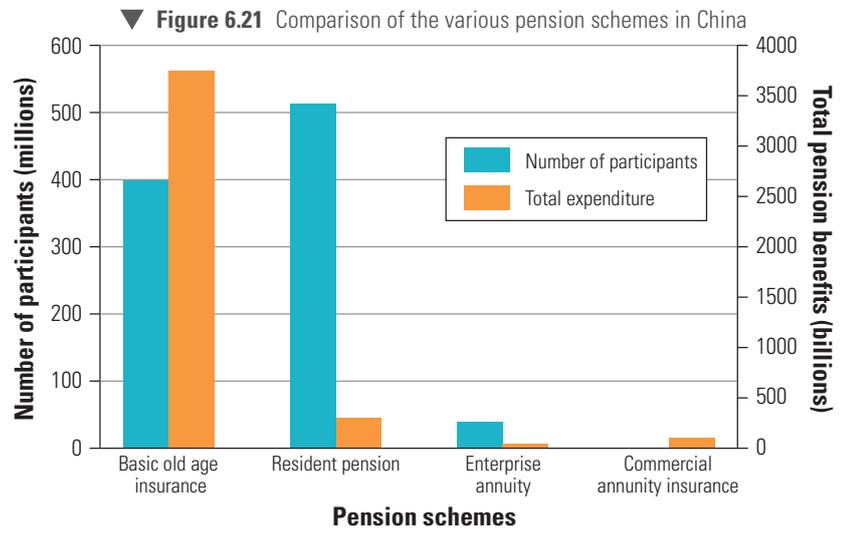
support a larger group of older people. Officials have promoted services to make the economy less reliant on labour-intensive manufacturing and construction. Another strategy is to raise the retirement age. In March 2021 the Chinese government announced that it would gradually lift the retirement age in response to the declining labour force, longer life expectancy, and an ageing population, to help sustain the state pension scheme. For decades China's retirement ages have been pegged at 60 for men, 55 for female government workers and 50 for other women. In Australia, from 2024 you will have to be aged 67 or older to access the pension.

As the demand for elderly care increases in China, so does the shortage of affordable assisted living facilities and nursing homes. Services and facilities geared toward elderly care such as retirement homes, nursing homes, and rehabilitation care, are still rare, even though nearly 23 per cent of the older people in China cannot fully take care of themselves. Until recently, China had no effective elderly care system. The Chinese government elderly care policy is governed by a 90/7/3 formula, meaning it aims for 90 per cent of seniors to remain at home, 7 per cent to stay at intermediate facilities and 3 per cent at nursing homes. Beijing's solution to the challenge of elderly care is to have private capital fill the need and significant numbers of investors have already been attracted to the scheme. China reported a 17 per cent jump in the number of private nursing homes in 2018 from the year before. Most elderly care facilities have been developed for the high-end market. However, the uptake of these facilities has been slow and often businesses do not make a profit. The situation is worse in rural areas where retired farmers receive much smaller pensions than their urban peers. To address this problem, the government has raised subsidies for private nursing homes in the hope of making some of them a viable business.

▶ **ACTIVITIES**

1. Discuss why a 'Three Child Policy' may not be able to overcome the challenge of an ageing population.
2. Why is the provision of pensions a problem for China in the future?
3. Identify other problems associated with supporting the elderly population in China.
4. Using Figure 6.20, compare the trend in the TFR of China and other Asian countries.

What is the role of geospatial technologies in developing and implementing strategies?
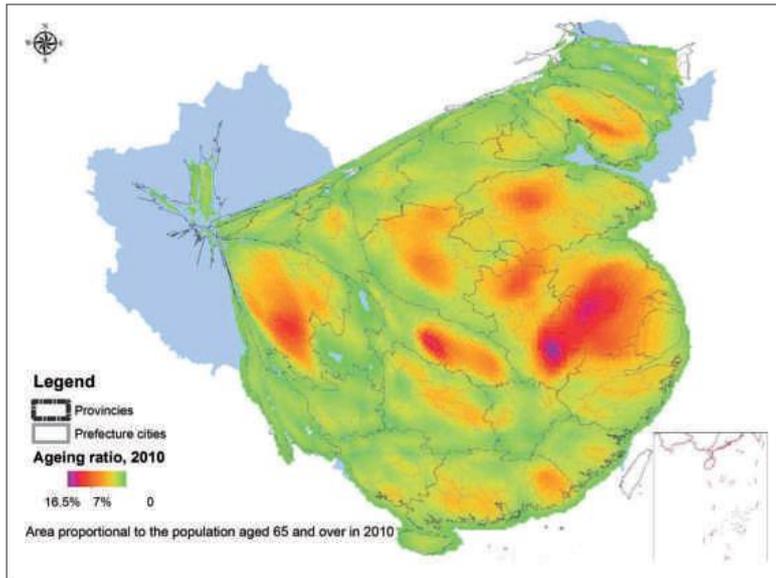
▲ **Figure 6.22** This ageing map is a tool to visualise ageing and to target areas for age-specific services

Every ten years, China's National Bureau of Statistics conducts a national population census, most recently in 2020. This information is essential in China's decision-making at a national, provincial and local *scale*. Information gathered includes the size of the population, organised by *region*, and its sex and age composition. Additional information includes employment figures, education levels, migration, fertility and the rate of urbanisation. This information is collated, viewed and analysed spatially using Geographic Information Systems (GIS). Uses of GIS include administrative management, population research and market analysis. In Beijing, analysts are using this data to track the ageing of its population in order to understand the accessibility of residential care and to help allocate care resources for the future.

Figure 6.22 is a map created using census data from China's sixth census in 2010. It shows the level of ageing as a ratio. This spatial data highlights the variation in the *distribution* of China's population

Ivan Motley
Founder and Director of .id

I am a geographer. Officially I am the Founder and Director of .id (informed decisions) www.id.com.au, but whenever I travel overseas I always proudly refer to myself as a "Geographer", because that is my qualification and it is the way I think.

I think in terms of places and the communities, economies and environment that make up those places. I think about where people live, where they work, where they socialise and how and why they move between places. I'm fascinated by social trends and how they can be influenced to achieve better social outcomes. Where people live should not mean that they have better or worse opportunities to participate in the "good society". Also of course, geographers love maps. A good map can reveal profound insights into places and what makes them tick. But most importantly, a good geographer is a good story teller.

.id (informed decisions), applies Geography principles to decision-making and is proof of the power of thinking as a geographer. At .id we are not only the industry standard for providing local government across Australia and New Zealand with their demographic, housing and economic data, but we now advise Australia's major banks, developers, retailers and sporting organisations, based on our geographers' perspective of the world.

I have an Honours Degree in Geography from Flinders University. On graduating, after travelling, I started a job in the Geography Department at Flinders as a cartographer for the Atlas of South Australia (Griffin and McCaskill, 1986, Wakefield Press). Following this, I worked on various research projects at the university before landing a job with the City of Adelaide working on the first major Plan Review with a multi-disciplinary team of architects, planners and economists. I worked as a researcher in State Government in Victoria, producing land supply studies and demographic forecasts which formed the basis of co-ordinating the provision of services and facilities across the metropolitan area of Melbourne.

A passion for place is what makes geographers tick. This requires a deep curiosity and, combined with the tools and skills of a geographer, means that you can have lethal influence on decision-making.
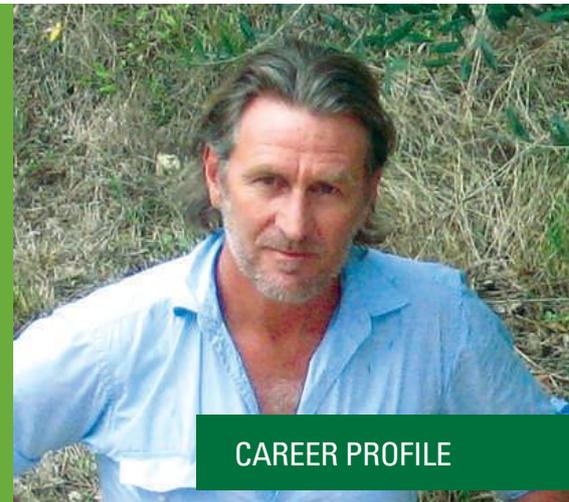
CAREER PROFILE

Figure 6.23 China's Smart Cities
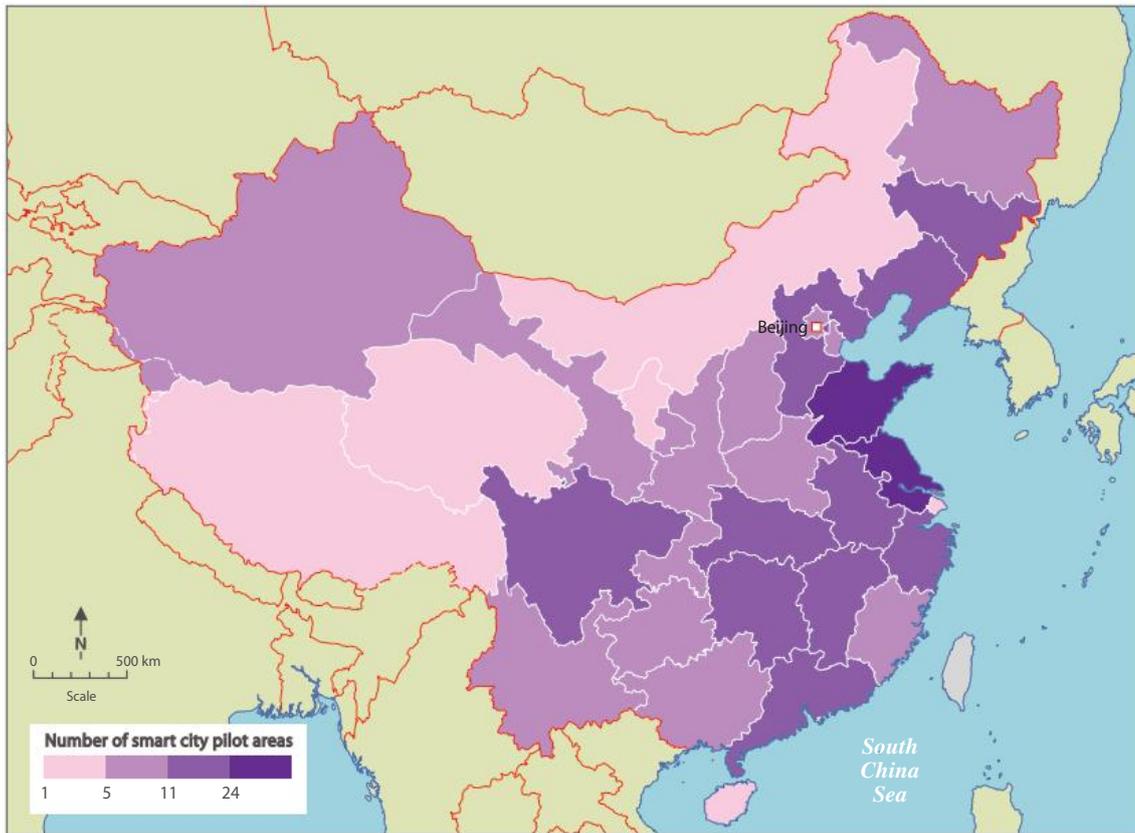
issues and the need for responses at a variety of spatial *scales*.

As a result of its growing population China has over 160 cities with a population of over one million, including 10 megacities (cities with a population over 10 million). Geospatial technologies will have a role to play in how these cities function and how they plan their futures. 'Smart cities' are urban centres that use digital data and technology to increase the quality of life of residents in the city. All smart cities rely on geospatial science and technology for the framework of smart tools. Most smart cities rely on digital sensors and live location tracking to continuously collect data. Using GIS as a tool in a smart city development can detect *environmental* problems or natural disasters, estimate and compare urban planning scenarios, predict or prevent transportation congestion, and even analyse social services. In 2020, Shanghai won the World Smart City Award with projects aimed to make the city more liveable, *sustainable* and economically viable. China has a number of smart cities and more than 500 smart cities are being built across China, according to the government (Figure 6.23).

In China during 2020 smart city projects played a significant role in the COVID-19 prevention and control *process*. Through the Smart City concept,

geographic information companies and institutions in China, worked together with the public, to ensure the management of the virus through mapping, tracing, navigation, location-based service, and remote sensing. Government departments and professional institutions used this data to provide services such as epidemic monitoring as well as analysis of population *movement*. During the epidemic prevention and control campaign, drones have played a crucial role through mapping, logistics for *distribution* of vital goods like food, face masks, medication as well as disinfecting communities and information dissemination. Nevertheless, smart cities have been criticised by some as 'surveillance cities' that enable close monitoring and management of large populations. The COVID-19 pandemic enabled China to have greater routine surveillance than in the past, and this could be regarded as a violation of privacy as well as coming at significant expense to individual and social freedom.

▶ ACTIVITIES

1. Using Figure 6.22, describe the *distribution* of China's population aged 65 and over.
2. Using Figure 6.23, describe the *distribution* of China's pilot smart cities.

7 Population trends and issues: ageing in Japan

What are the geographic characteristics of Japan?

Japan is located in East Asia. It is an island nation with four main islands and 6852 islands in total. It has a land area of 377,963 square kilometres – about one-twentieth the size of Australia – of which three-quarters is a mountainous *environment*, created via plate *movement* along the Pacific Ring of Fire. Japan's climate is generally temperate but, as it extends from 24 to 46 degrees north latitude, this varies considerably from south to north. Strong *regional* influences on climate include warm moist easterly winds from the Pacific Ocean bringing summer rain to southern Japan and the cold northerly winds from nearby Siberia that cause heavy winter snowfall in northern Japan.

▲ **Figure 7.1** Japan's location in East Asia

What are the population characteristics of Japan?

Japan had an estimated population of 125.7 million in 2020, ranking as the sixth most populous country in Asia and eleventh in the world. Japan was the first country in the world to be considered 'hyper-aged' – defined by the United Nations as a country with more than 20 per cent of its citizens aged over 65 years. With a median age of 48.4 years, Japan has both an ageing and a declining population.

The average population density in Japan is 348 persons per square kilometre with approximately 92 per cent of people living in urban *environments*. Its population is unevenly *distributed* with higher densities in the south compared with the north (see Figure 7.2). There is a strong *spatial association* between the location of Japan's major cities and the limited coastal plains and lowlands. These flat, fertile lands support agriculture as well as large settlements and extensive transport infrastructure. Many of Japan's largest cities are found on the island of Honshu which is home to over half the country's population, and efficient transport networks create strong *interconnections* between *places* on this island. The largest city is Tokyo, the capital city, with over 13 million people. Other large cities include Kyoto, Osaka, Nagoya, Kobe and Hiroshima.

In 2020 it was estimated that approximately 2.93 million people living in Japan were born overseas. The majority were from other nearby countries in the Asian *region* such as China, South Korea, Philippines and Vietnam. Although the number of migrants has been increasing, this represents around 2 per cent of Japan's population. In terms of religious affiliation, over 60 per cent of people in Japan do not identify with any religion but, of those who do, the majority follow Shinto or Buddhism. Japanese people are well educated (the literacy rate is 99 per cent) and have a reputation for working long hours, averaging up to 60 hours per week.

▶ **Figure 7.2** Japan's population *distribution*
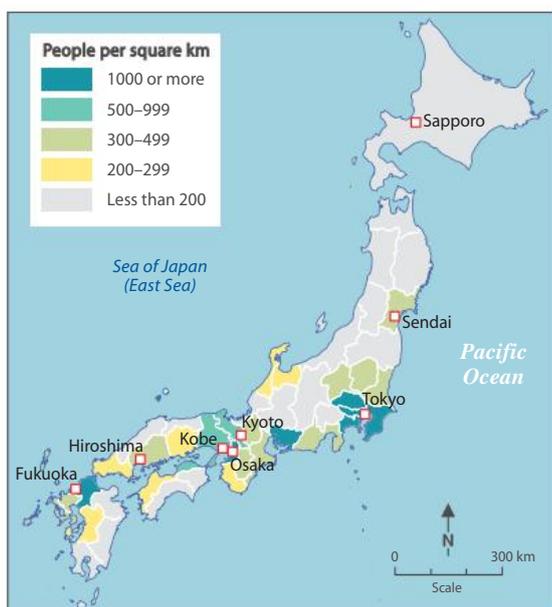
What is the nature of the population trend in Japan?

Japan not only has an ageing population but it is truly hyper-aged with over 28 per cent of its population over 65 years of age in 2021. In 1950 just 4.9 per cent of its population was aged over 65. Its population has been steadily declining every year since it reached a peak of 128 million in 2010 (refer to Figure 7.3). This has resulted in a substantially different demography to any other current population.

Until the mid-19th Century, Japan's population was reasonably stable at approximately 30 million people. As the country improved health services, and infant and child mortality fell, its population increased

reaching 60 million in 1926 as a result of the declining death rates. The post–World War II baby boom caused birth rates to soar, leading to relatively rapid growth, with the 100 million population level reached in 1967.

The annual rate of population growth averaged about 1 per cent in the 1960s and 1970s. There was a small increase in the birth rate as the number of people born in the post-war baby boom reached the then-typical marriage age of their mid-twenties. However, as Figure 7.4 illustrates, the birth rate has continued to fall since then from 18 to 7.3 per 1000 per year, contributing to the ageing *process*. The death rate

Figure 7.3
Japan's *changing* population growth and structure, 1950–2065

Figure 7.4
Japan's *changing* birth and death rates
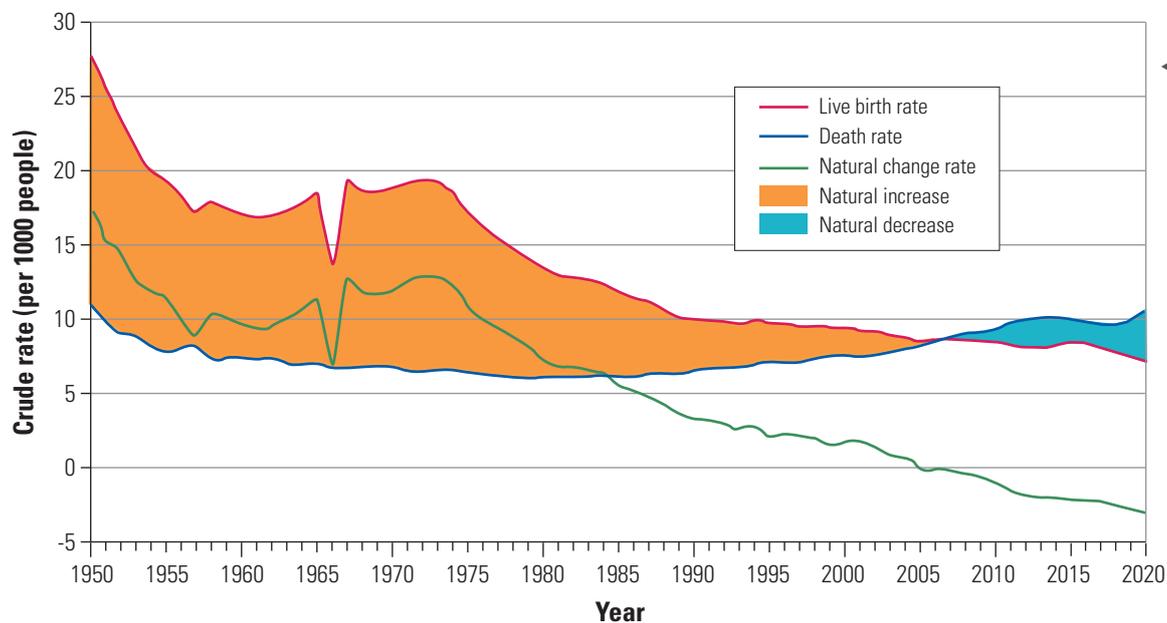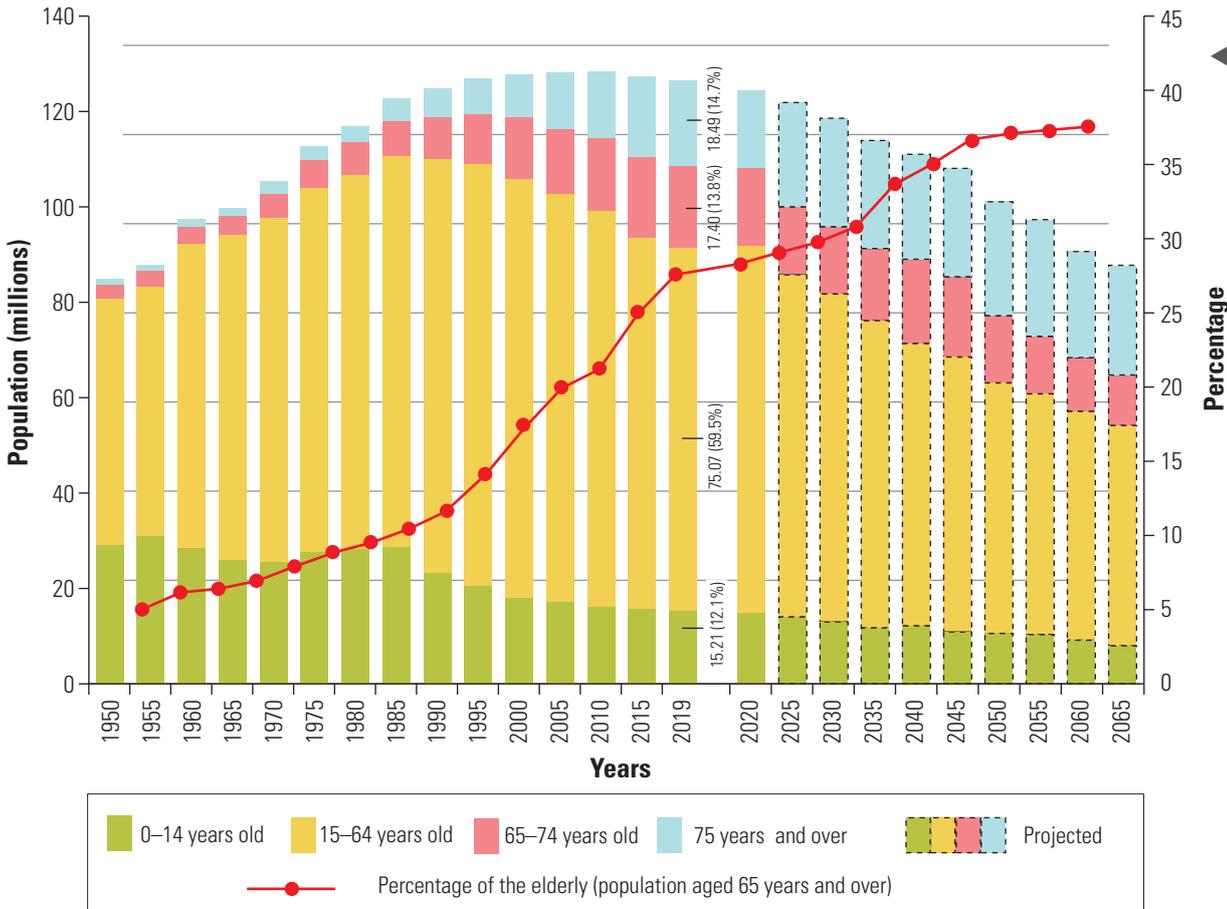
▼ **Figure 7.5** Japan's *changing* population pyramids
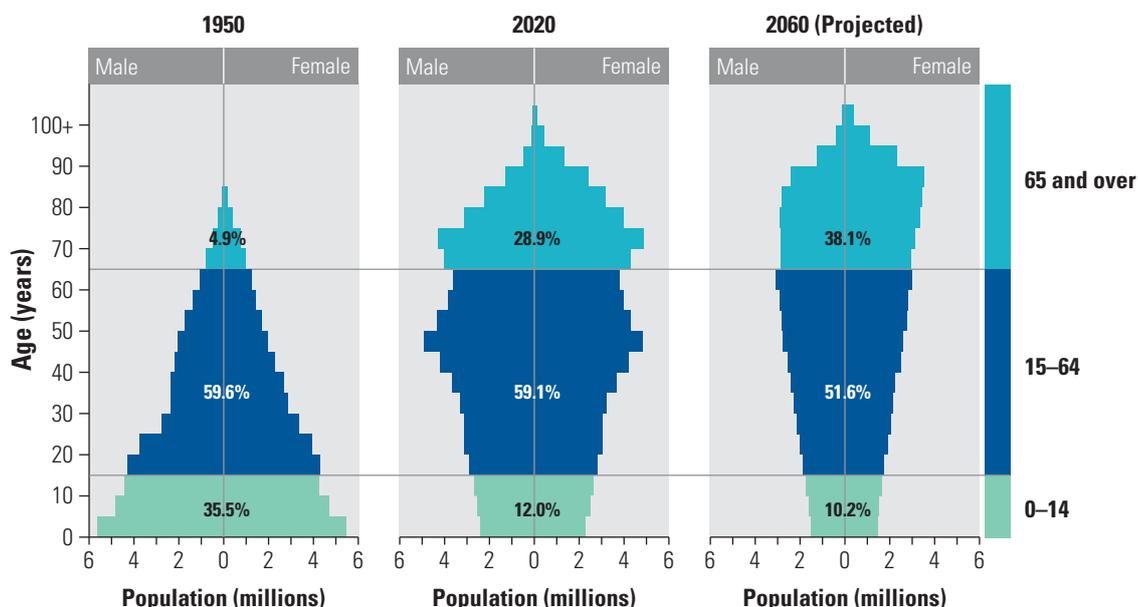
showed little *change* between 1975 and 1987 (between 6 and 6.3 per 1000 per year). Since 1988, however, it has increased due to the increased percentage of aged persons in the population. The death rate was 10.8 per 1000 in 2020. From 2005, there has not been any net natural increase, but instead Japan's population decreased – in 2020 the natural rate of population *change* was minus 3.5 per 1000.

The resulting population structure of Japan is illustrated by the population pyramids in Figure 7.5. The broad base of the 0–14 age groups in 1950 (35.5 per cent of the population) had reduced by almost one third by 2020 to 12 per cent. Conversely, the percentage of people aged 65 years and above increased from 4.9 per cent in 1950 to 28.9 per cent in 2020 and is expected to contain over one-third of the population by 2050. The proportion of the population in the working age groups (59.1 per cent in 2020) has been declining since 1993 and is expected to continue to do so. Reflecting its ageing society, the population profile has *moved* from a pyramid shape to what some demographers have ironically called a coffin shape. The speed of the ageing *process* in Japan has been much faster than that in any other modern country to date.

The large *scale* and rapid rate of *change* presents significant challenges in terms of responses to the impacts of this population trend.

Factors contributing to Japan's ageing population

As outlined in Chapter 1, an ageing population is a function of two *interconnected processes*: increased life expectancy and declining fertility. The rates of *change* of these two components, however, are unique in Japan due to the specific characteristics of Japanese society. As shown in Figure 7.6 Japan has experienced a steady increase in life expectancy since 1950 and the nation now has the highest average life expectancy in the world. According to the World Health Organization (WHO) this is estimated to be over 85 years: 88.8 years for women and 81.9 years for men. Japan also has the highest number of years lived in good health – 78 years for women and 72 years for men. Suggested *interconnected* factors responsible for this high life expectancy have included:

▶ the healthy Japanese diet which contains lots of fresh vegetables, fish and soy products with minimal sugar

▼ **Figure 7.6** *Changing* life expectancy, fertility and infant mortality rates in Japan

Year	Life expectancy (years)	Total fertility rate (births per woman)	Infant mortality rate (deaths per 1000 live births)
1950	60.00	3.65	40.0
1960	67.67	2.00	30.4
1970	71.95	2.14	13.4
1980	76.09	1.90	7.4
1990	78.84	1.34	4.6
2000	81.08	1.40	3.3
2010	82.84	1.34	2.4
2015	84.74	1.41	2.0
2020	85.03	1.40	1.6
2025 (projected)	87.06	1.40	1.6
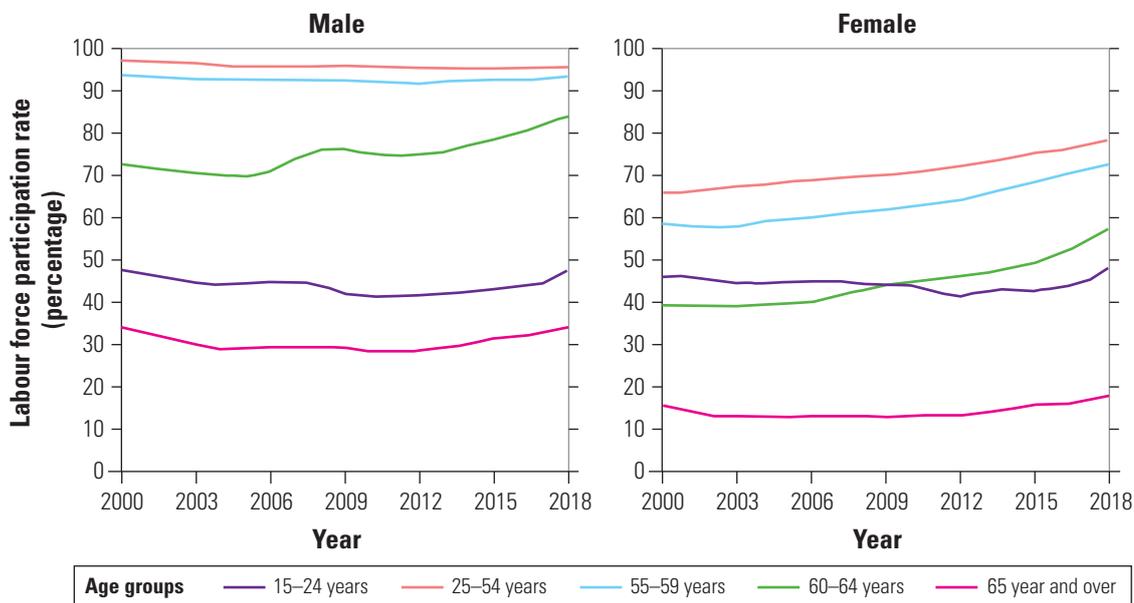
Male / **Female**

Labour force participation rate (percentage) vs Year (2000–2018)

Age groups — 15–24 years — 25–54 years — 55–59 years — 60–64 years — 65 year and over

▶ after World War II the Japanese government invested heavily in public health to reduce infectious diseases in the *environment* and created a universal health insurance regime to ensure that anyone could receive necessary medical treatment. It has also run campaigns to reduce the intake of certain harmful foods such as salt

▶ the Japanese people place a strong emphasis on hygiene and most people have regular health check-ups

▶ the active lifestyle of Japan's retirees – not only in terms of physical activity but in terms of community and family involvement.

Fertility rates have experienced a significant decline in the post-war period and have been below replacement rate since the mid-1970s (refer to Figure 7.6). In the 1950s and 1960s, fertility rates were initially lowered via abortion, but in later decades additional family planning options were available. Japan's fertility rates have remained low due to a number of factors.

▶ The increased average age of marriage of Japanese women (29.6 years) has resulted in fewer reproductive years in which to have children. Marriage remains the only socially acceptable way to have children in Japan: far fewer children are born outside wedlock than in other more developed countries (2.3 per cent of births in Japan compared to nearly 50 per cent in Britain in 2020).

▶ The traditional expectation that women will not remain in the workforce once they marry and have children. As Figure 7.7 shows, workforce participation for Japanese women is substantially lower than that for males and those rates fall considerably for women aged 25 to 39 years of age. More than 50 per cent of women stop work after the birth of their first child compared to one third in the USA.

▶ Long working hours – the Japanese work ethic and the expectation that employees will devote long working hours to their company make it very difficult for family life. Eleven per cent of employees work more than 60 hours per week, with men working an average of 50 hours per week. In addition, few Japanese people take all their annual leave entitlements (ten days) as they feel they are letting their company down if they do.

▶ Child care is costly and in short supply. According to government estimations there are 47,000 children on a waiting list across the country. Costs are means tested but range from around A$1800 to A$2400 per month.

▶ Culturally, Japanese husbands do not make a significant contribution to child care and housework – an estimated one hour per day compared with three hours per day in Germany and USA.

▶ The high cost of living, the weak economy and limited living space in urban areas discourage large families. Education fees for children are also expensive.

▶ The high cost of housing means that many young people remain living with their parents rent free until about the age of 30. These 'parasite singles' (Figure 7.8) use their disposable income on themselves rather than planning to take on their own family responsibilities.

▲ **Figure 7.8** Parasite singles – young singles who typically remain living with their parents and pursue a consumer rather than a family lifestyle

▼ **Figure 7.9** *Changes* in Japan's social security over time

2018
121.3 trillion
(45.6%)

2018
43 trillion
(32.6%)

2018
35 trillion
(21.8%)
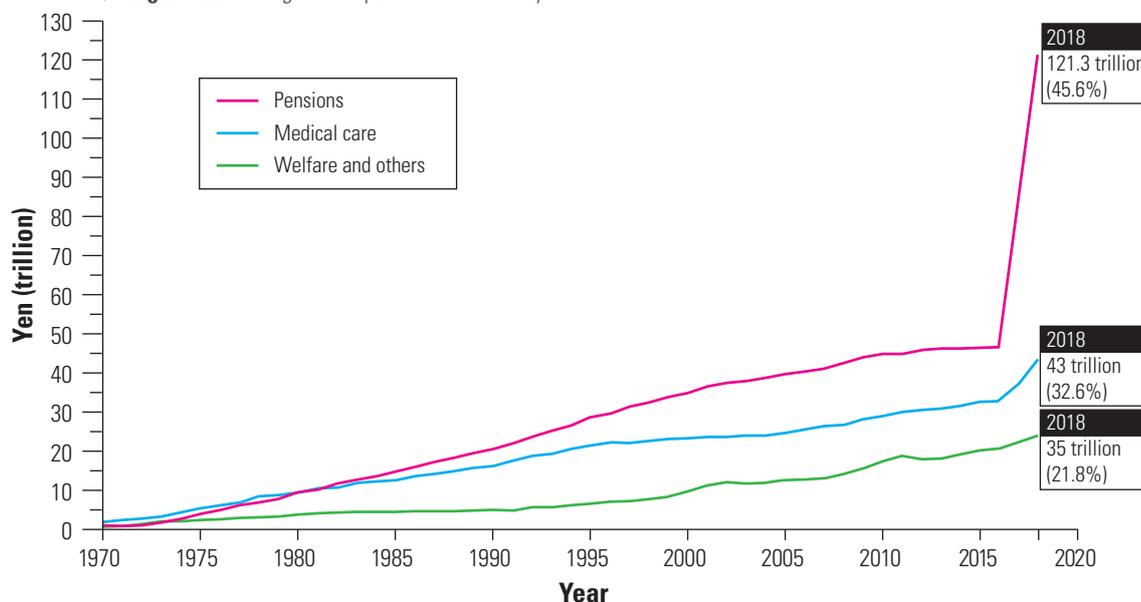
What are the population issues and challenges in Japan?

Japan has been experiencing the issue of a decline in the working population since 1995. The number of working age people is expected to roughly halve between 2010 and 2060, decreasing from 81.73 million to 44.18 million. Unless the rate of labour force participation increases dramatically, the resulting smaller workforce leads to the challenge of how to support each elderly person with fewer taxpayers. The elderly dependency ratio (the ratio of the elderly to the working age population) is increasing rapidly. In 1985 there were seven economically active individuals to support each person over 65 years. This fell to 2.8 by 2010 and is projected to drop to 1.7 by 2035.

The economic implications of these trends are significant. One challenge is that less revenue is received by the government via taxation, but it must spend more on social security such as pensions and aged health care. Benefits for the aged account for approximately 70 per cent of Japan's total expenditure on social security benefits which is over A$2200 billion annually. Pensions account for half of this and medical care almost another third (refer to Figure 7.9). Such expenditures are forecast to continue growing, causing the challenge of considerable budgetary pressure for the government.

In addition, the smaller population will result in the issue of a smaller domestic market and less demand for goods and services which will have an impact on the country's Gross Domestic Product (GDP), exacerbating this problem. The issue of a smaller labour force could lead to labour shortage challenges and therefore upward pressure on wages. Such impacts could also discourage further investment by manufacturers in Japan, lowering economic growth and impacting Japan's global reputation as a valuable trading partner. Japan's economic prosperity on the world stage makes it more vulnerable to the issue of a declining workforce. Japan will therefore face the challenge of how to finance the direct and indirect costs of its ageing population as well as the political consequences of this. The impacts of the COVID-19 pandemic will put further economic and social strain on the nation.

Of course, an ageing population may also present new economic opportunities for companies (see Figure 7.10). Products aimed specifically at the 'silver market' are in increasing demand; for example, mobility scooters, household services, financial management, travel tours designed for seniors and accessible housing.

Household composition has shown a steady increase in single-person households and, in contrast, a decline in nuclear family households (see Figure 7.11). It is anticipated that single-person households will almost double from 3.87 million in 2005 to 7.17 million by 2030 as a result of this cultural shift. This presents a challenge in terms of providing care for older people with their increasing reliance on external assistance rather than traditional family support. Both the *distribution* and structure of households pose considerable challenges for the provision of relevant aged care, and the high cost of living makes the issue of financially supporting a growing older population more difficult.

In terms of political impact, Japan's senior citizens will have increased electoral influence, given that they will comprise an increasing percentage of voters. The possibility exists for intergenerational conflict over the future allocation of government spending

▲ **Figure 7.10** Japanese wave after modelling the latest styles of adult nappies during a show in Tokyo. The show was organised to raise awareness of some of the issues facing the country's rapidly ageing population

Figure 7.11 caption and chart legend:

- Single-person
- Married couple
- Married couple with one or more children
- Single-person with one or more children
- Others
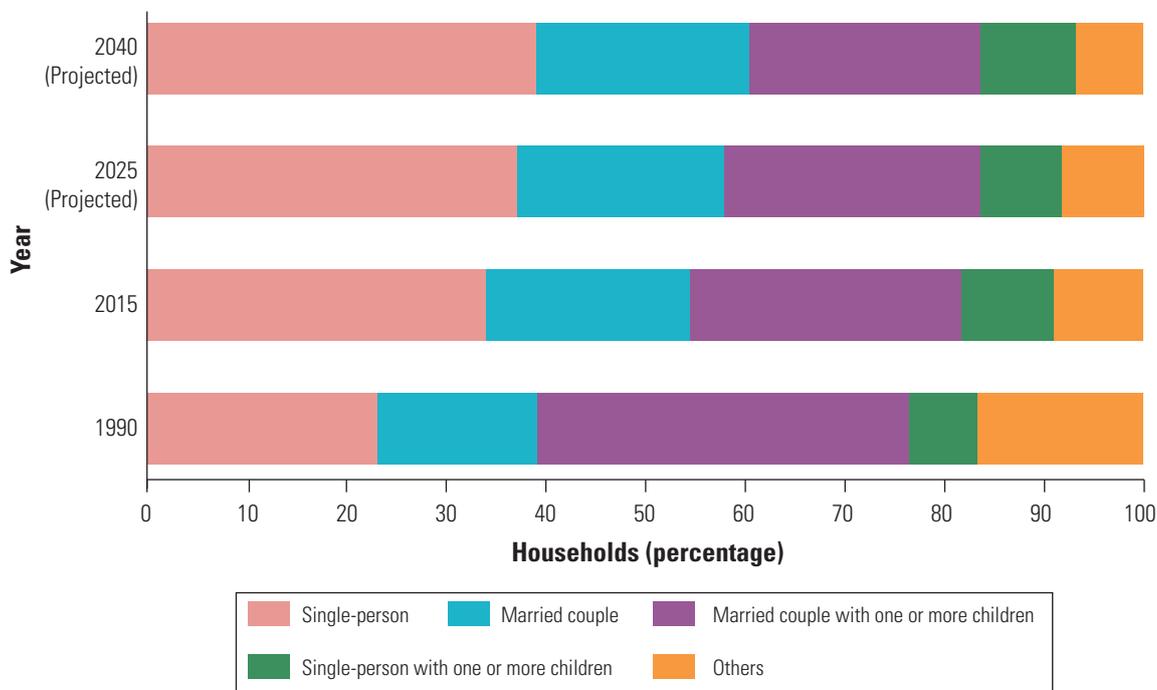
and the challenge of the *sustainability* of the debt burden faced by the country.

There is considerable *regional* variation in Japan's *changing* population (see Figure 7.12). As a result of mass rural-to-urban migration especially during the 1950s and 1960s, the average age of Japanese farmers has increased from 51 years in 1980 to 67 years in 2020. In 2020, 70 per cent of farmers were aged 65 years and over. Many rural communities in Japan have already faced not only an ageing population, but the challenges of a declining one. For example, the population of the rural town of Minamiaizu in Fukushima Prefecture has declined by a third in the last forty years as young people *moved* to cities, primarily searching for employment and education, and, of those remaining residents, nearly half are older than 65. Nearly 900 of Japan's 1700 municipalities have been identified by the government as 'cities at risk of extinction' as they have depopulated to the extent that populations are falling below the threshold for viability. The hardest-hit *regions* are in the isolated mountainous *environments* of central Kyushu, western Honshu, the Kii Peninsula, and Tohoku and Hokkaido in the north. The number of unoccupied dwellings in Japan was estimated at 13.6 per cent in 2019, with one third of all houses likely to be vacant by 2033, posing a significant challenge for local governments. By reducing the numbers of workers and consumers, depopulation often causes the reduction of less profitable existing infrastructure such as education, healthcare and communications facilities and both private and government businesses are no longer attracted to establish in these economically-declining communities. This decline is a major push factor causing the *movement* of internal rural migrants to the cities. An *interconnected environmental* issue is that the land becomes simultaneously neglected and unproductive. Future food security for Japan may also be an associated challenge as rural populations both age and decline.

The greatest increase in the elderly population in future will be in the large urban *regions*, where over
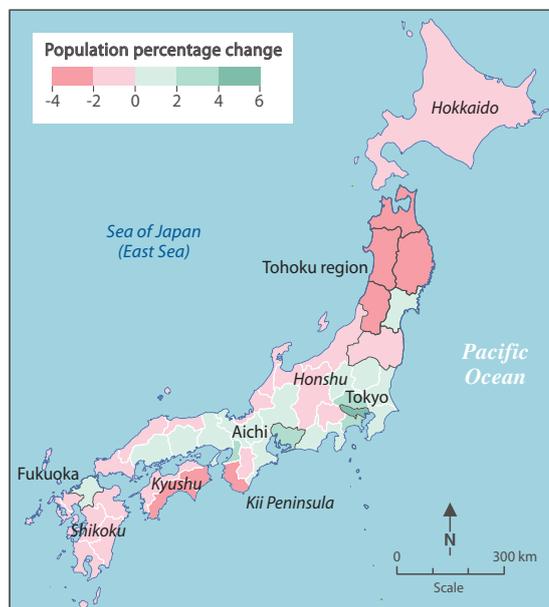
90 per cent of Japan's elderly people already live. Tokyo, Japan's largest city of over 13.5 million, currently has under 21 per cent of people aged 65 years and over. However, its population is expected to halve in the next 90 years, and by 2100, an estimated 3.27 million of the 7.13 million residents in the city will be over the age of 65, presenting a range of issues. In all of the *regions* with rapidly ageing populations, there are significant social, cultural and economic challenges faced making aged communities more *sustainable*. For example, responses are needed to attract the inward *movement* of younger people to maintain population growth and social stability and to encourage inhabitants to stay. Vibrant communities can help distinctive *regional* and local cultures survive. The importation of workers, commodities, services and investment is needed to assist businesses create employment, income, provide essential infrastructure, help ensure economic viability and improve liveability, Stronger communities also have greater political influence by having more voters that can help make governments more responsive to local interests and needs.

World *regional* context

As outlined in Chapter 1, population ageing is occurring on a global *scale* and the *region* of Asia is no exception. By the 2030s it will be home to more than 60 per cent of the world's population aged over 65, rising from 365 million people at present to more than 520 million. Currently, China has more than 166 million senior citizens, more than the total in all European Union countries combined. Whilst Japan's rate of *change* from an ageing to a hyper-aged society has been fast, it is predicted that other countries in the *region* will age much more quickly in future: 20 years for Vietnam and 22 years for Thailand compared to the 26 years taken by Japan. As Figure 7.13 shows, the proportion of elderly population in Asia is unevenly *distributed*: Japan has the highest proportion of older people and is expected to continue to do so, South Korea is expected to close that gap significantly by 2050 whilst countries such as Laos, Mongolia and Pakistan have less than a quarter the proportion in comparison.

▼ **Figure 7.13** How Asia's population is ageing, 2015–2050
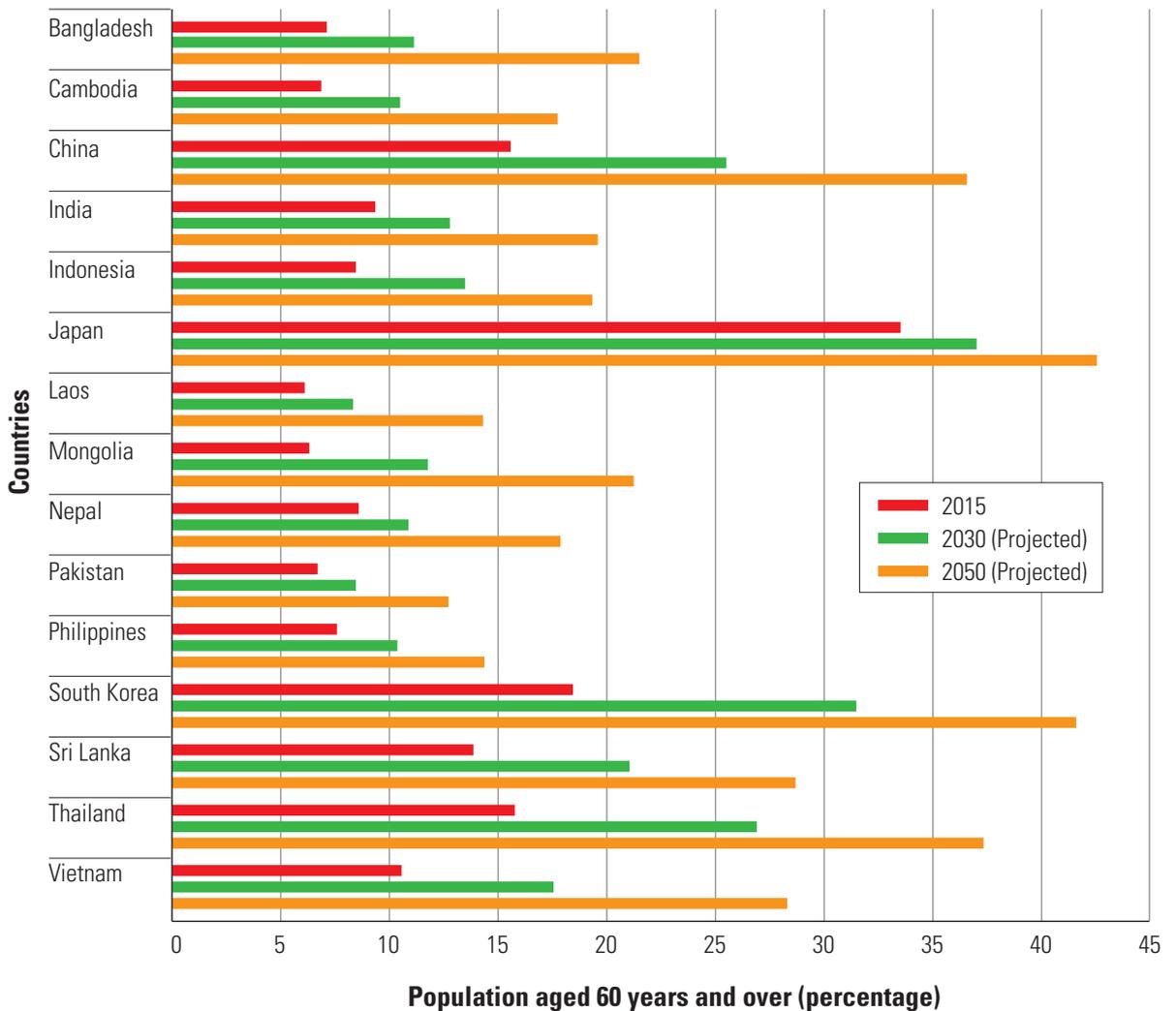
▶ ACTIVITIES

1. Japan's birth rate, as shown in Figure 7.4, showed a significant decrease in 1966. This has been attributed to the 'year of Hinoeuma' (the fire horse). Use the internet to find out what this is and why it affected Japan's birth rate.

2. a. Classify the factors affecting Japan's life expectancy and fertility rates (economic, social, cultural, *environmental* or political).

   b. Which factor do you consider to have the greatest relative importance on (i) life expectancy and (ii) fertility rates in Japan? Justify your decision.

3. a. Draw a futures wheel or flow chart to show the positive and negative impacts of Japan's ageing population.

   b. Use a system of colours on your diagram to state and classify the factors contributing to these impacts as *environmental*, economic, social or cultural.

4. Refer to Figure 7.12. Describe the *distribution* of population decline and population increase.

5. a. With reference to Figure 7.13, describe the *distribution* of ageing populations in the Asian countries listed.

   b. Evaluate the extent to which ageing Japan is typical of this *regional* context.

What are the strategies in response to the issues and challenges?

National-*scale* responses

In 1989, Japan's fertility rate reached a record low of 1.57, well below the replacement level of 2.1. Since then, successive Japanese governments have attempted to address the *scale* and impacts of an ageing population in a number of ways. The Japanese Health Ministry initiated the 'Angel Plan' in 1994. This pro-natalist policy aimed to encourage women to have more children as well as increasing labour force participation by women. Strategies included the provision of infrastructure to support dual parenting including paid maternity leave of eight weeks on 60 per cent of salary and increasing the retirement age to 65 years (and possibly to 70 years in the future). There were plans for the construction of 50,000 day-care facilities near train stations (although funding shortfalls caused not all of these to be built). Costs of childbirth were not previously covered by the national health insurance scheme (pregnancy and childbirth were not viewed as illnesses) until 2008. The 'Angel Plan' was further amended by the 'Plus One Proposal' in 2009 which aimed to create family-friendly working conditions by encouraging workers to use all their annual leave, attempting to halve the number of employees who work over 60 hours per week and by increasing the amount of time husbands spend on child care and housework from one hour per day to 2.5 hours per day.

There was limited success with these measures, primarily due to conservative social and cultural factors. Reduction in work hours did not take place until after legislation was introduced in 2018 to place upper limits on the amount of overtime permitted. In addition, these plans hoped to increase the percentage of those aged 60–64 years who were working from 53 per cent to 60 per cent; this target has been well exceeded by men but was only met by women in 2017. Pension eligibility *changes* are believed to be *interconnected* with this.

In June 2014, the then Japanese Prime Minister Shinzo Abe announced a number of reforms, dubbed 'Abenomics', aimed at increasing Japan's economic growth. Some of these centred on tackling the nation's shrinking population and declining workforce. His particular focus in this regard was to increase workforce participation by women, as traditionally many women have resigned from their jobs upon motherhood. One aim was to create an additional

Simon Kuestenmacher
Director of Research at The Demographics Group

My high school teacher in Munich, Dr Bohlender, first opened my eyes to how insightful it is to view the world through the lens of Geography. As a student I was interested in how economies and nation states interacted and Geography was the most helpful intellectual framework I encountered. To this day I immensely enjoy using maps and data to understand how the world works and share these insights with clients and the public on radio, TV and Twitter.

I started my university career with a four-year Geography and Social Sciences degree at Humboldt University in Berlin. My Geography studies allowed me to spend a semester at The University of Tulsa in Oklahoma, study for one year at the University of Melbourne and, in between, go on month-long fieldtrips to China and all across Europe. After a year back in Germany I returned to Australia to complete a Master's degree in Urban Geography at the University of Melbourne. During this time I got engaged and decided to make Australia my permanent home.

As the academic career pathway wasn't for me I started work as a data analyst at a large employment agency using spatial data from the Australian Census to model demand for employment-related services. I eventually took a job at the management consulting firm, KPMG, which had a specialised business unit around demographics – a dream job for every geographer. Here I learned the ins and outs of how to present geographic insights and data to different audiences. There is so much data and information available that businesses pay good money to management consultants who are able to collect, interpret and present relevant data-driven insights to them. This is what I do for a living now and it provides me with a lot of joy as I have found a niche in management consulting that allows me to heavily lean on my training as a geographer.

When I started university in 2005, three years before the first iPhone arrived in Australia, many businesses didn't quite see how geographers might help them. One decade on, Geographic Information Systems (GIS) are essential for businesses and good geographers are in high demand. Geography graduates who can operate QGIS or ArcGIS and are comfortable around data can look forward to great careers in business. Few, if any, nations have better and more accessible spatial data than Australia, which makes this a wonderful place for a career in the sector.

400,000 new childcare places and companies were encouraged to provide increased opportunities for women on company boards and in managerial positions. Whilst the employment rate of women aged 25–44 increased from approximately 68 per cent in 2012 to 77 per cent in 2018, a Labour Force Survey in 2018 found that an estimated 2.37 million women who wished to work were not doing so, demonstrating a failure to shift the working culture for women. In terms of women in managerial roles, whilst this proportion has increased from 6.9 per cent to 11.2 per cent, it falls well short of the 30 per cent target set by the government for 2020. As indicated by Figure 7.6, these responses have had little impact on fertility levels so they have had limited effectiveness. Fertility rates have remained well below replacement level and are expected to remain at 1.4 children per woman.

In terms of providing for the increasing number of older people, the Japanese government introduced a long term care insurance system in 2000 to supplement the universal healthcare system. Until then caring for the elderly was a family responsibility. Now, all those aged over 40 years pay a compulsory premium which is used to partly fund care for those aged over 65 years who require it. The remainder of costs are covered by national and local taxation and a 10 per cent user contribution. Due to the increasing costs it faces, the government has also been steadily raising co-payments on medical services. Currently, approximately 30 per cent of the cost burden is passed to the consumer, increasing the cost of medical services for Japanese people. Political and economic factors limit the degree to which this may be increased in the future.

How does population *movement* contribute to structural *change* in population?

As a policy to increase the workforce, the option of increasing population *movement* to Japan via immigration has not been a popular strategy in the past. The country has a largely homogeneous society and unique culture which the majority of the people perceive would be threatened if more immigrants were admitted. This poses a great challenge for governments trying to balance the economic need for more workers against domestic political resistance to immigration. As shown in Figures 7.14 and 7.15, immigrants currently comprise 2 per cent of Japan's population with a total of 2.93 million. The largest group is from China (810,000), followed by Koreans

▼ **Figure 7.14** *Change* in migration numbers and percentage

▶ **Figure 7.15**
Age structure of Japanese citizens compared with migrant residents
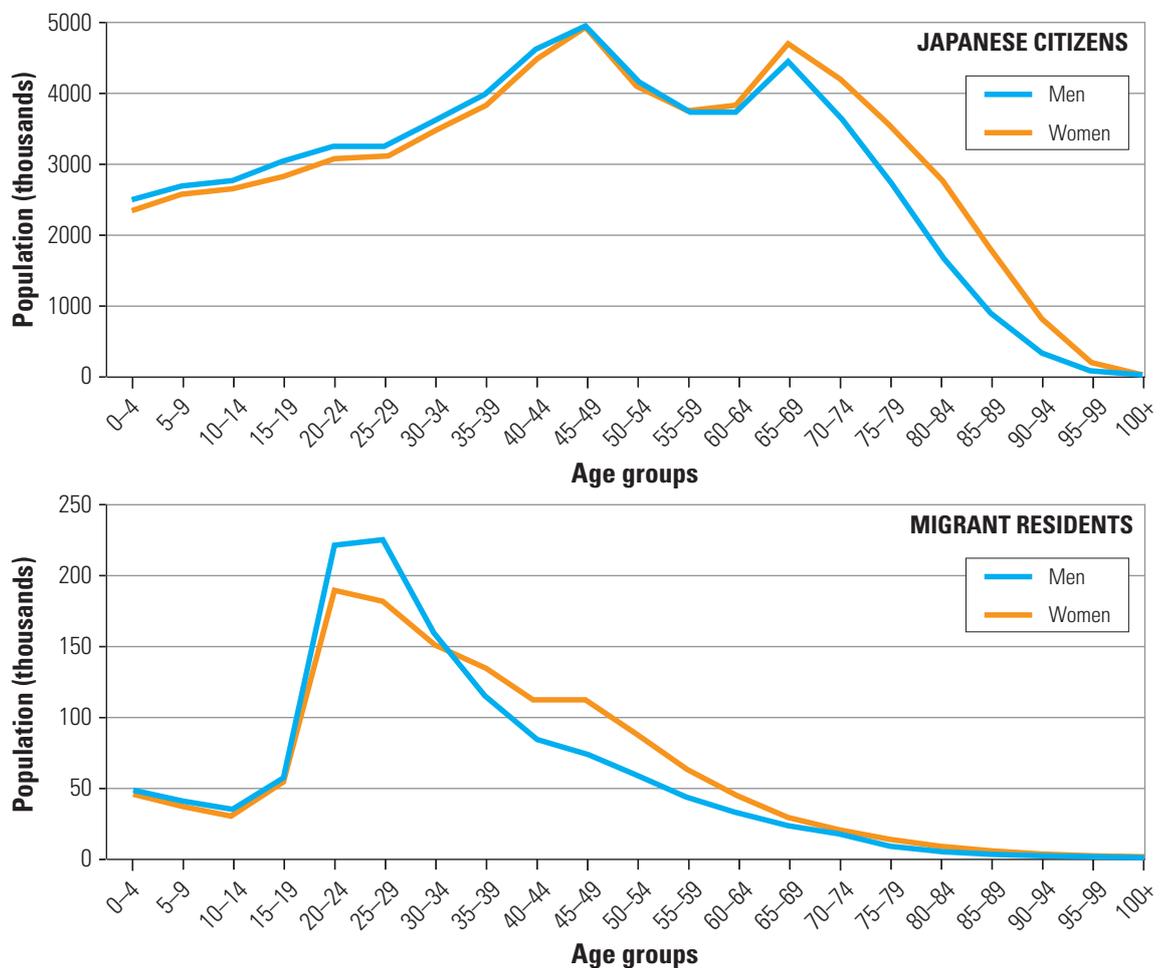
(44,000) and Vietnamese (410,000). In December 2018, the Japanese parliament passed legislation amending its Immigration Act to expand its temporary labour migration program from April 2019 to allow more than 345,000 new workers between 2019 and 2023 to fill areas of specified skills. These are projected to be care workers (60,000), food service industry (53,000), building cleaning and management (37,000), construction industry (40,000), agriculture (36,500), manufacture of food and beverages (34,000) and the accommodation industry (22,000) filling gaps in the labour force and diversifying Japan's culture. Workers with a lower skill level in this visa category have a five year stay limit and cannot bring family members, presenting limited opportunities to those in this category. However, workers with expert skills in some specified industries who can pass a Japanese language test and a field-specific skills test may bring their spouse and children, creating social and economic opportunities to those interested in *moving* to Japan.

As Figure 7.14 shows, migrant numbers have been rising steadily. Migrants to Japan do have a younger age structure than that of the Japanese population (see Figure 7.15) although they are still a small percentage of the population. At a local *scale,* structural *change* is more significant: among Tokyo residents in their 20s, one in ten is now overseas born; some small industrial towns such as Shimukappu in central Hokkaido have more than 15 per cent migrant population. The increased *movement* of international migrants into Japan will help offset some of Japan's population decline. However, the first twelve months of the policy saw fewer than 5000 applications. The COVID-19 pandemic then led to border closures, forbidding the return of three million overseas born residents of Japan, as well as the closure of testing centres for individuals to qualify for the new visas. This led to increased labour shortages. Therefore, there is only likely to be a limited contribution from migration in future to addressing the needs of Japan's ageing population and contributing to structural *change* by increasing the workforce.

Local-*scale* responses

The manufacturing sector in Japan has used its expertise in automation in the production line to design robots to assist the elderly and to help offset aged care staffing shortages. The domestic robot market is already a A$2 billion a year industry. The labour ministry is encouraging the spread of robots and spent A$6 billion to introduce them into 5000 age care facilities nationwide in 2017. Since then, the Japanese government has been funding development of elder care robots to help fill a projected shortfall of 380,000 specialised age care workers by 2025. Toyota has created a robot butler that is controlled via a tablet computer and can be trained to pick up and fetch objects. A robotic body suit for stroke victims and a robot used to lift hospital patients are two of many devices currently on the market.

In 2019 robots, such as that shown in Figure 7.16, were introduced into some day care centres in Tokyo to reduce administrative tasks required of staff. The VEVO robot is able to recognise the children's faces and exchange greetings. The robot can automatically calculate the length of time a child spends at day care by recording the time the child arrives and leaves and it can then calculate fees. During sleep times, a sensor attached to the children's clothing allows it to monitor breathing and triggers an alarm if something unusual is detected. Before VEVO, nursery staff needed to check on the children every 5 minutes and record details on paper.

Robotics are also being used to offset an ageing rural workforce by aiming to reduce farm labour by up to 30 per cent. For example, in Saga Prefecture in south-western Japan, farmers can lease a robotic harvester that picks greenhouse vegetables. The robot is equipped with an infrared sensor and can recognise vegetables ready for picking by their size. Once the job is completed the robot sends a notification to the owner's smartphone. By 2023, the Japanese market for 'smart farming' is predicted to reach A$406 million.

◀ **Figure 7.16**
Robots are increasingly used in the care of the young, as well as the elderly

▼ **Figure 7.17** An unusual response to declining population. Dolls have been made to take the place of people in the emptying town of Nagoro in the south-western island of Shikoku. The aim of the dolls is to help create a greater feeling of community

Matchmaking services are another local *scale* strategy to deal with the issue of the low fertility rate. Approximately half of the country's 47 prefectures have established one of these in the hope of encouraging marriage and therefore births, as government data shows the number of marriages in Japan fell by 200,000 in the last 20 years. The *region* of Saitama, located north of Tokyo, spent around A$187,000 in 2019 which resulted in 21 couples heading to the altar. In 2021 Prime Minister Yoshihide Suga's government allocated A$24 million to support local authorities that run such schemes by funding the use of artificial intelligence to help match lonely people. The technology will focus on an 'emotional quotient' to match potential couples with similar values, personalities and emotional intelligence rather than the usual characteristics of age, income level and looks. It will be interesting to see how successful this is.

The town of Kamiyama, located on the island of Shikoku, initiated a different approach in response to its ageing and declining population. In 2015, its

proportion of elderly was 49 per cent and its population had fallen to 5400 from 21,000 in 1955 and it was put at very high risk of disappearing. A team of local community members used the town's historic characteristics as a drawcard to establish an Artist in Residence program in 2008 which was promoted both internationally and within Japan. Abandoned school buildings, renovated by carpentry students, were used for the program which included establishing a museum and involving visitors in the local way of life and developing their understanding of traditional Japanese culture. Another strategy was to recruit businesses which could contribute to the community to set up in the town. Branch offices of 12 companies are currently located there and a made-to-order shoe shop and a locally grown food store are some of the new businesses that have moved in. Since the program has been established Kamiyama has grown by 91 households or 161 people. If it can maintain this *change* it has the potential to be a very effective means of dealing with the impact of its ageing population on infrastructure decline and community decay.

What is the role of geospatial technologies in developing and implementing strategies?

Japan conducts a population census every five years with the last one undertaken in October 2020. Around 600,000 census workers visited every household in Japan at least once to *distribute* the census form. The COVID-19 pandemic made it difficult to secure census staff and the census completion deadline had to be extended to take this into account. The Statistics Bureau of Japan (SBJ) encouraged people to submit their responses online in order to try to limit *movement* of workers. The survey response rate for the 2020 Census was 81.3 per cent in total, 39.5 per cent online and 41.8 per cent by mail. Although households are legally required to complete the census form, the completion rate is far from 100 per cent, although both response methods outweigh the previous ones

(36.9 per cent and 34.1 per cent respectively for the 2015 Census). Another issue is the time taken to *process* results: preliminary results were released in June 2021 and the final ones were expected by November 2021, almost a year after the census.

The tabulated data from each census is then used to produce maps using Geographic Information Systems (GIS) layers which are used by a number of government departments. GIS technology enables different maps to be digitally laid over each other for comparison and analysis, facilitating the identification of issues to be addressed. The Geographic Information Office in SBJ produces GIS maps based on grid squares of one kilometre, 500 metres and 250 metres. GIS technologies support urban planning in Japan.

For example, identifying the *distribution* of ageing population can inform the provision of aged care facilities whilst identifying areas of population decline or abandoned buildings can assist local councils in assessing their future infrastructure needs.

Census data is supplemented by a range of varied data collected by other Ministries and coordinated by the Director-General for Policy Planning (Statistical Standards). One example is the National Institute of Population and Social Security Research, attached to the Ministry of Health, Labour and Welfare. It conducts nation-wide surveys on an annual basis covering five themes which rotate every year:

▶ 2015: National Fertility Survey

▶ 2016: National Survey on Migration

▶ 2017: National Survey on Social Security and People's Life

▶ 2018: National Survey on Family

▶ 2019: National Survey on Household Changes

The data produced on demographics are the basis for determining a range of national and local policies, especially those related to social security and provision of services. For example, the National Fertility Survey seeks to understand the lifestyles of young people and their intentions to have children. This information helps to explore the causes of low fertility as well as peoples' work and child-rearing *environments* and how this may *change* over time. This data can also be used to help predict future population *change* in addition to helping to identify the needs of the population.

In addition to the census, GIS data is also obtained via government surveys. The National Survey on Migration, for example, observes trends on lifetime mobility of its residents. Rural-to-urban migration by young people has resulted in rural *regions* ageing quickly but as these *regions* continue to age, migration prospects are reduced. Another survey is that on Social Security and People's Life. Data on challenges facing people's living conditions, such as social connectivity for the aged, is collected. Thirdly, the National Fertility Survey collects data on marriage, childbirth and child rearing which is necessary for undertaking population projections. The results of surveys such as these are used in formulating national and *regional* population projections and policies. Whilst they are effective in terms of identifying trends in ageing as well as assisting in managing its impacts, much more effort is required to overcome this substantial population trend.

Governments and private industry are also using geospatial technology to address the issue of labour shortages on farms caused by Japan's ageing and declining rural population. Automated tractors use Global Navigation Satellite System (GNSS) connected to Japan's new Quasi-Zenith Satellite System (QZSS), a system of four satellites established between 2010 and 2017. At least one satellite of the QZSS is visible at all times from locations in the Asia-Oceania *region*, ensuring stable, high-precision positioning and control of robots with an error margin of 5 centimetres. In Hokkaido, these tractors are programmed to plough fields, plant crops and harvest produce. In addition to remote-control capabilities, they can autonomously *move* between fields along active roads using 3D LiDAR as well as the GNSS. Thus, the challenges created by declining rural populations are reduced as a result of this geospatial technology.

▶ ACTIVITIES

1. Identify a suitable criterion and evaluate the strengths and weaknesses of each of the strategies designed to respond to Japan's ageing population.

2. The Japanese government hopes to prevent the population from falling below 100 million people. What would be the advantages and disadvantages to Japan of meeting this target?

3. In what ways have social and cultural factors impacted the effectiveness of national *scale* attempts to increase female participation in the workforce?

4. Imagine you are an elderly person in Japan. Discuss the pros and cons of having a robot to assist you in your home.

5. Refer to Figure 7.15. Compare the population structure for foreign residents to that of Japanese nationals.

6. Debate this topic as a class: 'Japan's immigration policy holds the key to addressing the issues associated with Japan's ageing population.'

7. Evaluate the effectiveness of geospatial technologies in assisting with managing the impacts of Japan's ageing population.

8 Population trends and issues: ageing in Germany

What are the geographic characteristics of Germany?

Germany is *located* in Western Europe, sharing borders with nine other countries (see Figure 8.1). It has a total land area of 348,560 square kilometres – less than one-and-a-half times the size of Victoria. The northern third of the country is part of the North European Plain and its physical *environment* generally becomes steeper towards the south with the highest elevations. The Alps are located along the southern border. Germany's climate is mostly temperate and maritime, with cold, cloudy, wet winters and moderate warm summers. As part of the European Union, Germany has strong social, economic and political *interconnections* with other countries in the surrounding *region*.

What are the population characteristics of Germany?

In its most recent form, since re-unification in 1990, Germany has existed as a single nation comprising the two post-Second World War countries: communist East Germany and democratic West Germany. Germany had an estimated population of 83.2 million in early 2021 ranking it the second most populous country in Europe and nineteenth in the world. With a median age of almost 46 years, Germany has an ageing population, and it has *moved* into the hyper-aged category with 21.8 per cent of its population over 65 years of age, second after Japan.

Although the average population density in Germany is 240 per square kilometre, the country has a predominantly urban population with 76.4 per cent of the population living in urban areas. Its population is unevenly *distributed* with higher densities in the west compared with the east (see Figure 8.2). Despite its large population, Germany has relatively few large cities with only Berlin, Hamburg and Munich having a population of over one million people.

In 2021, approximately 13 per cent of the population was born overseas, the majority from other countries in the European *region* such as Turkey, Poland, Russia and Italy. After the United States, Germany is the
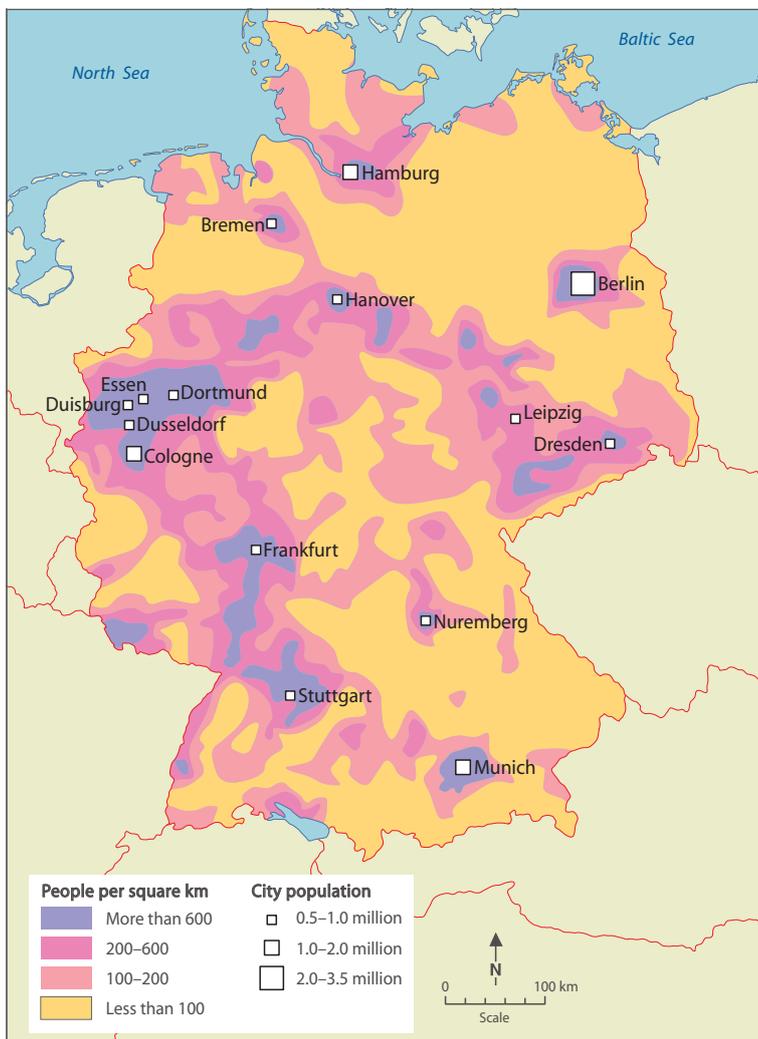
◀ **Figure 8.2** Germany's population *distribution*

second most popular destination for immigrants in the world, *interconnecting* it with the rest of Europe and beyond.

In terms of religious affiliation, over half of Germany's population are Christian (55 per cent) while an estimated 5.7 per cent follow Islam. Over 38 per cent of the country's people are non-religious. Germans are well educated (the literacy rate is 99 per cent) and have a reputation for being well travelled; they have a legally-guaranteed minimum 24 days of flexible vacation time, one of the highest amongst the OECD countries.

What is the nature of the population trend in Germany?

Germany's ageing population is a result of many years of increasing life expectancies and low birth rates, resulting in an increasing proportion of people aged over 65 years, as well as a potential decline in its population.

As shown in Figure 1.10, Germany is one of a number of countries in the European *region* currently experiencing a death rate higher than its birth rate, resulting in a negative rate of natural increase. As indicated in Figure 8.3, since reunification in 1989–90, the population has shown a slight increase (except in 1998 and between 2003 and 2010). Germany grew by more than two million people between 2015 and 2019 due to high levels of immigration but there was minimal *change* in 2020 due to the impact of COVID-19 on population *movement*, discussed further below.

Germany's population grew relatively rapidly in the post-World War II period although, as shown in Figure 8.3, its baby boom occurred slightly later (in the 1960s) than that of countries such as Australia as German families faced greater economic pressures. Fertility rates declined steadily from 2.36 children per woman in 1970 to hover around the 1.3–1.4 level in West Germany since 1975. East Germany experienced more variability in fertility in response to some government incentives provided in the 1980s but, following national reunification in 1989–90 and improvement in living standards, its fertility rate fell quickly to mirror that of West Germany (refer to Figure 8.4). With the higher levels of migration since 2015, there has been some increase in fertility levels as women with foreign citizenship tended to have more children (an average of 1.9 compared with 1.4 children per woman in the rest of Germany). Estimates for

2020 put the fertility rate at 1.59 births per woman with total births under 770,000 in that year. Fertility rates have fallen not only because of social factors such as improved education about contraception and its availability, but also due to *changing* roles and aspirations of women. Those German women who do have children are doing so at a later age – now averaging over 30 years compared with approximately 28 years in 1991 and 23 years in the 1970s – resulting in fewer years to reproduce. However, there are now more women between the ages of 30 and 37 years which has also contributed to the recent slight increase in fertility rates in the last few years.

▼ **Figure 8.3** Germany's total population 1950–2060

Variant 3: Moderate development in the case of high net migration
Variant 2: Moderate development of fertility, life expectancy and migration
Variant 1: Moderate development in the case of low net migration
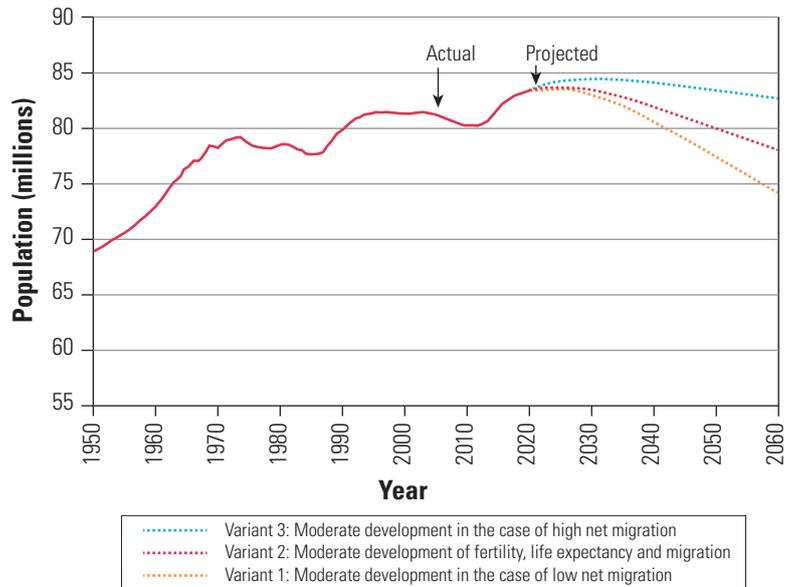
▼ **Figure 8.4** *Changing* fertility rates in Germany
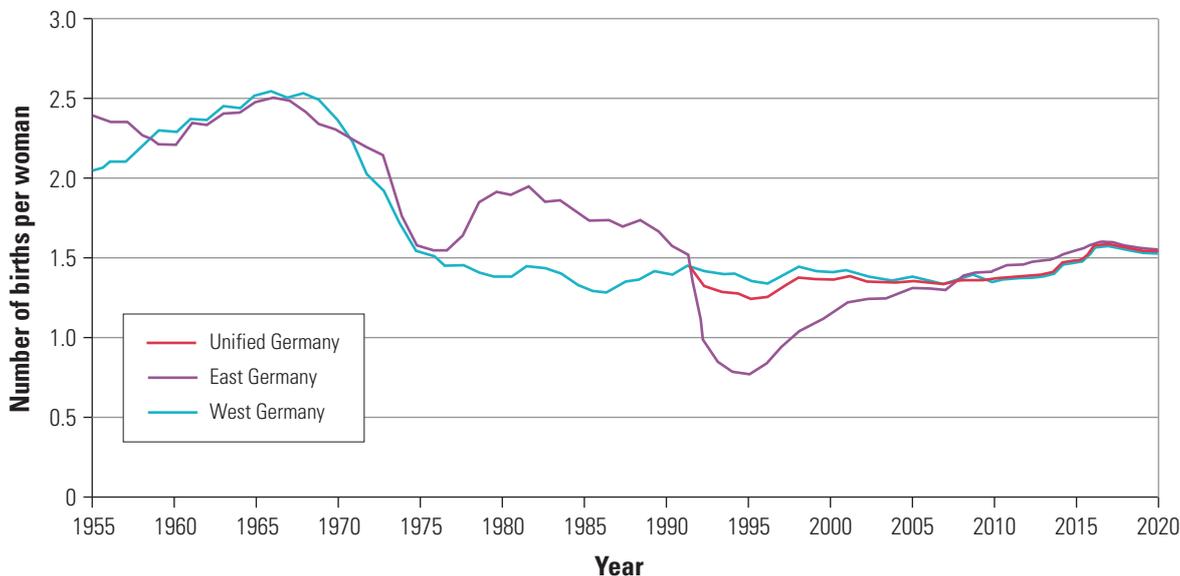
▼ **Figure 8.5** *Changing* births and deaths in Germany
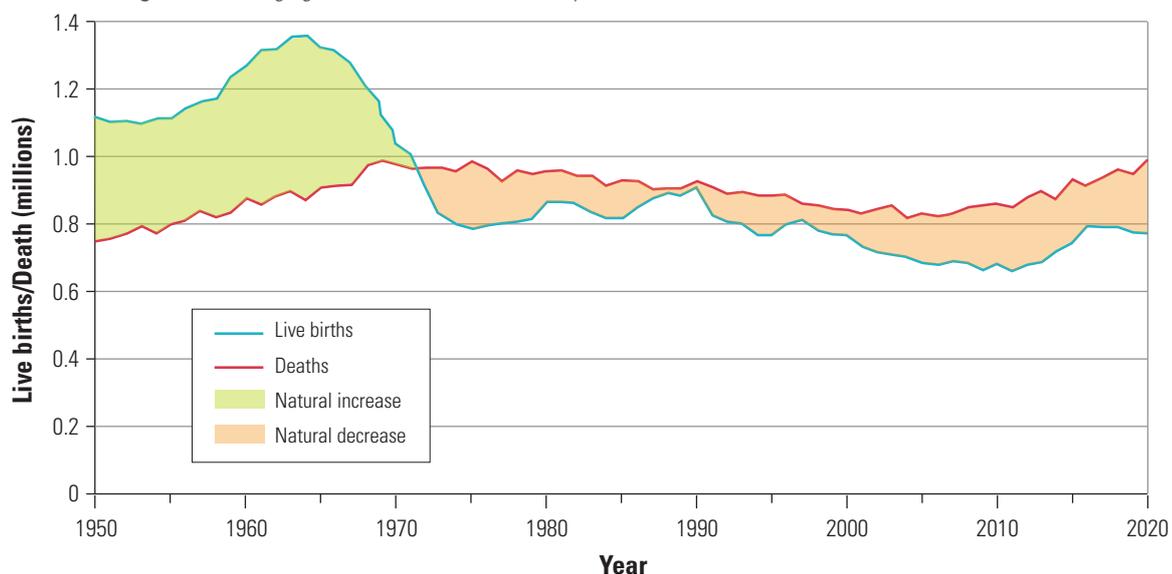
Cultural factors have also impacted fertility rates. German women face difficulties trying to balance career and motherhood. In Germany, societal attitudes towards working mothers are generally unsympathetic – women who manage paid work with raising children are commonly referred to as 'raven mothers', implying neglect. A study undertaken in 2012 found that the majority of Germans believe children are harmed if the mother works full-time. In addition, until recently, many childcare centres operated for only part of the day, closing in the afternoon and thus making it difficult for working mothers to find care. Given such circumstances, it is therefore not surprising that women in Germany are having fewer children.

Germany's death rate of 11.3 per 1000 people currently outnumbers its birth rate of 9.4 per 1000 people, clearly placing it at Stage V of the Demographic Transition (refer to Figure 8.5 and see also Chapter 1, pages 23–25). Death rates have fallen over time, particularly since the 1960s. Although they are low, they are expected to increase as the population ages. Both child and infant mortality are low and have continued to fall. In 2020, the under-five mortality rate for Germany was 2.6 deaths per 1000 live births,

having fallen from 5.4 deaths in 2000. Similarly, infant mortality fell gradually from 4.4 deaths per 1000 live births in 2000 to 2.1 deaths in 2020.

As shown in Figure 8.6, Germany's life expectancy has increased considerably over time from 69.3 years in 1960 to over 81 years by 2015. The German Federal Statistical Office estimated the 2021 figure as 81 years with the life expectancy of newborn boys at 78.6 years and that of newborn girls 83.4 years.

Some of the factors responsible for this increased life expectancy include:

▶ increased government expenditure on health care and provision for those with disabilities. For example, any workers with health issues have the right to receive aid from their employers such as a modified workplace and part-time options. Germany spends nearly 0.3 per cent of Gross Domestic Product (GDP) on disabled people, which is much higher than in other OECD countries. Cardiovascular disease is the leading cause of death in Germany and the government has provided extensive funding for research and treatment to reduce this

▼ **Figure 8.6** Germany's *changing* life expectancy
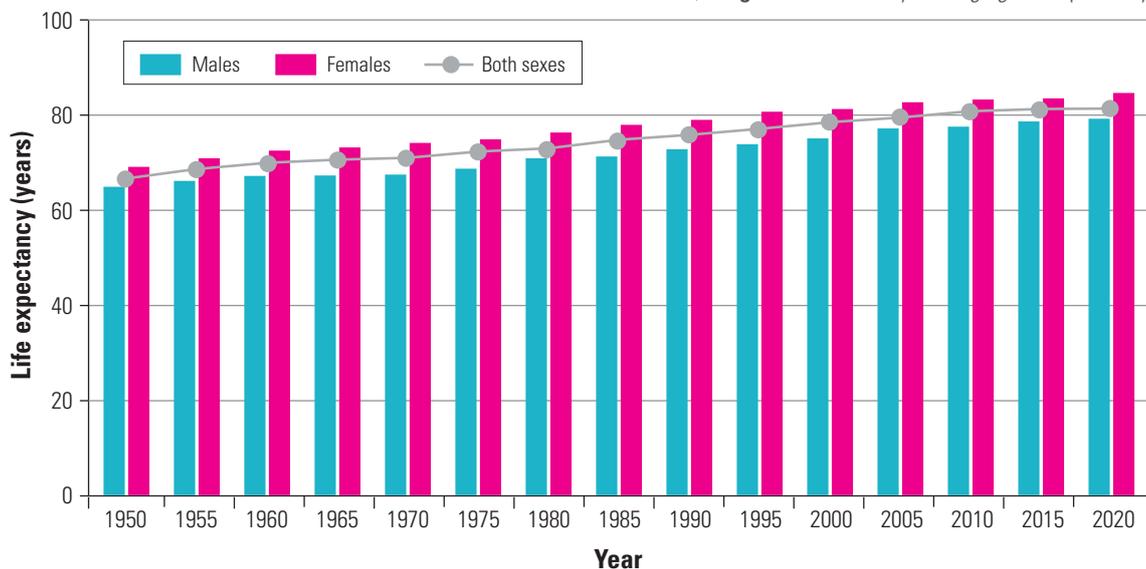
▼ **Figure 8.7** Germany's foreign population 2020
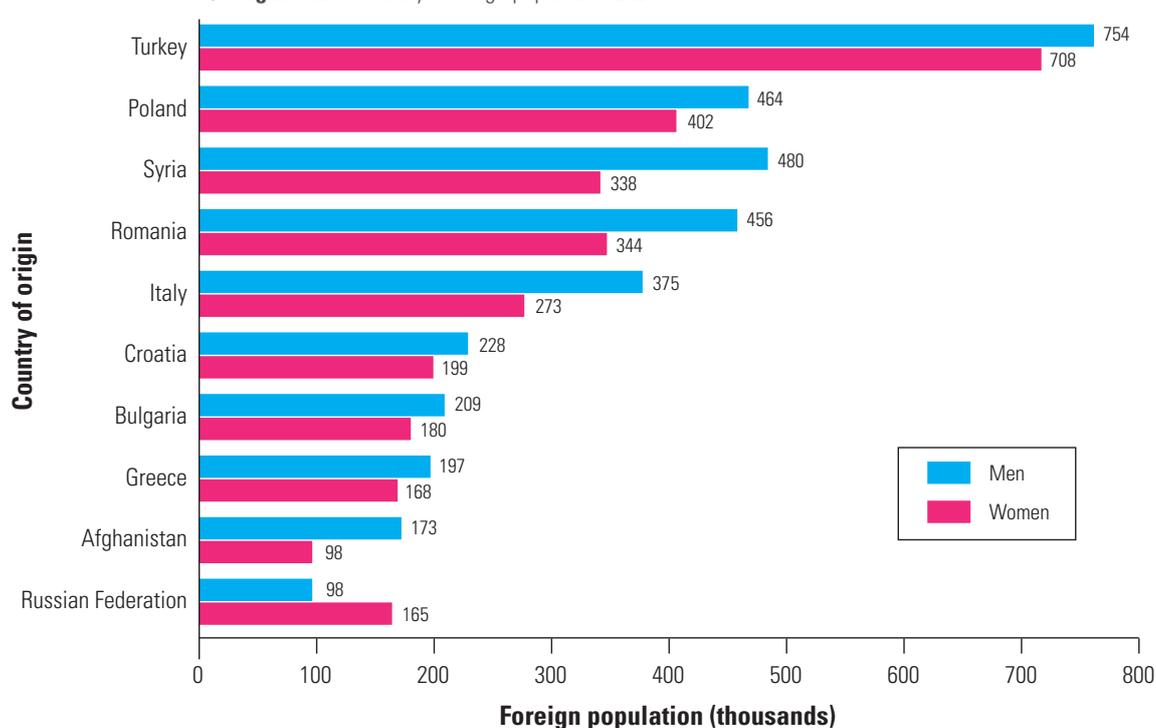
the government has ensured good working conditions and salaries via a statutory minimum wage allowing for adequate living conditions, and therefore longer life expectancy

▶ the German education system offers both general and occupation specific pathways, helping ensure high quality schooling and therefore income earning potential. Lack of poverty is associated with longer life expectancy

▶ engagement of citizens in the community, as evidenced by high percentage of voter turnout (76 per cent compared with 68 per cent on average in OECD countries) reflects the involvement of people in their community. Other family programs assist in the sense of connectivity. People may therefore be happier and live longer

▶ improvements in housing have occurred, particularly in the former East Germany, which help people live healthy lives. Since 1993 the government modified 1.1 million units to ensure almost all households had access to a private indoor flushing toilet

▶ reduced air pollution has improved the quality of the *environment* and therefore the health of Germans. This has been done by actions such as improving the efficiency of public transportation and introduction of hybrid buses as well as modification of heating units such as wood-burning stoves.

As a consequence of having low birth and death rates and high life expectancy, Germany's population structure has a lower percentage in the under 15 year age group, approximately 14 per cent in 2020, compared with 22 per cent in the 65 plus year age group. About 64 per cent of the population is therefore in the 15–64 year age group. The *process* of Germany's ageing can be seen in Figure 8.9.

As the fertility rate has been well below the replacement rate for 40 years, this generation of children has been smaller in number than their parents' generation. High rates of immigration to Germany since the 1950s prevented the overall population from decreasing accordingly. The German economy has a history of dependency on 'guest workers' from south and south-east Europe for factory and service labour. The collapse of the communist system in the 1980s led to a return *movement* of migrants of German origin from the former Soviet Union, Romania and Poland. There are currently 11.4 million migrants registered in Germany with the largest group being from Turkey followed by Poland (refer to Figure 8.7).

The year 2015 saw a major *movement* of asylum seekers into Germany following the then Chancellor Angela Merkel's compassionate 'open door' policy in regard to Syrian refugees who were fleeing their country due to civil war. Over one million asylum seekers arrived in Germany in 2015, with one in three from Syria and other large groups from Afghanistan and Iraq (see Figure 8.8). This pattern has continued to the present day. Albanians and Kosovans are also major groups arriving, but their citizens are not normally eligible for political asylum as the German government considers their countries of origin to be safe.

Migrant population in Germany rose only 204,000 or 1.8 per cent in 2020, the slowest in the last ten years. *Movement* from European Union (EU) countries was relatively stable with a 2.2 per cent increase but that from non-EU countries fell to 1.5 per cent from 3.3 per cent in 2019. The largest decline was from India, falling from 21,000 in 2019 to only 8000 in 2020.

NOTE: Some of the people
seeking protection who came
to Germany in 2015 were
only registered during 2016.
For that reason, the figures
of people seeking protection
as at 31 Dec 2015 are likely
to be underestimates.
West Balkan Countries
are Albania, Bosnia and
Herzegovina, Kosovo,
Montenegro, Northern
Macedonia and Serbia.
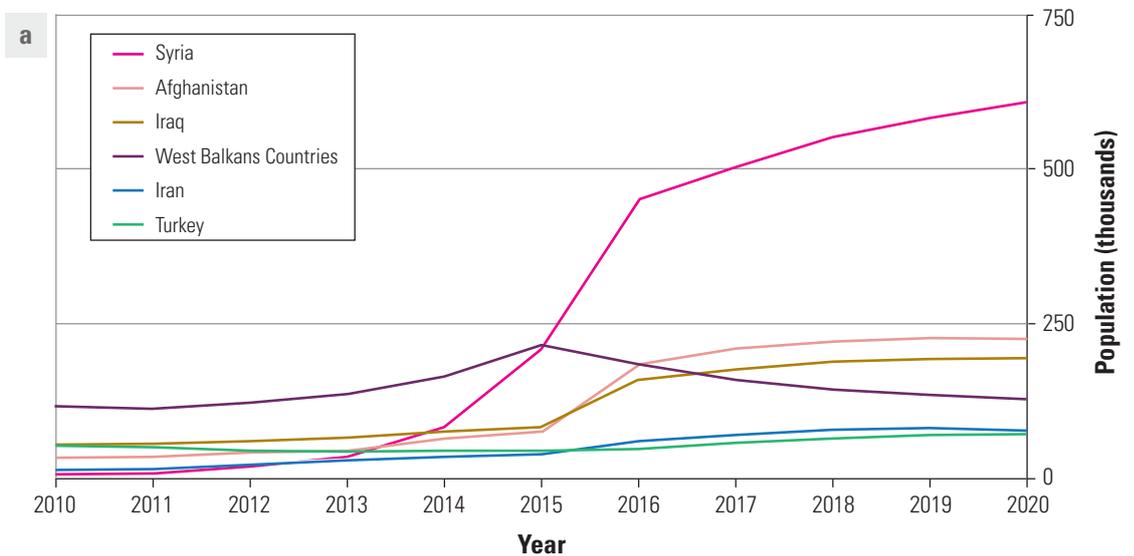
► **Figure 8.8 (b)**
Age structure of
people seeking asylum
in Germany, 2020
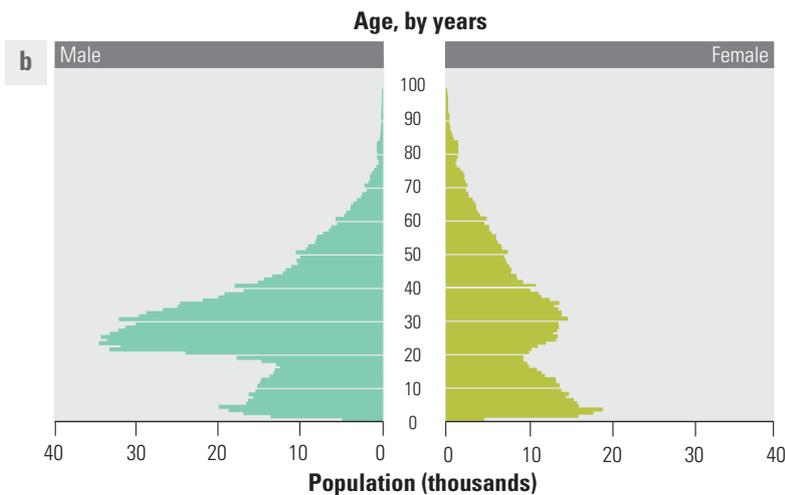
What are the population issues and challenges in Germany?

Despite the contribution of migration, the German Federal Statistics Office estimates Germany's population will decline by 2040 and at the latest to between 74 and 84 million by 2060, depending on the level of net migration. As the *changing* population pyramids in Figure 8.9 show, there will also be the issue of a decreasing percentage of young people in the overall population and a rising percentage of elderly people. The number of economically active people aged between 20 and 66 years is expected to decrease by between four and six million by 2035.

The percentage of retirees will grow to over one-third of the population by 2050 with the median age increasing to 47.4 years. Consequently, the old-age dependency ratio will also increase. In 2015, the old-age dependency ratio was 31.1, having increased from 21.6 in 1970, growing at an average annual rate of 4.79 per cent. By 2030, only two people will be working to support each retiree, falling further to 1.8 by 2040. The issue of a declining workforce will cause considerable economic challenges for Germany.

► **Figure 8.9**
Germany's *changing*
population structure
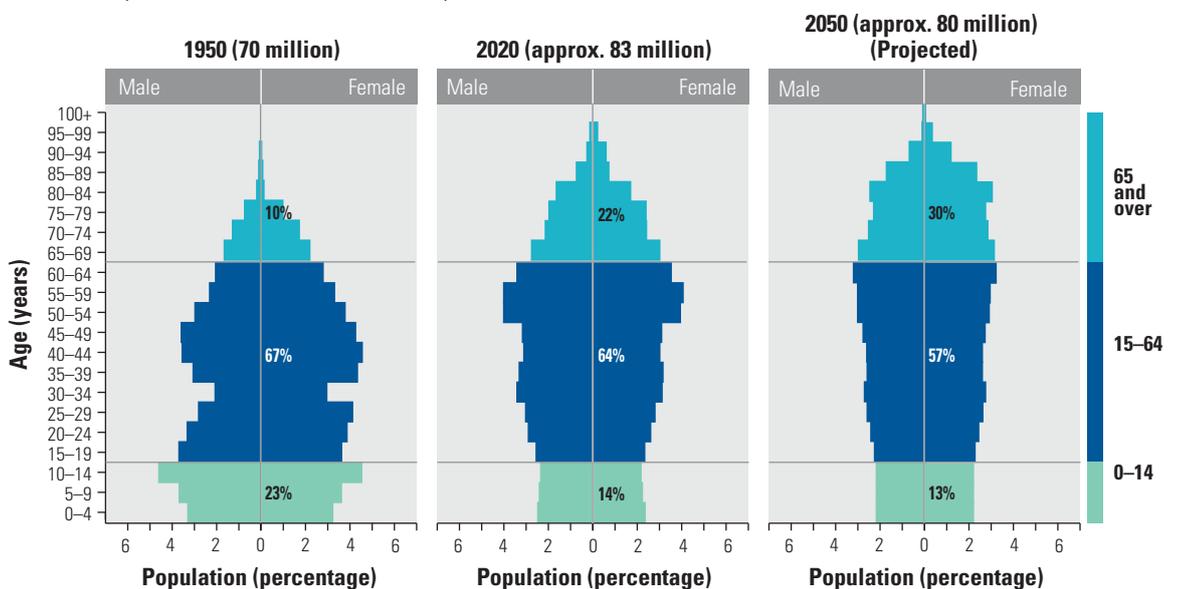
This, in turn, is *interconnected* to challenges for social welfare systems in Germany. Germany's pension system is a 'pay as you go' system – each set of retirees is paid for by the current working generation. As a result, all the money collected by the workers' contributions is immediately distributed to current pensioners. Around 85 per cent of the average pensioner's income is state-financed which is considered to be *unsustainable* (Figure 8.10). If the tax base does not grow to its target level due to the *changing* dependency ratio, pension benefits will decline as a direct consequence. Additional subsidies have therefore been necessary to guarantee pension payments. In 2020 that subsidy was more than A$154 billion, roughly a third of the federal budget, creating a considerable financial challenge to Germany's government.

Medical care in Germany is high quality and guaranteed for everybody. Health care is the largest employment sector in Germany, providing over four million jobs – a positive impact of ageing. However, the large proportion of elderly people means a large percentage of the country's GDP is spent on health. At 11.7 per cent of GDP, its health spending is over 2 per cent above the OECD average. In 30 years from now, one in ten inhabitants will be aged 80 or over, creating a considerable challenge in terms of likely financial expenditure.

Interconnected to the health sector, businesses that are predicted to grow due to Germany's *changing* population structure include asset management, pharmaceuticals, bio-technology, and support and social services. However, other areas will face challenges. There will be less demand for products and services brought by younger people and families. Products that supply the local retail market only (not exporting) and real estate are likely to be hardest hit by the decrease in numbers and *changing* population structure. The contraction of the labour force creates

▲ **Figure 8.10** Cartoon depicting the burden of Germany's old-age dependency ratio

both positive and negative impacts. For instance, this contraction forces a decrease in the unemployment rate on the one hand but the challenge of potential skill shortages on the other.

The *distribution* of Germany's ageing population, and therefore the *distribution* of the issues and challenges faced, is uneven. As shown in Figure 8.11, the greatest population *change* is taking place in the former East Germany where widespread *regions* experienced over 6 per cent annual decrease in population. In contrast, *regions* of population growth are dispersed mainly in the south and north-west, centred on major cities such as Munich and Frankfurt. This pattern is expected to continue into the future with seven of the country's sixteen federal states expected to see net decreases in population by 2035. The largest decrease is anticipated in the state of Saxony-Anhalt, where a 10.6 per cent fall is forecast. In contrast, the state of Hamburg is expected to increase by 9.1 per cent. The exception to this pattern is the state of Berlin; although in the east of Germany, it is predicted to grow by over 14 per cent by 2035.
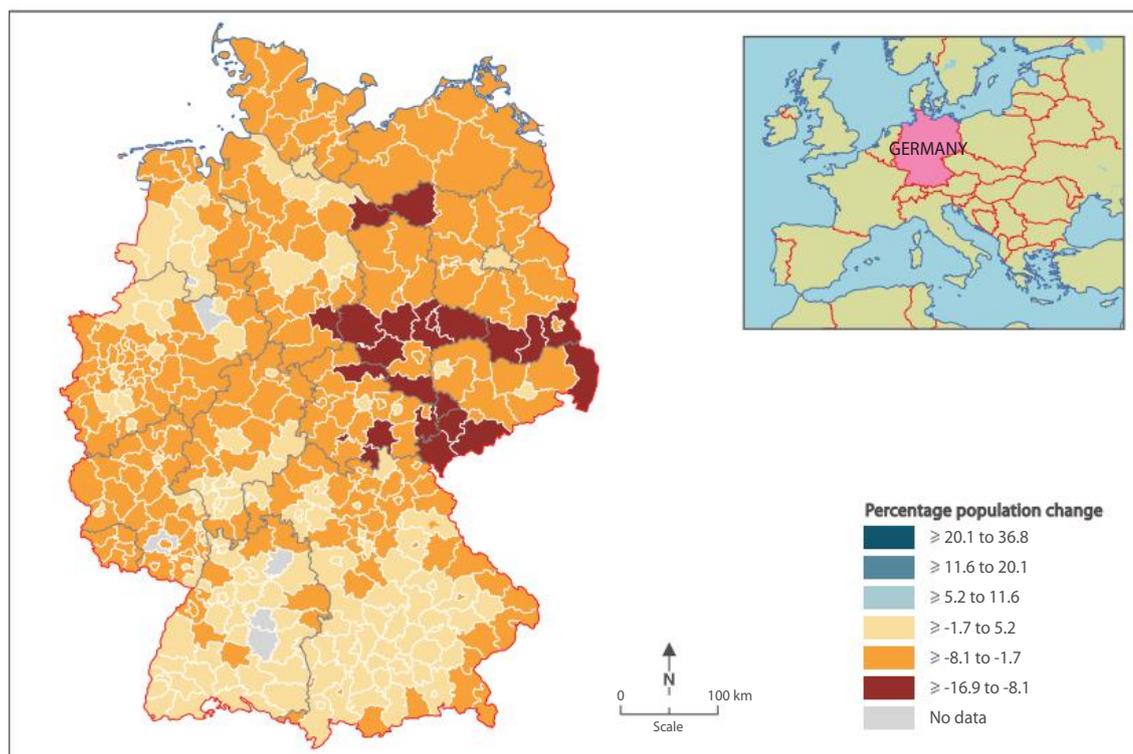
◄ **Figure 8.11** Population *change* in Germany, 2019

Percentage population change

- ⩾ 20.1 to 36.8
- ⩾ 11.6 to 20.1
- ⩾ 5.2 to 11.6
- ⩾ -1.7 to 5.2
- ⩾ -8.1 to -1.7
- ⩾ -16.9 to -8.1
- No data

▼ **Figure 8.12** Germany's *regional* context: median age of population in EU countries

Note: 2050, population according to the 2019 projections, baseline variant (EUROPOP2019).
(¹) 1990: not available.
(²) 2019: estimates and/or provisional.
(³) 1990: excludes French overseas territories.
(⁴) 2050: not available.

Legend:
- 2050
- 2019
- 1990
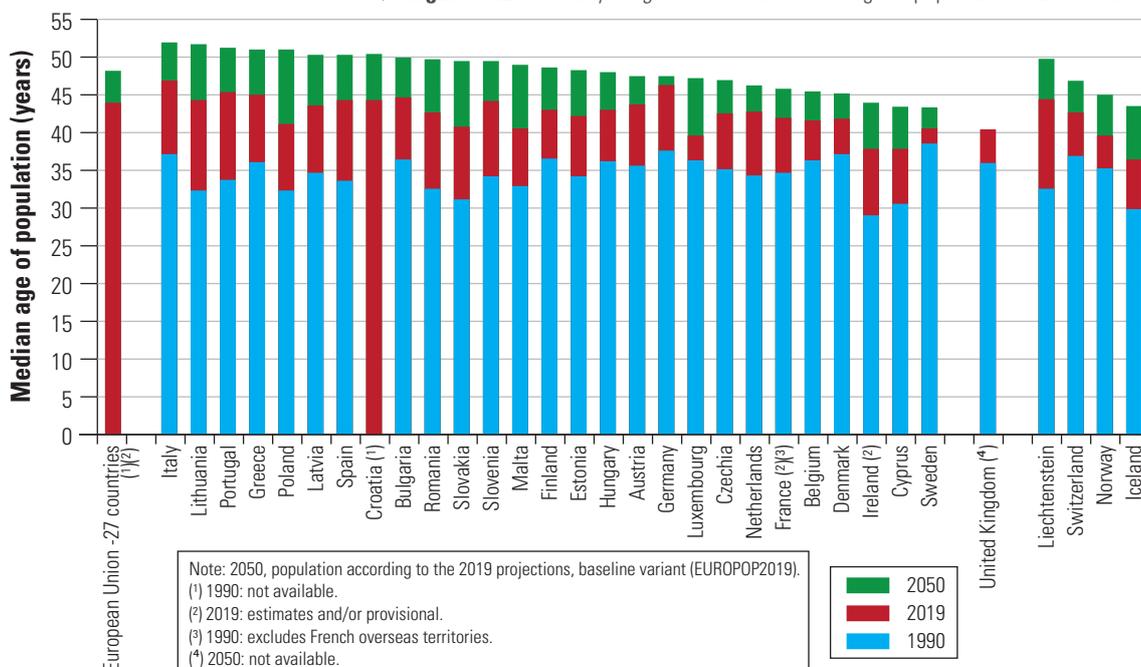
The issue of population decline in the east has been exaggerated by population *movement* from east to west, especially by young women in search of employment (although increasingly there is return *movement*). Small towns such as Wittenberge contain boarded-up and crumbling buildings. Fewer people in these economically-depressed locations have contributed to an increase in frustrated youth and right-wing extremism, posing significant political challenges. In general, rural *regions* experience the greatest challenges of a rapidly ageing community and of depopulation as youth migrate to the larger cities. On the positive side in terms of increasing biodiversity, after nearing extinction, numbers of endangered species such as wolves are slowly increasing in Germany's depopulated eastern states particularly because of reduced human activity in neighbouring rural *regions* including forest and farmland *environments*.

World *regional* context

In terms of its world *regional* context, population ageing is a long-term trend which began several decades ago for similar reasons in many *places* in Europe. As shown in Figure 8.12, the median age is rising in all the European countries shown although this varies considerably. In 2019, Italy and Germany had the highest median ages, over 46 years, compared with just under 40 years in Ireland. These variations in ageing between countries in the *region* will continue in the near future. Eurostat projects that Italy will be the first to reach a median age of 50 in 2028, followed by Portugal in 2032 and Greece in 2036. The share of the population aged 65 years and over is also increasing in all countries. However, Germany has already aged more extensively than most other countries in the European *region*, hence its high median age. It has the lowest proportion of young people and the second highest proportion of older population (Italy has 22.8 per cent in the 65 years plus age group compared with Germany's 22 per cent) compared with an average figure for the EU of 20.3 per cent. Major exceptions in Europe are Turkey and Ireland where the proportion of the youngest age group is high (24 per cent and 21 per cent respectively) and persons aged 65 and over comparatively low (8.8 per cent and 14.1 per cent).

▶ ACTIVITIES

1. Describe the *changing* dependency ratio and the rate of population ageing for Germany.

2. Refer to Figure 8.9. Outline the *interconnection* between the economic, social, political and cultural factors which account for the *changing* characteristics of Germany's population structure from 1950 to 2050.

3. Refer to the cartoon Figure 8.10. Do you consider this is an accurate representation of Germany's population? Justify your answer using appropriate statistics.

4. Refer to Figure 8.11. Describe the *distribution* pattern shown. Refer to an atlas, if necessary, to identify appropriate examples.

5. Refer to Figure 8.12. To what extent is Germany typical of other countries in the *region* in terms of the *changes* to its median age?

How does population *movement* contribute to structural *change* in population?

As mentioned earlier, Germany has a history of using immigration to help fill workforce shortages. Numbers of people with a migrant background (defined by the German government as 'they or at least one parent do not have German citizenship') are expected to increase from the 2020 figure of 26 per cent of population to 35 per cent by 2040. In March 2020, Germany enacted new rules under the 2019 Skilled Immigration Act to expand the availability of German work visas to qualified skilled immigrants from outside the EU. Migrants tend to be males (55 per cent) and have a lower median age in comparison to the population as a whole; over 39 per cent of migrants are aged 25 to 40 years of age, compared to 19 per cent of the total population.

While this can help deal with some of the impacts of ageing in the short term, it is estimated that Germany would need to meet the challenge of unrealistically large net migration of 500,000 per year to stabilise its workforce size, and a massive net migration of 261 million over the next 90 years to stabilise the current old-age dependency ratio. Immigration from the newest European Union members Bulgaria and Poland has increased, but more competition for labour from other countries in the *region* is also likely in the future.

The intake of refugees, primarily from Syria, may assist with alleviating some workforce shortages in the short term although an additional challenge is that language is proving a barrier to recruitment. Schemes to attract migrants from countries such as India and Indonesia in fields such as information technology and health have not met targets. Cultural and social issues relating to the acceptance and integration of migrants into German society have also been contributing factors. Although the federal government has been working to overcome such issues through its 'National Integration Plan', the far-right political party *Alternative for Germany* gained its first parliamentary seats in the 2017 election, reflecting increasing public discontent on this matter. This poses a continuing challenge for Germany in terms of attracting migrants to offset its ageing population.

Associate Professor Libby Porter
Academic researcher in urban Geography

I am an academic researcher in urban Geography at RMIT University. My title is Associate Professor and Vice Chancellor's Principal Research Fellow. That simply means I do academic research. I studied Geography in Year 11 and 12 and really enjoyed it. When I went to University I decided to take a degree in urban planning which uses lots of geographical and spatial concepts, but applies them to real-world problems in cities and human settlements.

Now all of my work is a mix of urban planning and urban Geography. Mostly I try and answer questions about how cities work and how we can make them work better for a more equitable, sustainable and socially just world. I'm especially interested in how some people get pushed out of areas because of the way that cities develop. I use my Geography skills every day, because Geography for me is about understanding the relationship between people and place, and how we should manage that relationship so that everyone can benefit. Lots of my work involves using maps in participatory research trying to understand this relationship between people and place and what it means for how we think about and manage cities. I also use my geographical analysis skills to understand the layers of cities over time.

I work with people from many different disciplines including geography, planning, architecture, Indigenous studies, anthropology, politics and sociology. I feel most at home with geographers! There are lots of ways that people who study Geography can make a real contribution to the major challenges that face the world – you can do research that involves Geography; design policies; consult to governments, communities and industry; and work overseas.

Every day I'm inspired to keep studying Geography because place is so important to all of our lives. If we don't have good places to connect with, then our daily life is diminished in important ways. We each live out our daily lives in ways that are placed – we live in a place that we call home, work in places that become familiar, have fun in places that are important to our spirit and wellbeing, care for our families and friends in places that perhaps they call home, and help produce places every day.
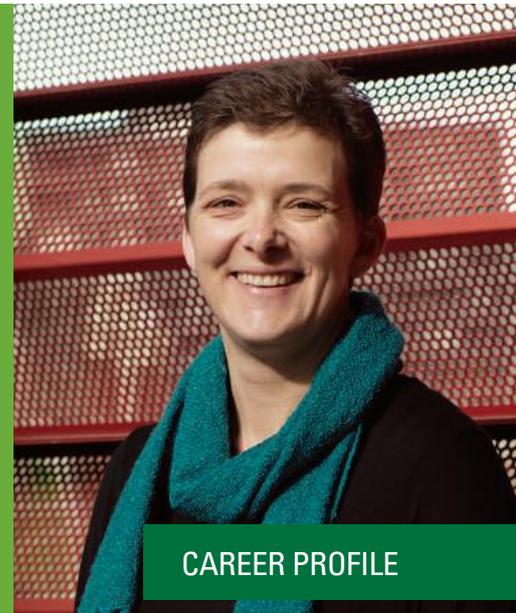
CAREER PROFILE

What are the strategies in response to the issues and challenges?

National-*scale* strategies

The German government has implemented a number of legislative reforms in response to its ageing population including:

▶ Agenda 2010: in 2004, former Chancellor Schroder introduced taxes on retirement funds in an effort to keep people working longer. Incentives and disincentives were provided to try to get people to work beyond 65 years – pension cuts of 3.6 per cent for every year you retire before 65 years and pension bonuses of 5 per cent for working beyond that. A '*sustainability* factor' was brought in to assess finances each year and determine entitlements based on the funds available.

▶ from 2012 there has been a gradual increase of one to two months per year in the retirement age from 65 to 67 years by 2030. However, this may have limited effectiveness as in 2014, based on an election promise, legislation *changes* allowed people who have worked at least 45 years since the age of 18 to retire at 63 with a full state pension. Although this may not affect a large proportion of the workforce, the government estimates that about 200,000 workers will be eligible each year and the additional annual costs for this measure will rise from around A$1.6 billion in 2014 to around A$4.8 billion in 2030.

▶ increased salary contributions towards social security from 20 per cent to 22 per cent of salary by 2029.

In order to try to raise the birth rate, a number of family-friendly measures were introduced under Chancellor Merkel from 2006:

▶ parental leave provisions of up to three years to care for a new child. Both parents are entitled to this leave and employers are legally compelled to keep work positions open

▶ Kindergeld allowance (children's money) of approximately A$338 per month is paid to parents to help support their children until 18 years of age (or until 25 years if they pursue further education)

▶ Eltnergeld allowance (parents' money) is a limited income subsidy covering the first 12 to 14 months of a child's life. Payments total 67 per cent of the parent's income for a maximum of approximately A$2700 per month. Payments can be split between the mother and father so that responsibility for child rearing can be shared.

However, these measures have had little impact on Germany's fertility rate – and at considerable economic cost to the government. For example, births in 2010 totalled 678,000, a decrease from 685,000 in 2007 despite the government paying around A$6 billion in parental leave payments. A UNFPA study found that higher monetary transfers were likely to have minimal impact on fertility decisions, particularly for higher educated parents who may be more concerned about the impact of having breaks from employment on their careers. As indicated earlier in this chapter, recent slight increases in births in Germany have been attributed to higher levels of migration. As Germany's

▼ **Figure 8.13** Pensioners enjoying outdoor chess

public expenditure on tax-breaks for families is more than 0.5 per cent of GDP, the effectiveness of these family friendly measures on raising fertility has been questioned.

One additional government strategy to deal with the impacts of a declining population has been to tear down vacant, run-down buildings, mainly in the former East Germany, and replace them with parks. The federal government together with the Länder (states), established an urban restructuring program, *Stadtumbau Ost,* in 2002 following a survey that found one million flats, representing 13 per cent of the East German housing stock, were vacant. It intended to stabilise the housing market by demolishing abandoned or underused buildings and improving the more stable residential quarters. This saves maintenance costs and improves the quality of the *environment* for remaining residents as shown in Figure 8.14 (a) and 8.14 (b). Between 2002 and 2012 an estimated 300,000 empty residences had been removed with another 250,000 by 2016. The first seven years of the program had a cost of A$4 billion but without building removal it was estimated that flat vacancies would have risen to 1.42 million by 2020. Forecasts assume that 624,000 residential units will have to be demolished by 2030 in order to prevent the vacancy rate from rising any further. Emphasis has also been on revitalising city centres with the view that urban restructuring can contribute to adapting cities to the consequences of population decline and offer more favourable conditions for new development opportunities. A twin program, *Stadtumbau West*, was implemented in West Germany in 2009 to deal with issues of urban stagnation. These two programs were merged in 2017 to enable a more targeted approach to future challenges. This includes not only analysing vacancy rates but being mindful of historic and cultural values and social and *environmental sustainability*. Over A$400 million is allocated annually for the program which currently funds urban redevelopment measures in 1081 municipalities.

A more recently developed strategy to assist structurally weak *regions* in Germany due to the ageing population is the federal government multi-generational house program which began in 2021. This national *scale* strategy, 'Together – for one another', aims to improve the quality of life and social cohesion for communities by providing meeting *places* where younger and older people can support each other. The intergenerational houses may provide facilities such as a café, playroom and/or a repair workshop, as well as assistance with a range of needs from using smart phones to parenting support. By fostering *interconnections* within the community, it is hoped that the social and cultural *environment* of neighbourhoods is improved for people of all ages, including the elderly. The government aims to fund 530 houses for eight years using both full time employees as well as volunteers.

Local-*scale* strategy

German companies have responded in a number of ways to the increasingly ageing population. Vehicle manufacturer BMW realised in 2007 that the average

▲ **Figure 8.14 (a)** Apartment block demolished in Dresden 2005

▼ **Figure 8.14 (b)** Now replaced by a park suitable for both young and older residents

age of the workforce at its plant in Dingolfing, located 100 kilometres north-east of Munich, was expected to rise from 39 years to 47 years in 2017. The company was concerned about possible declines in productivity and therefore its competitiveness. In anticipation of this ageing, the company staffed a pilot production line with workers whose average age was 47 years. BMW managers then worked with the people on the line, Workers Council representatives and technical experts to develop a framework for *change* across five areas: health management, skills, the workplace environment, retirement policies and *change processes*. As a result, 70 *changes* were made to workplace equipment that reduced physical strain and error. For example, these modifications included: use of wooden flooring with weight adapted footwear to reduce joint strain; vertically adjustable tables for workstations to reduce back strain, especially adapted chairs to enable work whilst sitting and

larger type face on instructional screens. The total cost of the 70 measures was only A$64,000. In addition, a two-hour rotation cycle of jobs during a shift was introduced to improve worker concentration and to reduce strain on any one part of the body. The result of these *changes* was a 7 per cent increase in productivity, equalling the productivity of lines staffed by younger workers. Absenteeism due to illness reduced from 7 per cent prior to the implementation to 2 per cent, below the plant average and the level of defects also dropped. Consequently, BMW has created a culture of supporting positive ageing and has used this response in Dingolfing as a model for other plants in terms of effectively managing an ageing workforce.

▶ ACTIVITIES

1. Identify those national-*scale* strategies of the German government which may be considered pro-natalist policies. Justify your answer.

2. What advantages and disadvantages does immigration pose for Germany in terms of dealing with its ageing population?

3. Debate as a class whether the empty buildings in Germany should be demolished.

4. Classify the impacts of each of the strategies into *environmental*, economic, social and cultural.

5. Suggest other solutions for dealing with an ageing population at a local or national *scale*.

6. a. Compare and contrast one national *scale* strategy with one local *scale* strategy used to manage Germany's ageing population.

   b. Which do you consider more successful? Justify your answer.

What is the role of geospatial technologies in developing and implementing strategies?

Demographic data is obtained in a number of ways, a major method being via a census. Germany holds a census every 10 years in accordance with European Union regulations (all European Union members have a responsibility to supply data to Eurostat, the statistical office which ensures consistency of information for planning across the *region*). The scheduled 2021 census was postponed to May 2022 due to the impact of COVID-19. It is estimated that this census will cost over $A2 billion. Obviously holding a census only every 10 years means that the information being used is quite out of date by the end of the intercensal period.

The 2011 census also caused some controversy due to *changes* in the methods of data collection: rather than asking the whole population to complete forms, the government used demographic information retrieved from population registers and merged it with information and surveys. The cities of Berlin and Hamburg unsuccessfully lodged a court case claiming damages as their populations were underestimated and that, therefore, they missed out on funding. The German government has made adjustments to data collection for the 2022 census.

The census supplies basic data on population characteristics, employment and housing. Such data is commonly used to produce maps using Geographic Information Systems (GIS). Although results take more than two years to be published, German census data is freely available online in both tabular and cartographic form for both Länder (state) and municipal level. This enables access for the general public as well as government departments which use it to inform policy decisions. For example, the Federal Office of Building and Regional Planning uses census data and data collected via other means to examine housing vacancy rates and the age of buildings to help determine where apartments should be demolished for the *urban restructuring* program. Identifying concentrations of aged citizens in relation to transport options has been undertaken by the Federal Ministry of Transport and Digital Infrastructure. As shown in Figure 8.15, this has enabled it to determine priority action locations due to the ageing population.

The European Space Agency completed a feasibility study, known as AgeSpot, combining population dynamics modelling with high-resolution satellite imagery of land use. The aim was to provide details of where the elderly – or any age group for that matter – are likely to live in the future to assist with planning for a 'silver economy'. The linking of the satellite data with demographic statistics was found to be sufficiently accurate to estimate the number of elderly people up to a 50 metre grid level. This could also be linked to spatial data on health and income and assist with long-term forecasting. This *process* gave a more accurate picture than only using census data as it could be more readily updated. Service providers could therefore efficiently target, place and support critical services needed for an ageing population. It is hoped that this method will be utilised by both government organisations and private companies in the future and lead to a stronger *spatial association* between *regions* with large populations of any particular age cohort and the provision of relevant infrastructure to support them.

▼ **Figure 8.15** Map identifying areas in need of service support due to ageing and declining populations

Need for action due to demographic reasons – affected by ageing and decline of the population

- low
- middle
- high

Carrying capacity of services of general interest and supply quality

- high-order centre, the carrying capacity of which has to be secured
- middle-order centre, the carrying capacity of which has to be secured
- areas for which the carrying capacity has to be secured
- accessibility of supply facilities to be ensured

Central Places as of 2014

- high-order centre
- middle-order centre
- network of high-order centres
- network of middle-order centres
- cities with high-order functions in neighbouring countries

▶ **ACTIVITIES**

1. Use the German census website (the word translates as *zensus*) to explore the data available. Information in both tabular and geospatial format will gradually be added as the 2022 census data is made available.

   a. How might geospatial data such as this be of use to government and non-government organisations?

   b. How might the application of geospatial technology be improved in terms of its effectiveness?

2. Study Figure 8.15.

   a. Describe the *distribution* of high priority areas for action in dealing with the ageing and declining population.

   b. To what extent is there a *spatial association* between the location of the areas you identified above and high order urban centres?

   c. Suggest implications this might have for German planning officials in terms of provision of facilities for the aged population.

9 Population trends and issues: ageing in Australia

Home to the world's oldest living culture, Australia is now a multicultural society with a growing yet ageing population. The number of Australians aged 65 and over is expected to double by 2050 with 50,000 people projected to be aged over 100. Over the period 2020 to 2050, the proportion of people aged over 65 in Australia is projected to increase from 16 to 22 per cent. This will create an increasing number of social and economic issues and management challenges. As Australia's population is ageing there are proportionally more people retiring which can increase dependence on a shrinking income taxpayer base. The composition of the population is important as a high proportion of retirees can be viewed as a burden on the economy. Along with various pro-natalist strategies, population *movement* into Australia is a major strategy used by the Australian government to try to keep the population at a *sustainable* level.

What are the geographic characteristics of Australia?

Australia is a geologically ancient land located in the Southern Hemisphere lying between the Pacific and Indian Oceans. It has a land area of about 7.7 million square kilometres, comprising 5 per cent of the world's land mass. Australia is the Earth's sixth largest country by area. It is the lowest, flattest and sunniest continent and has very little fertile soil.

Apart from Antarctica, Australia is the driest continent. Rainfall across many *regions* of Australia is generally low and variable. Rainfall is low in the arid centre of the country, and high in the tropics and some coastal areas. Seventy-five per cent of Australia is bare desert or semiarid land covered with sparse grasslands. Only the south-east and south-west *regions* have a temperate climate and moderately fertile soil typically clothed with remnant forest or woodland. The northern *region* has a tropical climate, with a variety of tropical rainforests. There is a strong *spatial association* between the *distribution* of intensive agriculture and access to fresh water, and in those wetter *regions* population density is higher than in the vast, dry, lower-productivity lands further outback.

▼ **Figure 9.1** Australia's location in south-east Asia
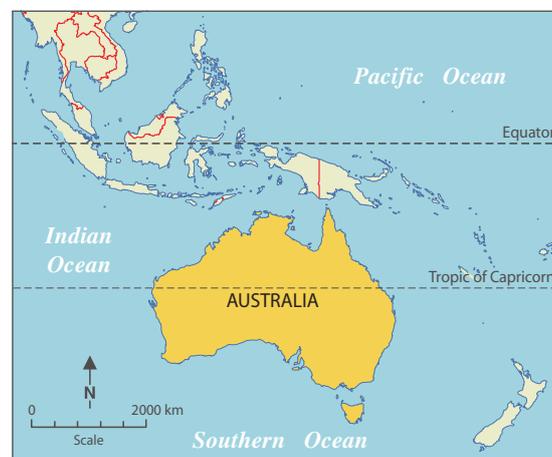
What are the population characteristics of Australia?

Australia's population was 10 million in 1960, 17 million in 1990 and reached 25.7 million on 30 September 2020. Its steady annual growth rate of about 1.7 per cent dropped to 0.9 per cent during the COVID-19 year to September 2020. In the past decade, the growth rate is one of the highest in the developed world and is driven largely by net migration as shown in Figure 9.2. Based on these statistics, Australia's population is projected to reach 34 to 40 million by 2050. In 2019, the United Nations ranked Australia 8th out of 189 nations according to the Human Development Index (HDI). New Zealand was ranked 14th while Indonesia is ranked 109th. Australia's high ranking indicates a very high standard of living based on life expectancy, the average years of schooling and gross national income per capita. Life expectancy was 80.9 years for males and 85 years for females 2017–19.

Australia's first peoples are estimated to have arrived over 50,000 years ago. The first European migrants arrived in the late 17th and early 18th Centuries. Australia's significant post-war migration program began at the end of World War II in 1945. The government encouraged migration to increase both security and economic growth, including settling displaced people from war-torn Europe in Australia.

For the year 2014–15 Australia accepted 190,000 migrants. This target remained for 2017–18 in addition to the arrival of 18,750 displaced persons. On arrival, immigrants tend to settle in established *regions* particularly in coastal cities which can place pressure on housing availability and overall infrastructure in these areas. Economic and social factors accounting for this trend include the pull factors of greater job opportunities and more lifestyle choices.

The variability of Australia's climate is one factor that has affected Australia's uneven population *distribution*, with approximately 80 per cent living close to the eastern seaboard (Figure 9.3) where rainfall is greater, more reliable and predictable. Physical, political and social factors have also influenced the *distribution* of the population. For example:

▶ people in Australia choose to live in *places* close to schools, public transport, medical facilities and retail precincts

▶ the availability of jobs can influence population *distribution* on a local *scale* whereas Australia's relatively low unemployment rate make it attractive to skilled immigrants on a national *scale*. According to the Australian Bureau of Statistics (ABS), Australia's unemployment rate was 5.8 per cent at the start of 2021 compared to, for example, 17.7 per cent in Greece and 11.6 per cent in Italy

▶ the physical characteristics of a *place* offer incentives such as living in a green suburb or disincentives such as relocation away from a potential source of pollution

▶ political factors, particularly that influence a person's freedom to make life choices, may provide some people with a reason to *move*. This does not occur to the same extent as in other countries.

▼ **Figure 9.2** Australia's population growth and immigration levels, 1967 to 2019
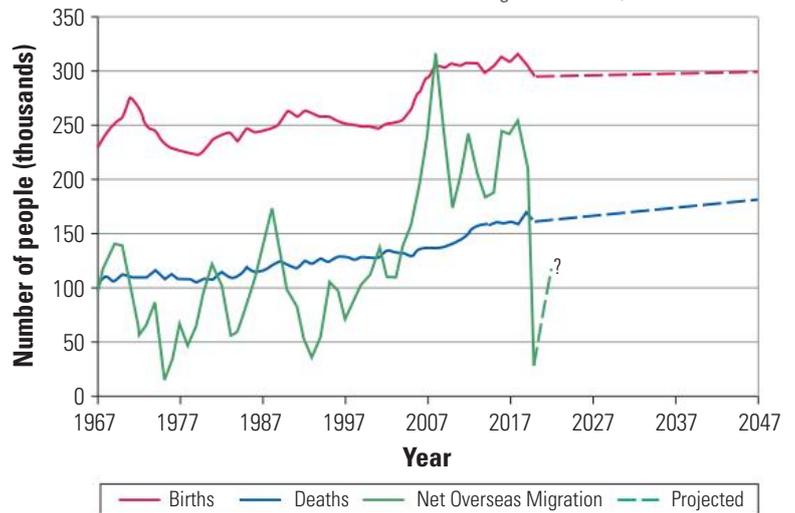
The COVID-19 pandemic has disrupted international travel and migration trends. NOM changes are due to the impact of these travel restrictions.

The overall population density of Australia is just 3.3 people per square kilometre, making it one of the least densely populated nations in the world. However, there is a lot of geographical variation in population density within Australia, creating a very uneven population *distribution*. In 2020, 89.7 per cent of the Australian population lived in urban areas and Greater Melbourne had a population density of 487 people per square kilometre. The proportion of the population living in Australia's urban areas is expected to rise with an annual rate of urbanisation of 1.65 per cent in 2019. Victoria has a density of 28 people per square kilometre, which is the second highest of all states and territories, and the Australian Capital Territory has 179 people per square kilometre. Within Melbourne, inner-city Melbourne is the *region* with the highest population density containing 22,400 people per square kilometre.
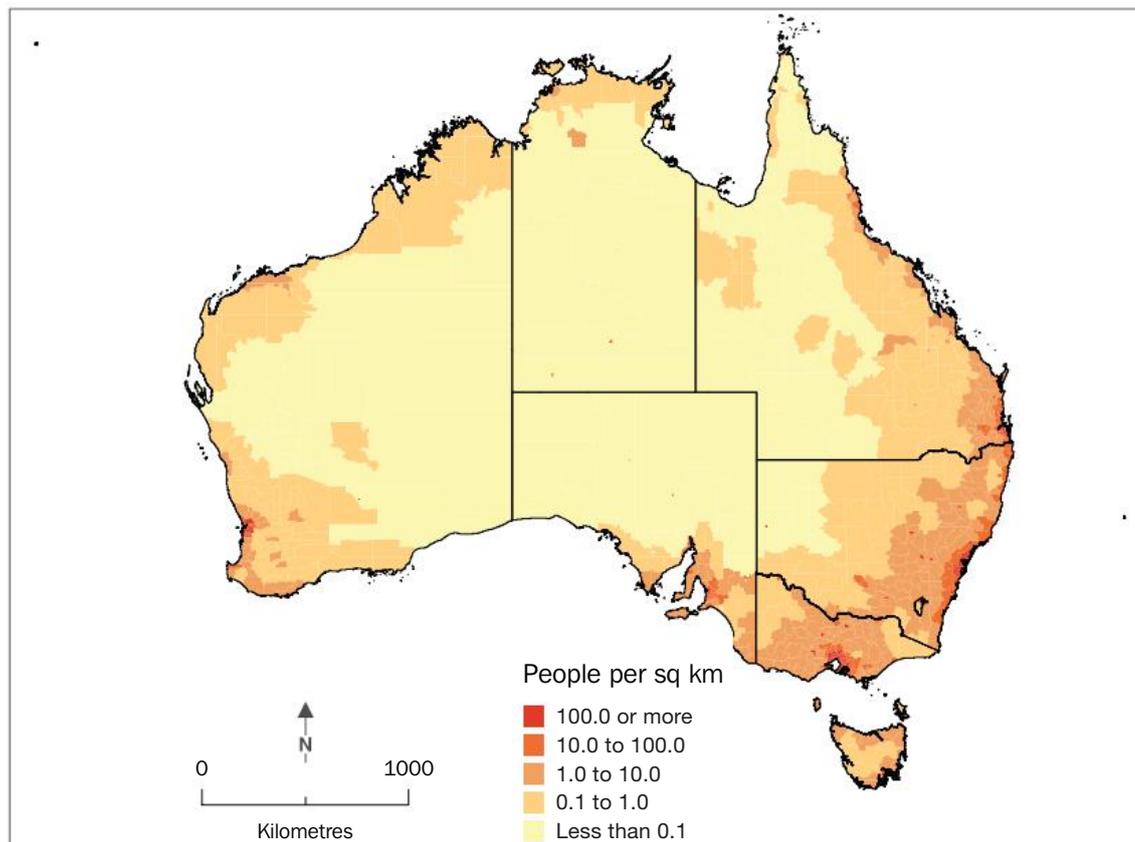
◀ **Figure 9.3**
Distribution of Australia's population

What is the nature of the population trend in Australia?

Australia is an example of an ageing population. Australia's population over 65 is currently 16 per cent and is predicted to be 22 per cent by 2050. The ageing is caused by declines in the total fertility rate and increases in life expectancy.

Australia's total fertility rate (TFR) has fluctuated over time but mainly at a small *scale*, as shown in Figure 9.4. The *process* towards lower fertility rates has largely been due to the *changing* attitudes of society as more women participate in the workforce and there has been greater availability of contraception, offset by a modest baby bonus. The trend shown in Figure 9.4 mirrors historical events, such as wars, economic downturns and the introduction of pro-natalist government policies. The TFR reached a low of 1.74 babies per woman in 2001 before increasing to a 30-year high of 2.02 babies per woman in 2008 and then holding relatively constant at 1.69 in 2019. A dip is predicted for 2020–21 as people delay having children because of the economic downturn and uncertainty that accompanied the COVID-19 pandemic. Even though there are minor fluctuations, Australia's TFR has been below the replacement level of 2.1 since 1976.

The crude birth rate (CBR) in Australia has also dropped steadily from approximately 23 live births per 1000 people per year in 1965 to 12.5 in 2020.

Figure 9.5 shows a steady increase in the life expectancy of Australians from 1905 to 2020. During this same period, the crude death rate (CDR) in Australia dropped from approximately 18 deaths per 1000 people in 1905 to 6.7 in 2020. There are many factors responsible for this *change*. Up until 1932, infectious and parasitic diseases caused at least 10 per cent of all deaths each year, with rates highest among the most vulnerable: the very young and very old. Living conditions in the early 20th Century improved due to better and more reliable water supplies, sewerage systems, food quality and health education, leading to lower death rates and a higher life expectancy. As Australians accumulated more wealth, their lifestyles became healthier, their access to health care improved and the rates of violent crime and civil unrest decreased. In the second part of the 20th Century, degenerative diseases such as heart disease, stroke and cancer replaced infectious and parasitic diseases as the main cause of death

▼ **Figure 9.4** *Change* in total fertility rate in Australia
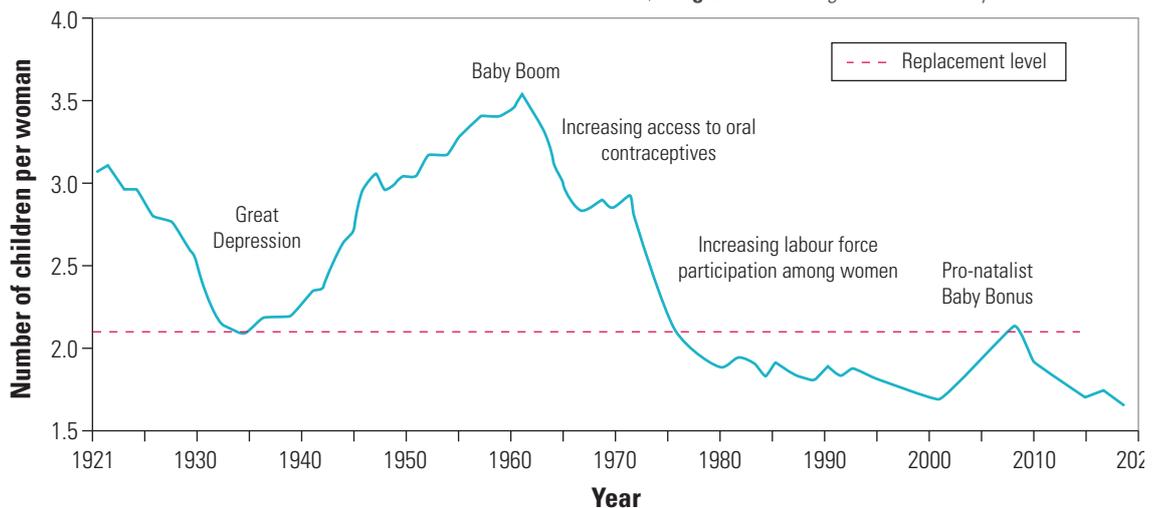
▼ **Figure 9.5** Male and female life expectancy at birth, 1905–2055
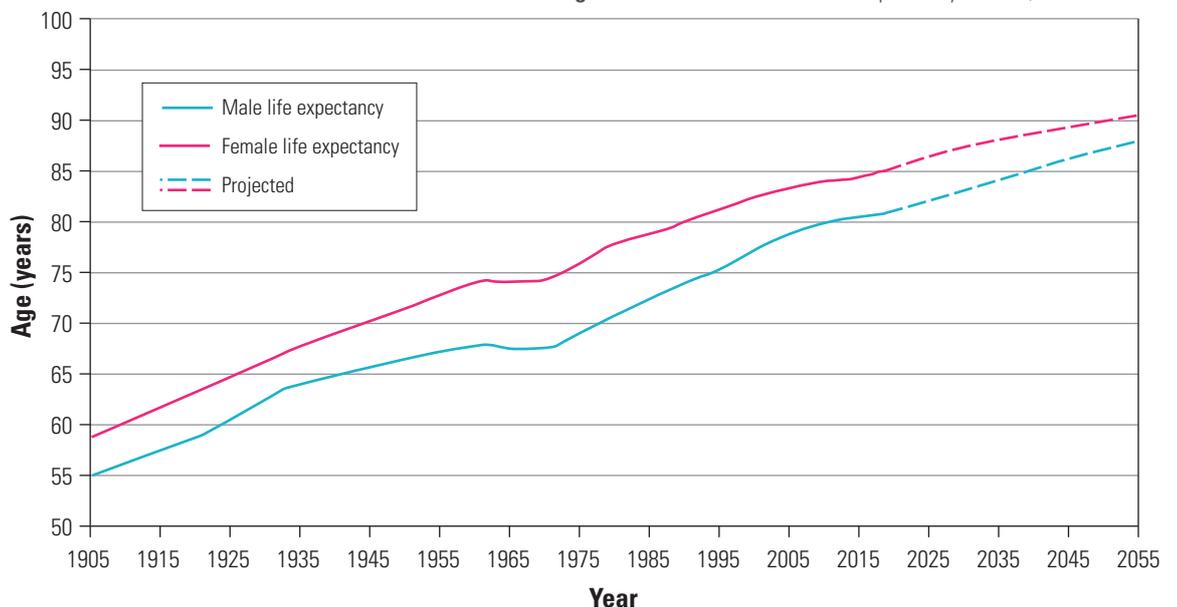
▼ **Figure 9.6** Infant mortality rate, 1916–2019
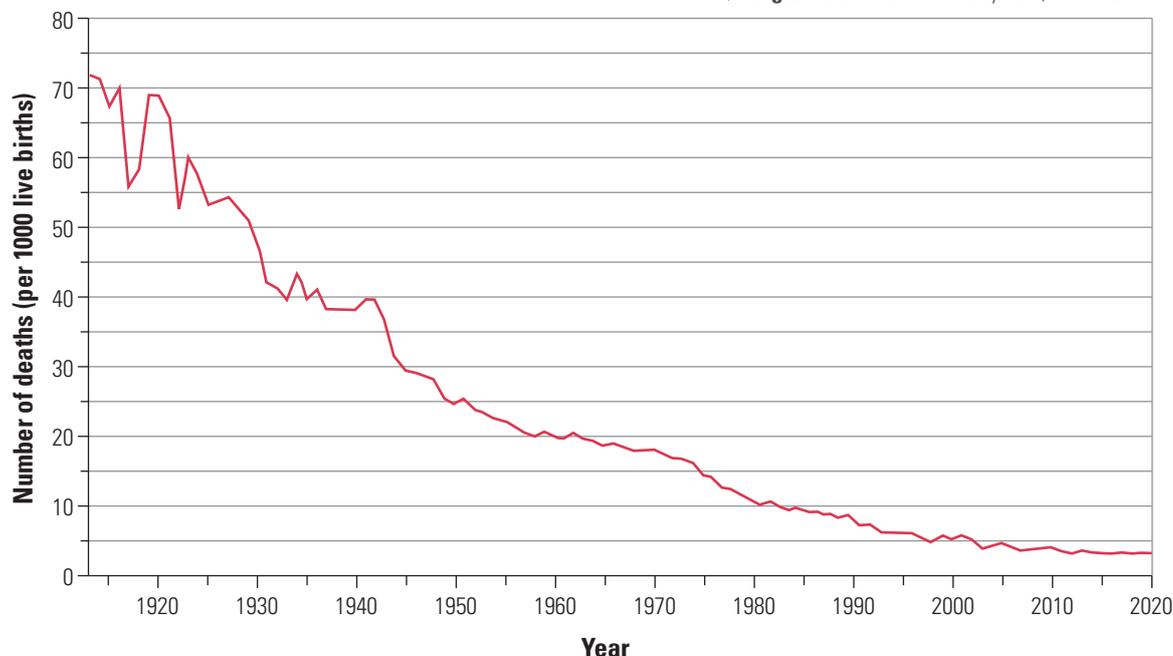
of older people. Despite these illnesses increasing, continued improvement in social conditions and advances in medical technology have led to longer life expectancies overall. In contrast, disadvantage persists in Australia's Aboriginal and Torres Strait Islander population where life expectancy is estimated to be about 8 years lower than that of the non-Indigenous population for both males and females.

Figure 9.6 shows the steady decrease in Australia's infant mortality rate (IMR) which coincided with the reduction in the TFR and increases in life expectancy. In 1901, the death of infants less than one year of age was approximately 104 deaths per 1000 live births and in 2020 it was just three.

▶ ACTIVITIES

1. a. Describe the *distribution* of Australia's population, as shown in Figure 9.3.
    b. Compare the population *distribution* patterns of Victoria and New South Wales.

2. Refer to Figure 9.2.
    a. Compare the number of births and deaths since 1967 and the projected number in 2047. How has the rate of natural increase *changed* over this period?
    b. Quantify the fluctuation in net overseas migration during this period.
    c. Suggest reasons for the *changes* noted in parts a and b.
    d. To what extent has migration contributed to Australia's population growth since 1967 and how is this expected to *change* towards 2047?

3. Figure 9.4 shows several peaks and troughs in Australia's TFR since the 1920s.
    a. Choose one of these fluctuations and undertake research to investigate:
       ▶ Australia's population characteristics during the corresponding time period
       ▶ factors leading to the *changes* in the TFR
       ▶ reasons why the upward or downward trends did not continue.
    b. Why has Australia's population continued to grow despite its TFR being below the replacement level?
    c. Categorise the factors that have led to *changes* in TFR shown in the annotations on Figure 9.4 as economic, social, political, *environmental* or cultural factors.

4. Explain why increasing access to oral contraceptives or increasing labour force participation among women decreased Australia's TFR.

5. Discuss the relative importance of three factors that have led to an increase in life expectancy in Australia.

6. Visit the Gapminder website, and find the Tools section from the Resources page.
    a. Explore the correlation between variables such as life expectancy, fertility and mortality rates, population density and education.
    b. Using this data and Australia's population statistics, discuss the *interconnection* between TFR, CBR, CDR, IMR, life expectancy and population growth.
    c. Briefly describe the major *changes* in Australia's population dynamics over time.
    d. Compare Australia's population characteristics to other countries within the Asia-Pacific *region*.

a

Age group, 1987

Male · Female

Population (percentage)

Australia's population structure

Figure 9.7 shows the *change* in the structure of Australia's population from 1987 to 2017 and the expected future structure. The reduction in the width of the pyramids' bases over this period correlate with Australia's falling CBR. The tapering of the pyramid in 1987 indicates a lower life expectancy and a predominantly young population while the rectangular shape of Figure 9.7 (c) demonstrates a reduction and stabilisation of the growth rate, a more even population *distribution* and an ageing population.

◀ ▼ **Figure 9.7** Australia's *changing* population structure **(a)** 1987 **(b)** 2017 **(c)** 2047 (Projected)

b

Age group, 2017

Male · Female

Population (percentage)

c

Age group, 2047 (Projected)

Male · Female

Population (percentage)
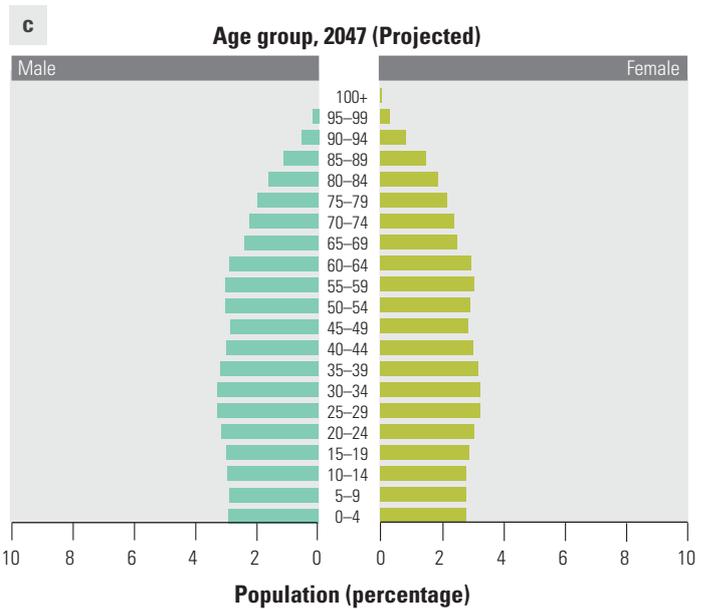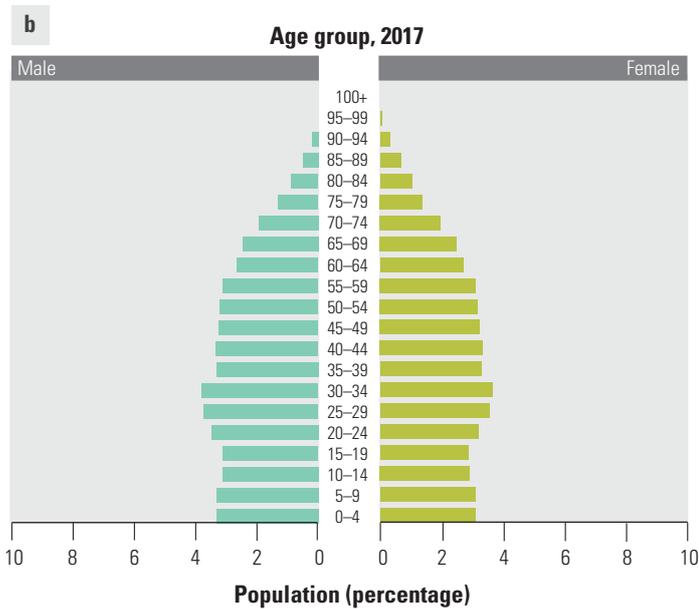
▼ **Figure 9.8** The number of older Australians by age group from 1911 to 2016
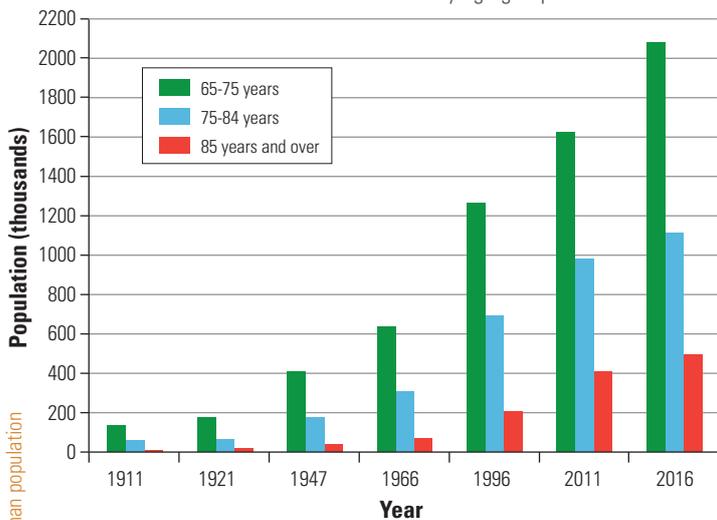
- 65-75 years
- 75-84 years
- 85 years and over

> ▶ **ACTIVITIES**

1. Refer to Figure 9.7.

  a. Describe each of the three population pyramids including their shape and the cohorts with the largest and smallest percentages.

  b. State whether the shape of each pyramid indicates a growing, stable or declining population.

  c. Using statistics, describe the *change* in the proportion of the population that is over 65 years in each of the time periods.

  d. Using your knowledge of the Demographic Transition Model and Australia's population characteristics, suggest the stage that applies to Australia in 1987, 2017 and 2047. Justify your choice.

  e. Suggest reasons to account for this *change*.

2. Visit www.populationpyramid.net and compare Australia's population profile for the current year with another country in the Asia-Pacific *region*.

3. Using Figure 9.8, describe the *change* in the number of older Australians in all three age cohorts from 1911 to 2016.

4. Following the 2021 census, new figures will become available. Investigate the number of Australians over 65 years old.

How does population *movement* contribute to structural *change* in population?

Despite having a TFR that is below the replacement level, Australia's population growth has remained steady due to immigration. Figure 9.9 highlights the significance of this contribution. Net Overseas Migration (NOM) shows fluctuation over time while the natural increase, despite early fluctuations, remains relatively steady. In 2019, more than 29 per cent of Australia's population, or 7.5 million people, were born overseas according to figures released by the ABS. This was the highest proportion of migrants since the late 1890s when Australia was still a colonial society. A further 48 per cent in 2019 had at least one parent who was born overseas.

▼ **Figure 9.9** Contributions to population growth for Australia, 2001–2021
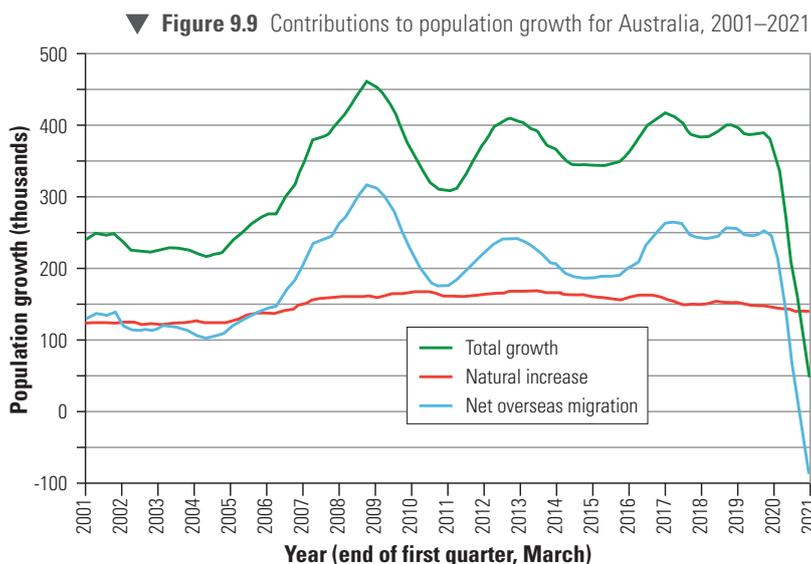
CAREER PROFILE

Bernard Salt
Partner KPMG and Social Editor *The Australian*

I was inspired to study Geography by my secondary school teacher, Trevor Wickham, now retired. After high school, I completed a Masters in Arts/Geography under Joe Powell at Monash University in 1985. Joe taught me to write. Joe would prompt me to ask the big-picture questions. I knew I was well trained because I had been taught by the best.

My current work involves geographic analysis and social observation for business and the media. I initially moved into consulting by investigating shopping centre catchment areas – a very geographical topic. At that time, the writing standard in consulting was poor as reports were dictated. I crafted my reports with care and clients responded to the higher quality result. I moved to management consulting and continued providing demographic advice to the business sector. It was during this time that I conceived a national report on population trends and convinced the firm I was working for to back it – which they did by allocating $20,000 in PR access and media training. The report gained national coverage overnight and was the most exposure the firm had ever received. This process was repeated every year in the 1990s.

I apply Geography skills and knowledge in my work. I have the ability to remember population figures and to compare and contrast suburbs and towns. Businesses deal with geographic issues in sales, distribution and investment, and the media wants a commentator who can talk knowledgeably about every region and every suburb in Australia. In 2001, I wrote a book in which I predicted the 'sea change' shift. That book, *The Big Shift*, put me in a different space to every other consultant and provided opportunities for public speaking and presentations, and also writing columns in *The Australian* and other publications around the world. I have spoken to business audiences on the geography of business in 30 global cities including New York City, London, Rome and Buenos Aires. Although I employ two other geographers at my workplace, there are also great prospects in working with large data sets and in GIS.

I believe the secret to my success is having better skills than others (in writing and speaking), being bold in my vision of where I wanted to go with my career (you can go anywhere – all that holds you back is a lack of vision) and, of course, hard work and determination.

▼ **Figure 9.10** Country of birth, proportion of Australia's population

Legend:
- 2004
- 2008
- 2014
- 2020

X-axis: **Percentage** (0 to 6)

Y-axis: **Country of birth**
- United Kingdom
- India
- China*
- New Zealand
- Philippines
- Vietnam
- South Africa
- Italy
- Malaysia

* Excludes Taiwan and Special Administrative Regions (SARS): Hong Kong, Macau
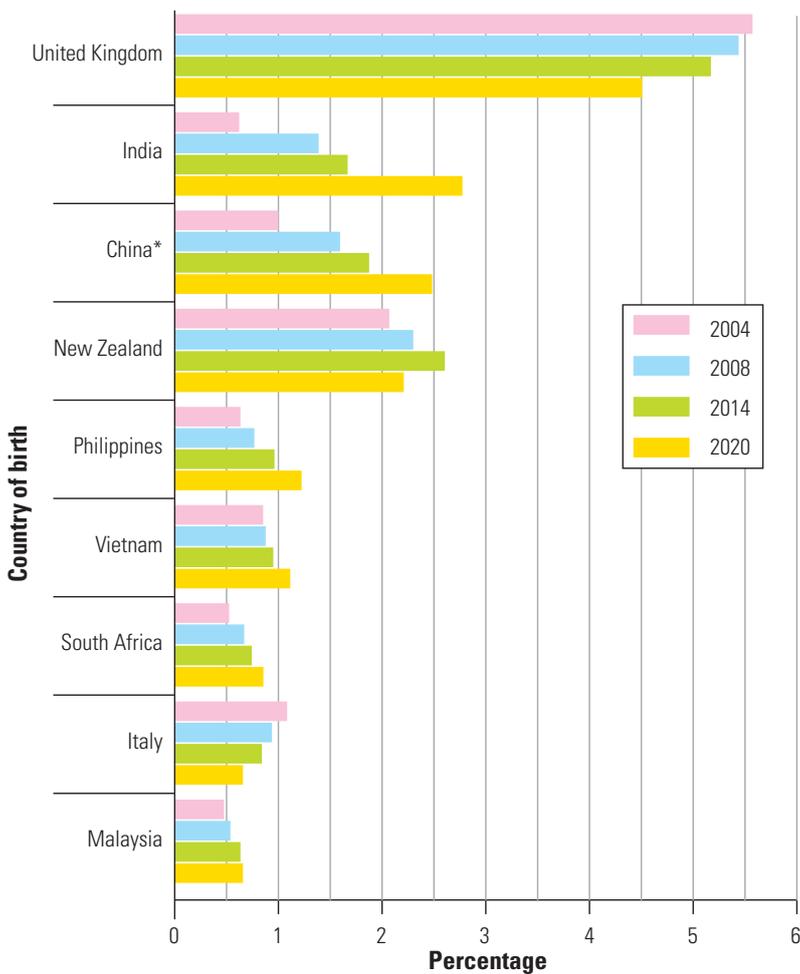
Australia accepts migrants from every country in the world. Traditionally, migrants came from the United Kingdom and its colonies before a major shift to Europe occurred from the late 1940s. In the past 50 years this has now diversified further with more people from Asian countries such Vietnam and more recently China and India choosing to live in Australia (Figure 9.10). Australia experienced a rise in net overseas migration between 2004 and 2008, which was mainly the result of an increase in the number of overseas students (Figure 9.11) and a higher intake of permanent and temporary skilled migrants.

Nearly three million international students have undertaken studies in Australia from 2002 to 2019. International students have a small effect on the population structure of the population as they are predominantly in the age group 20–29. In 2020, international border closures during the COVID-19 pandemic saw Australia's immigration paused resulting in the population falling by 0.02 per cent (4200 people) in the quarter June to September 2020. Net overseas migration of –34,800 was the main driver for the quarterly population decline. This is an unusual dip in Australia's population trend that had not seen a population decline since 1916, during World War I. Overall, in 2020 Australia's population grew despite one quarter of negative growth. If international travel restrictions continue this may affect Australia's population growth and structure in the future, especially as the COVID-19 pandemic has resulted in fewer international students studying in Australia in 2021 compared to 2019.

▶ **Figure 9.11** International students in Australia, 2002–2020

Y-axis: **Number of students (thousands)** (0 to 700)
X-axis: **Year** (2002 to 2021)
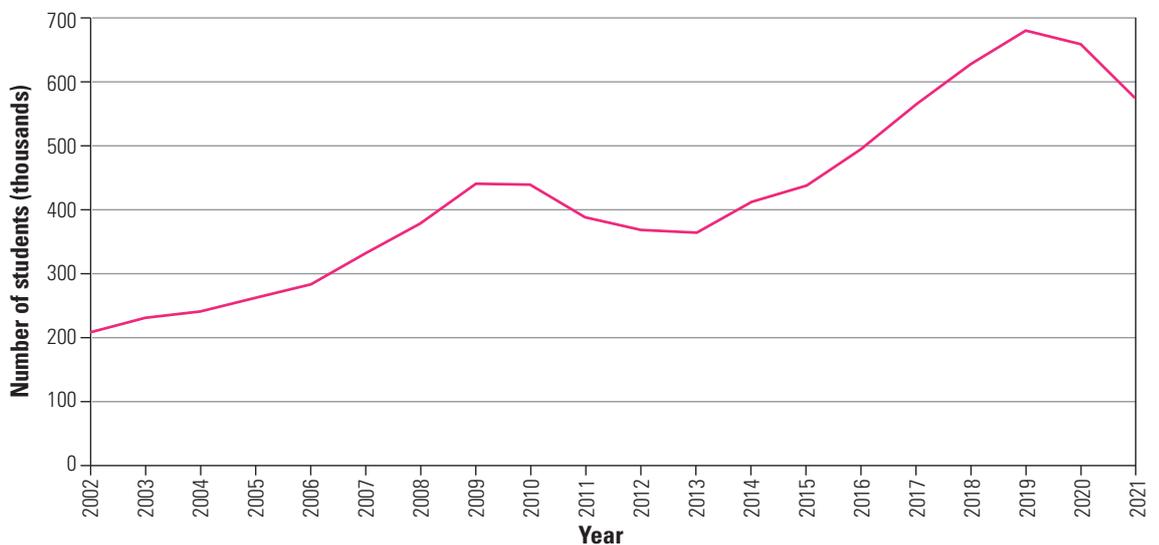
▶ **ACTIVITIES**

1. Refer to Figure 9.9.
   a. Compare contributions of net migration and natural increase to population growth between March 2001 and 2021.
   b. Suggest factors that could account for the variation in net migration during this period.

2. Refer to Figure 9.11. Describe the trend in international students in Australia. Quantify your answer.

3. Refer to Figure 9.10.
   a. From which world *region* are the majority of Australia's recent immigrants?
   b. How has the origin of Australia's major migrants *changed* between 2004 and 2020?

4. Do an internet search for 'Australia's annual population growth'.
   a. What is the overall trend for migration for Australia in 2020 and in each following year?
   b. Describe the pattern of population growth.

What are the population issues and challenges in Australia?

The key issue for Australia is the projected increase in the ratio of older people (65 years and over) to the working-age population (15–64 years old), per 100 people. By 2047, the predicted number of people aged 65–84 in Australia will have increased substantially, as shown in Figure 9.12. There will be seven million Australians aged 65–84, compared to 3.2 million in 2017. This would represent approximately 18 per cent of the total population, compared with 12.5 per cent in 2017–18. In 1974, only 1.2 million people were aged over 65, or just 9 per cent of the total population.

Figure 9.13 shows that the *distribution* of ageing throughout Australia is uneven with wide variation across Australia's states and territories. By 2021, and despite recent high levels of immigration, Tasmania will surpass South Australia as Australia's most aged state population. By contrast, the Northern Territory is expected to maintain its relatively young population. However, there is further variation at a *regional* and local *scale*. For example, by 2021 the mid-north coast of New South Wales is predicted to become the *region* with the highest proportion of people over 55, followed by Wide Bay-Burnett in Queensland and Gippsland in Victoria. Although 59 per cent of older Australians live in capital cities, this makes up only 6.3 per cent of the urban population. On the other hand, 41 per cent of older Australians live in rural areas yet they make up 8.1 per cent of the rural population. This latter proportion is higher in some local examples such as Queenscliff on the Bellarine Peninsula where 19.1 per cent of the population are aged 75 years and over and the median age is 56.3.

One of the biggest management challenges stemming from an ageing population is providing adequate aged care to meet the growing demand. Support and care for older Australians is currently provided by three main sources: family, through the residential aged care sector or by community-based service providers in the

▼ **Figure 9.12** The ageing of Australia, 1967–2047

Legend:
- 0–14 years old
- 15–64 years old
- 65–84 years old
- 85 years and over
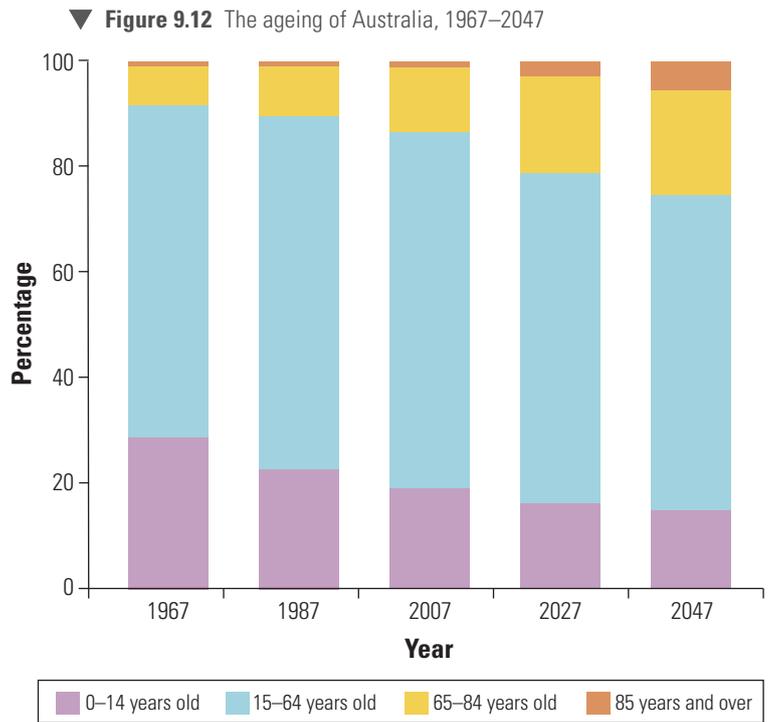
home. An older population means that more people will be living with health issues associated with ageing. This will place pressure on health services such as hospitals and rehabilitation centres to provide services to an increasing number of patients. Aged care facilities are often located in cities meaning that older residents located in rural and remote areas often lack access to the range of facilities found in urban areas. This means an ageing population can have a disproportionate impact on rural communities.

The Australian government spends approximately $10 billion per annum on the aged sector, with around two-thirds of this expenditure directed to residential aged care. While some older Australians can afford
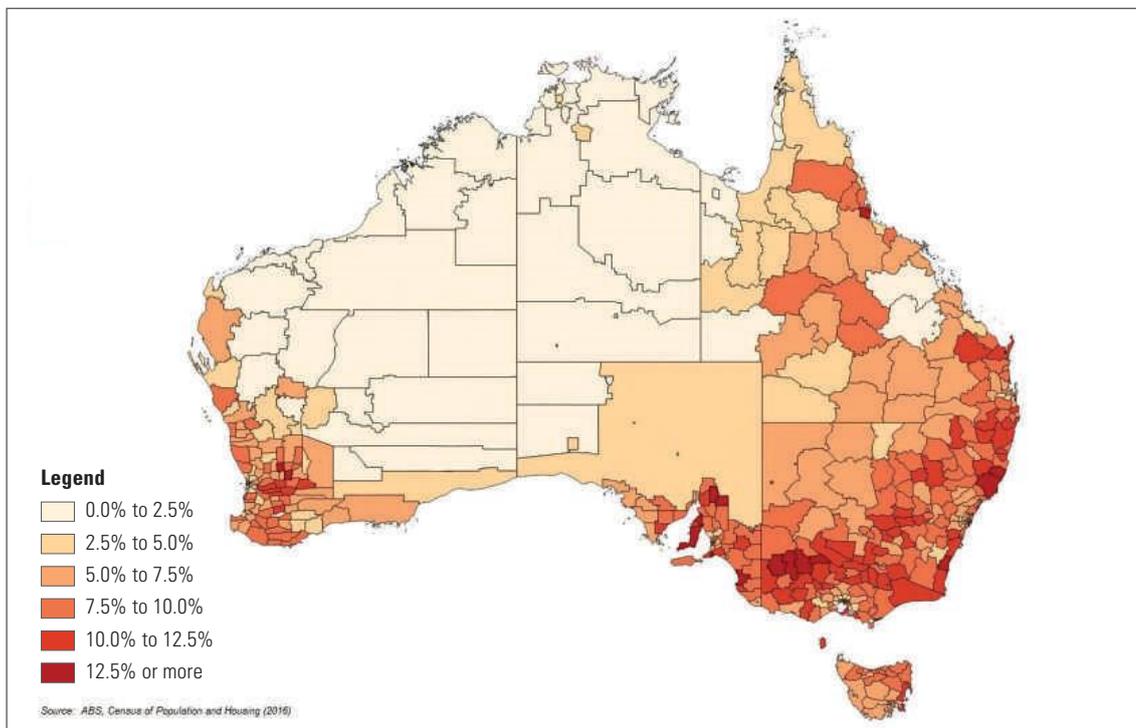
◄ **Figure 9.13**
The *distribution* of elderly Australians in 2016 measured as a proportion of the population in each local government area

Legend
- 0.0% to 2.5%
- 2.5% to 5.0%
- 5.0% to 7.5%
- 7.5% to 10.0%
- 10.0% to 12.5%
- 12.5% or more

Source: ABS, Census of Population and Housing (2016)
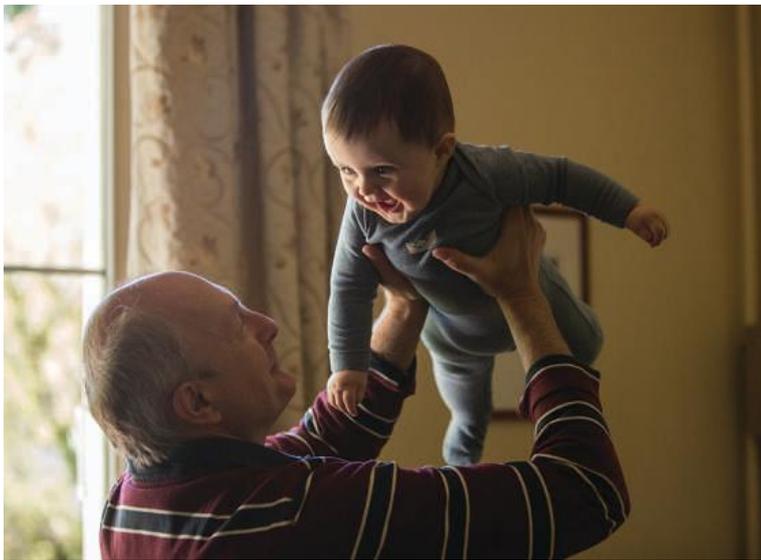
▼ Figure 9.15 The median age and aged dependency ratio of fourteen countries in the Asia-Pacific *region* in 2020

Country	Median Age (years)	Old-Age Dependency Ratio
Australia	37.5	25.1
New Zealand	37.2	25.5
Indonesia	31.1	9.2
Papua New Guinea	24.0	5.8
Fiji	29.9	8.9
Solomon Islands	23.5	6.5
Singapore	35.6	18.0
Malaysia	29.2	10.4
Philippines	24.1	8.6
Vietnam	31.9	11.4
Thailand	39.0	18.4
India	28.7	9.8
China	38.4	17.0
Japan	48.7	48.0

to make a financial contribution to the cost of their care, many aged care providers are constrained as government subsidies are insufficient to meet the cost of providing adequate care. The 2021 Royal Commission into aged care reported that the quality of residential aged care must be improved for the quarter of a million Australians who receive it, and for those who will need these services in the future. Increased funding is essential.

An issue common to ageing populations around the world is economic challenges relating to a higher aged dependency ratio. The old-age dependency ratio is the ratio of older dependents, aged above 64 years, to the working age population, aged 15 to 64. As Australia's population ages, its old-age dependency ratio is increasing, meaning there are less people of working age to support the economy. The increasing costs associated with an ageing population such as aged care facilities add to this economic challenge. In response to this issue, from July 2017, the age at which Australians could access the age pension was raised to 65 years and six months. This will continue to rise by six months every two years until July 2035 when 70 years will be the new qualifying age. Although this will decrease Australia's old-age dependency ratio, it will create additional challenges in ensuring suitable and meaningful work opportunities for older Australians (Figure 9.14).

The issues and management challenges facing Australia are not unique. Figure 9.15 shows the median age and old-age dependency ratio for several other countries in the Asia-Pacific *region*. The old-age dependency ratio in this case is shown as the number of dependents per 100 people of working age. This data shows that Australia has one of the oldest populations in the Asia-Pacific *region* and one of the largest old-age dependant populations.

Older people are important members of any society and people over 65 make important social and economic contributions. In Australia, negative stereotyping of older people may show them as frail and an economic burden but on average, older people will require high levels of care for only the last 1–3 years of their life. These stereotypical views need to be challenged as our elders offer their knowledge, broad life-experience and collective wisdom.

▶ ACTIVITIES

1. Refer to Figure 9.12. How has the age of Australia's population *changed* since 1967 and how is it expected to *change* in the future?

2. a. Describe the *distribution* of elderly people in Australia.
    b. Suggest reasons for this *distribution* based on push and pull factors.
    c. How might this *distribution* add to the issues and challenges relating to Australia's ageing population?

3. a. In a table, list some of the economic, social, cultural and *environmental* impacts of Australia's ageing population.
    b. Write a suitable response to the issue of an ageing population that a local council or the Australian government could adopt. Include the aim of the response, specific ways this aim will be met and the benefits of the response for Australia's future.

4. Using the data in Figure 9.15, draw a scatter graph comparing median age (x axis) and old-aged dependency ratio (y axis).
    a. Describe the relationship shown between these two variables.
    b. Are there any outliers that do not follow the main trend?
    c. What other factors besides median age might influence a country's old-aged dependency ratio?
    d. Suggest a response that a country with a high median age could implement to reduce its old-aged dependency ratio.

5. Choose one country from Figure 9.15 that has a high median age and undertake research to see whether it is facing similar issues and challenges to Australia.

What are the strategies in response to the issues and challenges?

Australia's Migration Programme

Following World War II, the Australian government aimed to increase Australia's population growth in order to stimulate the economy and protect Australia from the threat of invasion. The phrase 'populate or perish' was used as part of Australia's first federal immigration portfolio in 1945 to promote immigration and higher birth rates. The government set a target of 1 per cent annual increase through increased immigration and an overall growth rate of 2 per cent including natural increase. Fertility rates were high among the mainly young adult migrant population, which further boosted population growth. Overall, fertility rates rose to 3.5 babies per woman and Australia had a baby boom.

Australia's current Migration Programme ensures that its population can continue to grow with the intention of offsetting the low TFR and reducing the economic impacts of an ageing population. Each year, the Australian government allocates the number of places available for permanent migration. These places are split predominantly into skilled and family streams based on economic priorities and other political considerations. A skilled migrant is a migrant worker who, because of his or her skills, is granted preferential treatment regarding admission to a host country. They are expected to make a strong contribution to the Australian economy and require strong English language skills, appropriate qualifications and, in many cases, these skilled immigrants must have arranged employment prior to their arrival in Australia. Migration via the family stream does not contain a skills or language requirement and is reserved for immediate family members of Australian citizens or permanent residents. As shown in Figure 9.16, the proportion of migrants under the family stream has decreased over time in favour of skilled migration to meet areas of critical need within the Australian labour market.

There is debate as to whether or not Australia's Migration Programme has been successful in reducing the extent of Australia's ageing population and the associated economic impacts. Overall, immigration has contributed more to population growth than natural increase every year since 2006. However, each year the number and age of immigrants and emigrants is a major determinant of whether migration *changes* Australia's median age. At the time of their arrival, immigrants tend to be younger on average than the existing Australian population. For example, approximately 84 per cent of migrants who arrived in 2015–16 were aged under 40 years compared to 54 per cent of the resident population. Skilled migrants are of working age, meaning they reduce the aged dependency ratio and provide a demographic dividend. Compared to Australian-born citizens, immigrants are also more likely to spend, particularly in their first few years after arrival, when they need to purchase clothes, accommodation, furniture, transport, etc. However, many argue that although migration increases Australia's total population, it can only slow the *change* in Australia's age structure. This is because any reductions in the median age due to influxes of younger migrants is offset by the future ageing of these migrants, thus delaying the ageing of the population.

Australia's population will continue to disproportionately age over the next 30 years because of the declining total fertility rate and because people are living longer, largely due to public health campaigns and improved health services. Immigration can slow the increase in aged population. Demographers forecast that the proportion of the population aged 65 and over would increase from 15.9 per cent in 2019 to 26.2 per cent in 2051 if net migration was zero during this time, but it would be only 20.5 per cent if net migration continued at its present average of 190,000 per year. Australia has policies for income support, aged-care and health-related service provision for the elderly and will need to continue to monitor and review these.

▼ **Figure 9.16** The proportion of migrants in Australia from 2007 to 2017

CHAPTER 9 ▲ Population trends and issues: ageing in Australia
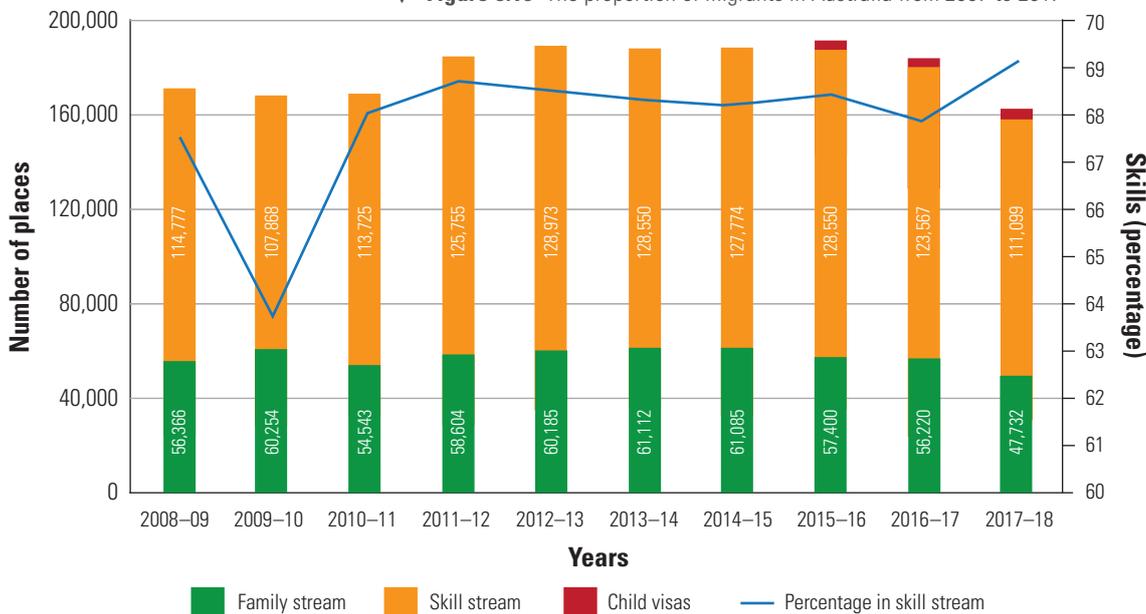
The Baby Bonus

In 2002, a national-*scale* Baby Bonus scheme was introduced to help counter declining fertility rates which reached a low of 1.7 babies per woman in 2001. Financial incentives were provided to parents of newborns to offset the expenses associated with bearing a child. It was hoped that this would lead to an increase in fertility rates and mitigate the impacts of Australia's ageing population. Parents of newborns received monetary rewards through tax cuts of $2500 per year. In 2004 this was *changed* to a lump sum payment of $3000 which was progressively increased to $5000 in 2013. Other *changes* to the scheme over this period included a restriction for people earning over $75,000 per annum and a switch from a lump sum payment to fortnightly instalments.

As part of the 2013–14 budget, the Baby Bonus was abolished with the aim to save the Australian government $1.1 billion over five years. It was replaced by smaller payments made as part of the Family Tax Benefit. Mothers could choose to either receive these payments or paid parental leave and they were only available to families who qualified based on their income. In 2018, parents of newborns who were eligible for the Family Tax Benefit received a lump sum payment of $550 per child and thirteen instalments totalling a maximum of approximately $1650.

The Baby Bonus was successful in helping to raise the TFR to a peak of two babies per woman in 2008. In 2011 the number of births exceeded 300,000. Overall, 3.1 million babies were born after the introduction of the Baby Bonus, creating a mini baby boom. Initially it was argued that the scheme only *changed* the timing that couples chose to have children rather than the number of children they intended to have. However, Figure 9.4 shows a sustained higher TFR for the length of the scheme indicating that this may not have been the case. After the abolition of the Baby Bonus, the TFR once again fell to just 1.69 babies per woman in 2019. The COVID-related economic uncertainly in 2020 led couples to delay having children. It's not yet known if the introduction of the 2021 Newborn Upfront payment of $570 and an income-tested supplement for 13 weeks will increase TFR.

▶ ACTIVITIES

1. Figure 9.16 shows the proportion of Australia's migrant streams from 2007 to 2017.

   a. How has the proportion of family and skill streams *changed* over this period?

   b. What factors might help the Australian government to determine this proportion?

   c. Undertake research to explore how and why Australia's migration intake has *changed* over time since the end of World War II.

2. 'Mass immigration has no effect on the proportion of aged people in Australia'. Discuss to what extent you agree with this statement. Justify your response using statistics.

3. Peter Costello, Australian Treasurer in 2002, was remembered for telling Australians to have "one for the father, one for the mother and one for the country". To what was Costello referring?

4. Visit populationpyramid.net and view Australia's population pyramids from 2001 onwards. Track *changes* in the number of people in the 0–4 age group and use this data to determine whether or not the Baby Bonus helped to reduce the extent of Australia's ageing population.

5. Using a table, summarise the economic, social, cultural, and *environmental* impacts of the Baby Bonus and Migration Programme on a national *scale*.

6. a. Using appropriate criteria, evaluate the success of the Migration Programme and Baby Bonus in responding to the issues associated with Australia's ageing population.

   b. Based on these evaluations, compare the success of these responses.

What is the role of geospatial technologies?

The Australian Bureau of Statistics (ABS) conducts a population census every five years. Data includes the size of households, income, education levels and religious preference. Analysis of this data reveals trends in fertility rates and the ageing of the population. Government departments and agencies use this information to inform planning for services and infrastructure across Australia. Local councils, public organisations, academics, students and businesses also have access to these datasets. Census data is organised by geographical location at a variety of *scales* including suburb, postcode, electoral division and local government area. Once downloaded, datasets can be viewed, organised and analysed using a Geographic Information System (GIS). Census data is also available on the ABS website using an online mapping portal, as shown in Figure 9.17. Using this spatial data, the ABS can, for example, track the *distribution* of ageing population, the proportion of older people in the labour force, the extent of internal and international migration and cultural and religious preferences of older Australians. This spatial data is vital in responding to the needs of Australia's ageing population such as choosing locations for the construction of new aged care facilities. The data also shows areas that are ageing because younger people have *moved* away so there is a high proportion of elderly who have stayed in their community.

Like other councils, the Shire of Nillumbik, a local government area in the northern suburbs of Melbourne and extending into rural localities, uses ABS data to plan for its ageing population. There is a major transition underway in Nillumbik as mature families become empty

nesters. The council identified that many older people wanted to stay in the area and are seeking smaller housing stock that was suited to retirees as well as providing improved aged-care services. This trend and response are common in other *places* across Australia.

The future trends in population predicted by the ABS show that at the predicted growth rate Australia's population is projected to reach 46 million by 2075. The ageing of Australia's population as a result of sustained low fertility combined with increasing life expectancy is likely to continue. In addition, the number of people 65 and over is expected to double, from 3.5 million people in 2016 to 6.8 million by 2040. Similarly, the number of people aged 85 years and over is projected to more than double by 2040, with 515,700 people in 2019 and expected to reach 1.2 million in 2040. By then, people aged 85 years and over will make up 4 per cent of Australia's population, compared to only 2 per cent in 2017. Geospatial technologies will continue to be essential in planning for the number and *distribution* of ageing Australians.

Australia's strategies in regularly collecting extensive data and using geospatial technologies to analyse and report on the data to plan for demographic *changes* is effective in identifying and helping to understand future needs. The census is conducted every five years and sampling data is collected and analysed more frequently to ensure currency of data. The data collected by the ABS is accessible to federal, state and municipal government, and non-government analysts. However, the cost of putting strategies in place can be a challenge and the costs of an ageing population require significant investment in aged care and health services. Given their limited mobility, aged populations also have distinctive transport and access needs. Geospatial technologies can assist planners identify the most effective locations to provide services including transport infrastructure, care facilities, shopping and recreation as well as developing the most age-appropriate modes for efficient *movement,* and this can include assisting in building design to give elderly people safer access.

▶ **ACTIVITIES**

1. Visit NationalMap – a website containing spatial data from Australian government agencies. Add data layers onto your map such as median age, household size and employment status and discuss the strength of their *spatial association*.

2. Briefly investigate how the COVID-19 pandemic has affected Australia's fertility, mortality and immigration. Use your knowledge of the pandemic's current impacts to predict what will happen to Australia's fertility, mortality and immigration in the next five years.

3. Visit the Victorian Population Statistics website (https://www.planning.vic.gov.au/land-use-and-population-research/victorian-population) which shows a 'Population map/Demography map' designed as a key tool for planners. Track population *changes* in your local government area and discuss the demographic challenges that your area faces. How can this geospatial platform contribute to planning decisions?

Glossary

age-sex structure: a diagram made up of a series of horizontal bars representing all of the different male and female age groups (or 'cohorts') in a particular population. The diagram typically shows males on the left and either represents a population by total numbers or as a percentage of the total population. It may also be referred to as a population pyramid, population structure diagram or population profile.

age-specific death rate: the death rate of a specific age group (or 'cohort') such as infants (under 1 year) or those over 65 years

ageing population: a population where, over a particular period, older people become a proportionately larger share of the total population. Definitions vary, but often refer to some or all of the following: increased percentages of the elderly (usually from the age of 60 or 65); increased median age of the total population; or decreased percentages of children.

agrarian: refers to the cultivation of the land, thus a rural lifestyle based on agriculture

annual population growth rate: the *change* in the number of people that reside in a country, state, county, or city over one year. The formula used to calculate this is: Birth Rate – Death Rate +or– Net Migration.

anti-natalist: an idea, strategy or policy that aims to decrease the crude birth rate in order to slow population growth

asylum seeker: a person who leaves their own country because they fear for their safety, so they seek protection in another country

baby bonus: a payment offered by government authorities to help offset the cost of raising children in order to stimulate births

baby boom: a significant increase in the birth rate following a period of lower birth rate. Often occurs as widespread hopes for better living conditions are raised in a community e.g. after a war or economic depression.

brain drain: term used to describe the loss of a country's skilled migrants who are attracted by better employment opportunities elsewhere

carrying capacity: the maximum population size of a species that can be sustained by the *environment* in terms of food, water and habitat; varies according to factors such as the populations' levels of consumption e.g. per person or in total, and the types and impacts of technology they use (so that the same number of people in different *places* can have markedly different carrying capacities)

census: a population survey carried out by the government of a country at regular intervals for planning purposes. In Australia the census occurs every 5 years.

change: the *process* through which the characteristics of something become different. *Change* can occur at varying rates, at different times, over varying durations, and at different *scales*. Phenomena in Geography are dynamic and therefore *change* is a fundamental part of studying many geographical concepts.

child-bearing age: usually regarded as between 15 and 49 years

child marriage prevalence: the percentage of women 20–24 years old who were married or in union before they were 18 years old

child mortality rate (CMR): average number of deaths of children under the age of 5 per 1000 children in a year

country of destination: the country that is an endpoint for migratory flows (also known as the host country, receiving country)

country of origin: the country that is a source of migratory flows (also known as the source country or donor country)

COVID-19: a highly-infectious virus, and the pandemic associated with it; has caused severe worldwide demographic *change* in the early 2020s by significantly increasing mortality and causing major disruption to people *movements*. Severe economic, social, political and environmental disturbance has also resulted from the pandemic.

crude birth rate (CBR): also referred to as birth rate; the number of births in a total population in a year, given as a rate per 1000 people

crude death rate (CDR): also referred to as death rate; the number of deaths in a total population in a year, given as a rate per 1000 people

declining population: occurs when the crude death rate exceeds crude birth rate, or an excess of births is offset by out-migration, so that the population decreases over time

delta: a landform that is formed by the deposition of sediment carried by a river when the flow of the river is slowed as it enters a larger body of water such as an ocean, sea, estuary or lake

demographic dividend: a boost in economic productivity that occurs when there are growing numbers of people in the workforce relative to the number of dependants

Demographic Transition Model (DTM): a general model of population *change* which aims to predict how a population's birth rate and death rate may *change* over time, separated into five expected stages based on historical experience

demography: the study of the growth, *change* and structure of the human population

dependency ratio: the ratio between those of working age (economically active) and those of non-working age (dependant population) usually expressed as the number of dependents per 100 economically active people in a population. Old-age dependency ratio refers to the number of people aged over 65 per 100 economically active people in a population.

dependant population: those who rely on the working population for support, typically the young (under 15 years) and elderly (over 65 years) who are not earning an income or paying tax. The population in this category are known as dependants.

desalination plant: where the removal of salt from seawater takes place to make the water potable for human consumption

distance: the degree of space between two points or concepts. *Distance* can be absolute, relative, psychological or cultural. Absolute or linear *distance* is the *distance* between two points, e.g. measured in metres and kilometres, whereas relative *distance* considers other factors, for example the length of time it takes to travel from one location to another and the costs involved. Psychological *distance* refers to the way people perceive *distance* whereas cultural *distance* relates to the degree of similarity or difference in attitudes and social norms.

distribution: the arrangement of phenomena in space or time. Spatial *distribution* considers the arrangement of something across an area, for example key sources of emigration, whereas temporal *distribution* considers the arrangement of phenomena (for example global emigration numbers) over a period of time.

donor country: the country that immigrants come from (also known as country of origin)

doubling rate: the number of years needed for a population to double in number at a particular rate of natural increase

economically active: those aged over 15 and under 65 years, who are typically earning an income

economic migration: *movement* of persons from one nation state to another for the purpose of employment. Also known as labour migration.

emigrant: person who *moves* away from their existing country of residence to live somewhere else

emigration: the act of leaving a country to settle in another

environment: the living and non-living physical elements and social conditions of the Earth's surface and atmosphere. The natural *environment* includes weather and climate, landforms, water features, natural vegetation and soils. The human, social and cultural *environment* includes surroundings made by people or human-made influences such as settlements, transport routes and nodes, farmlands, and social and political organisations.

European Union (EU): a peaceful alliance of 27 countries located in Europe mainly for regulating trade, security and people *movement*

expatriate: refers to someone living in a country different to their country of birth

external population movement: see international migration

family planning: the deliberate practice of controlling the number of children one has and/or the intervals between their births, particularly by the use of education and contraception

forced migration: involves people (forced migrants) who have no option other than to move from their country of origin so as to escape natural disaster, conflict, racial, religious or political persecution or other significant push factors

Geographic Information Systems (GIS): a computer-based system used to collate, analyse, produce and present digital data in a spatial form. It includes, but is much more than, a highly-sophisticated way of quickly, cheaply and accurately conducting research into *spatial associations*, and of mapping.

geospatial technology: a range of integrated systems and their components (GNSS, GPS, GIS, etc) that use digital geographical data to collect, analyse, compare and display information; also known as spatial technology

Global Navigation Satellite System (GNSS): systems of multiple satellites providing global coverage that transmit position and time data to Earth-bound GNSS receivers for use in navigation and the analysis of geographic data. The GNSS's individual networks include Galileo, BeiDou, NAVSTAR, and GLONASS.

Global Positioning System (GPS): a computer-based system that allows accurate positioning (usually in latitude and longitude) of a receiver anywhere on, or near, the surface of the Earth. It uses a range of satellite-based receivers for triangulation of electronic signals transmitted from a GPS-unit. It does this by automatically calculating the time differences that the signal reaches the two or more different satellites of known location and returning that information to the receiver. Initially developed with high accuracy, great privacy and stability for military operations in the 1970s, it has been expanded to civilian applications for governments, businesses and private citizens. Cost, accuracy, and ease of use have all dramatically improved. It can be used for many applications wherever precise knowledge of real-time geographical location is valuable including navigation, mapping, *environmental* monitoring and management, remotely-operating mobile machinery, and inventory-tracking.

Gross Domestic Product (GDP): a measure of a country's economy based on the total monetary value of goods produced and services provided in a country during one year

Gross National Income (GNI): the sum of a country's gross domestic product (GDP) plus net income (positive or negative) from overseas. It represents the value earned by a country's economy in a given year.

guest worker: a foreign worker allowed to temporarily work and live in particular host countries under special government schemes usually in industries with labour or skill shortages, but legally prevented from permanent settlement there

homogeneous: where the characteristics, e.g. in a *region*, are alike or very similar

host country: the country receiving immigrants (also known as the destination country or receiving country)

Human Development Index (HDI): a United Nations ranking *process* and the resultant indices. The United Nations gives each country a score between 0 and 1 (and typically four levels of human development between those numbers). The index is calculated using life expectancy at birth, years of schooling, expected years of schooling and the gross national income per head of population. The HDI is often used as a general indicator of social wellbeing rather than relying only on narrower economic measures such as Gross Domestic Product per person.

hyper-aged society: according to the United Nations, when more than 20 per cent of the population are 65 years or older

immigrant: a person who *moves* into a country to settle there

immigration: the act of *moving* into a country for settlement

industrialisation: a *process* by which an economy *changes* the nature of its major industries. The shift is typically from being largely dependent on agriculture or other primary industries (where natural resources are extracted or nurtured) to one based on adding greater economic value such as the manufacture of goods (secondary industry where materials are more highly processed) or the provision of services (tertiary industries such as the provision of entertainment, finance or information).

infant mortality rate (IMR): the number of deaths of children under one year old per 1000 live births in a year

infrastructure: the basic, essential structures and services required for an organisation, *region* or country to function efficiently; for example, roads, rail, docks, water and power networks

interconnection: the ways that geographical phenomena are connected to each other. This could be through *environmental processes*, the movement of people, flows of trade and investment, the purchase of goods and services, the exchange of ideas and information, political power and international agreements. *Interconnections* can be complex, reciprocal or interdependent, and have a strong influence on the characteristics of *places*.

internal migration: *movement* of people within one country, typically from one *region* to a different *region* within that country (rather than merely relocating within a particular neighbourhood)

internally displaced person (IDP): according to UNHCR: 'persons or groups of persons who have been forced to flee, or leave, their homes or *places* of habitual residence as a result of armed conflict, internal strife, and habitual violations of human rights, as well as natural or man-made disasters involving one or more of these elements, and who have not crossed an internationally recognised state border'. By law, they are protected by their nation's government, but that government might not recognise or honour those rights, and might even contribute to the IDP's vulnerability and displacement.

international migration: the *movement* of people from one country to another (also known as external population *movement*)

intra-urban migration: a form of internal migration within a single urban area e.g. within or between suburbs in one particular city; opposite of inter-urban migration

labour migration: *movement* of people from one nation state to another for the purpose of employment. Also known as economic migration

life expectancy (LE): the average number of years a person might be expected to live, usually measured from birth

maternal mortality (MM): the number of mothers who during pregnancy, child birth or within one year after pregnancy, die due to complications from childbirth or pregnancy, per 100,000 live births in a year

mechanisation: the increased use of machinery to replace human labour, for example in farming during the Agrarian and, later, Green Revolutions and in manufacturing during the Industrial Revolution

migrant worker: refers to any people working outside of their home country; may include 'guest workers' who are engaged under formal policies by host nations to temporarily employ migrants in industries suffering labour shortages

migration: the *movement* of people from one *place* of residence to another

monsoon: winds that occur in tropical *regions* and reverse their direction as the seasons *change*. They can bring dry or humid and wet conditions depending on the origin of the winds.

movement: the *change* in location of one or more phenomena from its original location to a new *place*. The concept of *movement* includes consideration of its nature, *distance*, direction, method, frequency, volume and magnitude.

nationals: refers to citizens of a particular country

natural decrease: the difference between crude birth rate and crude death rate of a population, with deaths exceeding births, usually expressed as a percentage

natural increase: the difference between crude birth rate and crude death rate of a population, with births exceeding deaths, usually expressed as a percentage

neo-Malthusian: views based on Malthus' late 18th Century theory of population growth but adapted much later (typically by demographers from the 1950s and environmentalists from the 1960s) and applied to contemporary conditions; neo-Malthusian views tend to be anti-natalist to reduce excessive population growth which is perceived as a burden on economic growth and/or a threat to *environmental* carrying capacity

neonatal: the first 28 days of life

neonatal mortality: death of an infant within the first 28 days of life

net migration: the net difference after the number of people departing from a country as emigrants is subtracted from the number of people arriving in that country as immigrants, usually reported over a 12-month period

nomadic: roaming from *place* to *place* usually in a deliberate fixed pattern of *movement* determined, for example, by people reacting to cyclical seasonal opportunities and limitations within the nomads' home *region* – these include pasture growth and the availability of game animals or water supply

old-age dependency ratio: see dependency ratio

out-migration: the *movement* of people migrating away from a country to settle elsewhere (also called outward migration, external migration, emigration); the opposite of in-migration or immigration

pandemic: the spread of an infectious disease through human populations across a very large *region* and typically at a global *scale*

parasite singles: a term used to describe young Japanese singles who remain living with their parents and pursue a materialistic consumer, rather than an independent, lifestyle

permanent migration: *movement* from one *place* to another on a long-term basis

population: the people, or number of people, who reside in a country, *region*, state, county, or city

place: parts of, or spaces on, the Earth's surface that are identified and given meaning by people. They may be perceived, experienced, understood and valued differently. Some characteristics of *places* are tangible, for example landforms and people, while others are intangible, for example scenic quality and culture. *Places* can be identified by their absolute or relative locations. Absolute location refers to a specific point on the Earth's surface expressed by co-ordinates, such as latitude and longitude. Relative location is expressed as a *distance* and direction from one *place* to another.

population change: the natural increase or decrease of a population, including the effects of emigration and immigration, or the *change* in structure of a population

population density: the number of people in a given *place* or *region*, for example per square kilometre

population distribution: the spatial arrangement of a population over an area at a global, national, *regional* and or local *scale*

population dynamics: the *changes* that occur in a population and how and why these *changes* occur

population explosion: a major, rapid *change* in population size in a relatively short period of time

population issues: refers to an impact which may result from a *change* in population, such as overcrowding. The identified issue needs to have a response including to be recognised, analysed and acted upon. It can be addressed by a global, national, *regional* or local *scale* policy with strategies. Traditional societies, community groups and individual families have often responded to various population issues by *changing* their demographic behaviour e.g. family planning or migration, without resorting to formal policies.

population momentum: the continued growth in a population despite earlier falls in fertility rate. This is because large numbers of young people, born in previous years of higher fertility, are *moving* into their reproductive years and are having, or will soon have, children.

population pyramid: see age-sex structure

population structure: the age and sex *distribution* of a population. Also used to describe the graph that represents this (see age-sex structure).

positive check: a decline in population due to famine, war or disease, bringing population size in line with resource availability or carrying capacity

preventative check: a decline in population in anticipation of population growth outstripping the resources available, eg. by abstinence or, in the modern day, use of anti-natalist policies

process: an identifiable series of actions or steps leading to *change* or preservation of phenomena, or which assist in developing an understanding of what creates, *changes* and sustains phenomena. Examples of *processes* are erosion, atmospheric and ocean circulation, disease transmission, urban development, globalisation and demographic transition.

pro-natalist policy: an idea, strategy or policy that aims to increase the crude birth rate in order to encourage population growth

pull factor: a force that draws people to *move* into a *place*

push factor: a force that drives people away from a *place*

raven mothers: a term implying neglect, originally used to describe working mothers in Germany who are perceived to have neglected their children by returning to work after giving birth

recurrent migration: occurs when migrants repeatedly return to a particular country; and may include leaving and later returning to their homeland

refugee: the 1951 Convention Relating to the Status of Refugees describes a refugee as a person who 'owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion, is outside the country of his nationality, and is unable to, or owing to such fear, is unwilling to, avail himself of the protection of that country'. Unlike internally displaced persons (IDPs), refugees are vulnerable because they have no protection from the government of the country they have been involuntarily forced to flee. Nevertheless, refugees can claim special status for protection under international law.

region: a definable area of the Earth's surface that contains one or more common characteristics that distinguish it from neighbouring areas

remittances: a transfer of money by a foreign worker to an individual in their home country; many less developed nations, and families of migrants within them, rely heavily on the income derived from remittances because of the lack of employment at home

remote sensing: collecting data from above the Earth's surface from satellites in space as well as aerial photographs from aircraft and drones

replacement rate: the fertility rate required to keep a population stable (neither increasing nor decreasing). Currently the global replacement rate is 2.1.

rural-to-urban migration: the *movement* of people from countryside to an urban settlement such as a town or city

sanitation: conditions that promote cleanliness and good hygiene such as clean drinking water and flushing toilets

scale: the relative size of an area being studied. Map *scale* shows the relationship between measurements on a map and the actual measurements on the ground whereas observational *scale* is conceptual and refers to the relative size of phenomena or the area or areas being studied – local, *regional*, national, international and global.

sea-changers: people who move to coastal *regions* attracted by a better lifestyle

seasonal migration: periodic migration from *region* to *region*, often urban to rural, and back again within a nation. The *movement* is seasonal depending on the greater availability of work at special times e.g. spring in particular *places* – usually near the workers' home village. Often involves long historical and deep cultural ties e.g. during crop harvest, fishing runs or game hunting. May also involve highly mobile specialist seasonal workers who follow the shifting harvest periods throughout most of the year.

short-term migration: see temporary migration

skilled migrant: a migrant worker who, because of his or her specialist skills or acquired professional experience, is usually granted preferential treatment regarding admission to a host country (and is therefore subject to fewer restrictions regarding length of stay, *change* of employment and family reunification)

slum or shanty settlement: an area that is characterised by informal housing. Most lack reliable supply of water, sanitation, and basic services. There is a strong *spatial association* between slums and poverty because very poor people can often only afford to live in slums.

spatial association: the degree to which two or more phenomena are similarly arranged over space. A strong *spatial association* occurs where the *distribution* of two phenomena are very similar. On the contrary, weak *spatial associations* mean there is little similarity between the *distributions* of phenomena.

spatial distribution: see distribution

spatial technology: see geospatial technology

sustainability: the condition that arises when an activity, structure, pattern or *process* continues unaltered over a lengthy period of time without the depletion of the resources upon which its existence depends; typically, it refers to *environmental sustainability* (and for example depends on *sustainable* economic, social, and *environmental* conditions); but geographers also use the term to refer to *sustainable* cities, populations, or economies

temporary migration: *movement* on an impermanent basis (also known as short-term migration)

total fertility rate (TFR): the average number of children a woman is likely to have if she lives to the end of child-bearing age

transmigration: the *movement* of internal migrants under specific government schemes aimed at decentralising population. This reduces overcrowding in cities, helps populate rural or remote *regions* and promotes greater economic development or security e.g. offering incentives for thousands of city dwellers to settle in the Indonesian and Brazilian rainforests. Opportunities may be offset by individual hardship, social disruption and *environmental* damage.

tree-changers: people who make an urban-to-rural migration for lifestyle reasons, and typically to inland rather than coastal *regions*

urban sprawl: the uncontrolled expansion of urban areas; usually results in the loss of access to urban infrastructure and a declining quality of life in the outer suburbs

urbanisation: the *process* whereby there is an increase in the percentage of a *region's* population living in urban areas; typically, a result of internal and international migration into a city and by natural increase of the urban population. Urbanisation is not to be confused with merely an increase in the number of inhabitants in (residents of) an urban population – urbanisation can occur with no *change* or even a decline in an urban population if neighbouring rural populations grow at a slower rate regardless of their size.

voluntary migration: *movement* from one *place* to another out of choice

youthful population: a population with a large proportion of people aged under 15 years

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Student resources for VCE Geography are located at:
gtav.asn.au/geography-students/students

UNIT 4 Human Population

AUTHORS

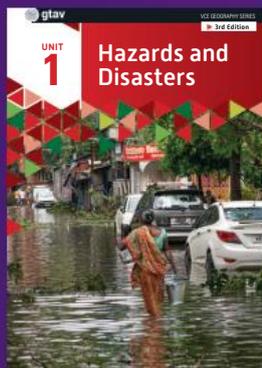**Adrian De Fanti, Trish Douglas, Lynne Griffiths, Catherine Holmes, Jeana Kriewaldt, Jenne King, Cathie Meyenn** and **Ray Pask**

Developed and published for the VCE Geography Study Design 2022–2025, *Human population* is a comprehensive course book that provides topical case studies helping students to understand and apply geographical concepts, key knowledge and skills.

Using this textbook, students investigate the geography of human populations. They explore the patterns of population change, movement and distribution, and how governments, organisations and individuals have responded to those changes in different parts of the world. Investigations include a study of two significant population trends that have developed in different parts of the world: a growing population of one country and an ageing population of another.

Written by experienced VCE Geography teachers, this third edition textbook incorporates updated text, case studies, geospatial technologies, fieldwork, rich data and activities to assist students to develop an understanding of the content and skills of Geography, and prepare them for success in their VCE assessments.
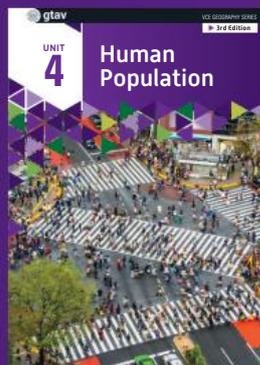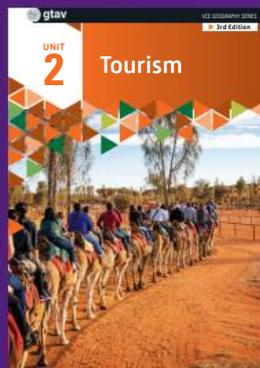
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