Demographic Trends in South Australia and Projection Assumption Suggestions

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Acronyms and abbreviations used in this report

ABS	Australian Bureau of Statistics
ERP	Estimated Resident Population
NIM	Net interstate migration
NOM	Net overseas migration
SASPOPP	State and Sub-State Population Projection Program
TFR	Total Fertility Rate

1. Introduction

The aims of this report are to give a brief overview of key demographic trends in fertility, mortality, migration, and population in South Australia over the last few decades, and offer suggestions for population projection assumptions.

The report does not provide a comprehensive and detailed assessment of South Australia's demographic trends. Instead, it focuses primarily on the 'headline' indicator variables relevant for projecting the State's population using the projection software SASPOPP (State and Sub-State Population Projection Program). These headline indicators comprise the Total Fertility Rate (TFR), life expectancy at birth, net overseas migration (NOM), and net interstate migration (NIM).

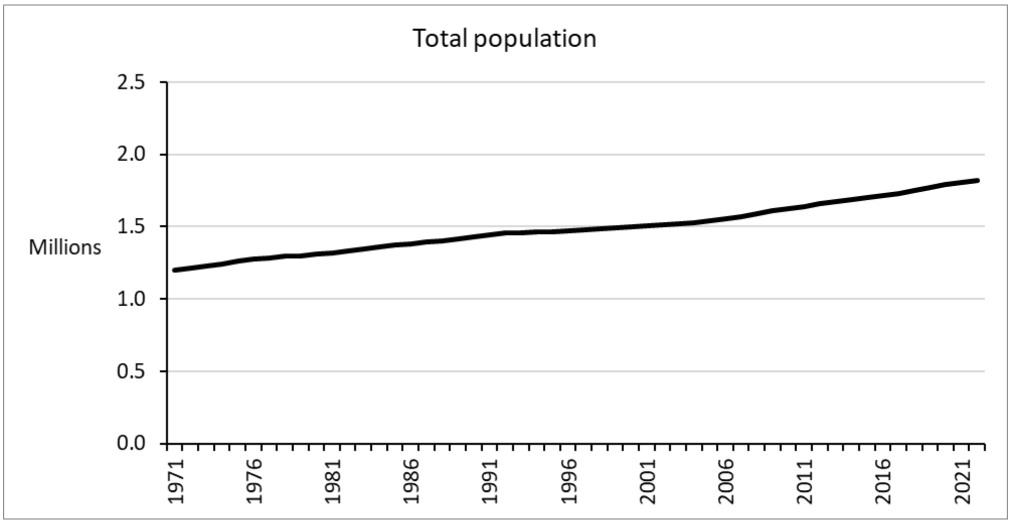
Long-run trends over many decades are more relevant for mortality, and fertility from a cohort perspective (see section 3), while migration is far more volatile – though trends over recent years are still relevant to short- and medium-term projections. Reviewing demographic trends over the last few decades is also very useful when it comes to assessing the plausibility of projection model outputs. Population projections should make sense in the context of long-run and recent trends and characteristics.

State fertility and mortality differences with national-level indicators, and share of NOM, is shown because projection models often project State (and sub-state regional) projection headline indicators through a relationship with national projections. In addition, age profiles of migration are shown both as rates/probabilities and as scaled rate/probabilities. This is because the SASPOPP model separates out the overall *level* of migration from the *shape* of the migration age profiles. The level of migration is susceptible to considerable fluctuation, while the shape of many migration age profiles tends to exhibit much greater stability over time.

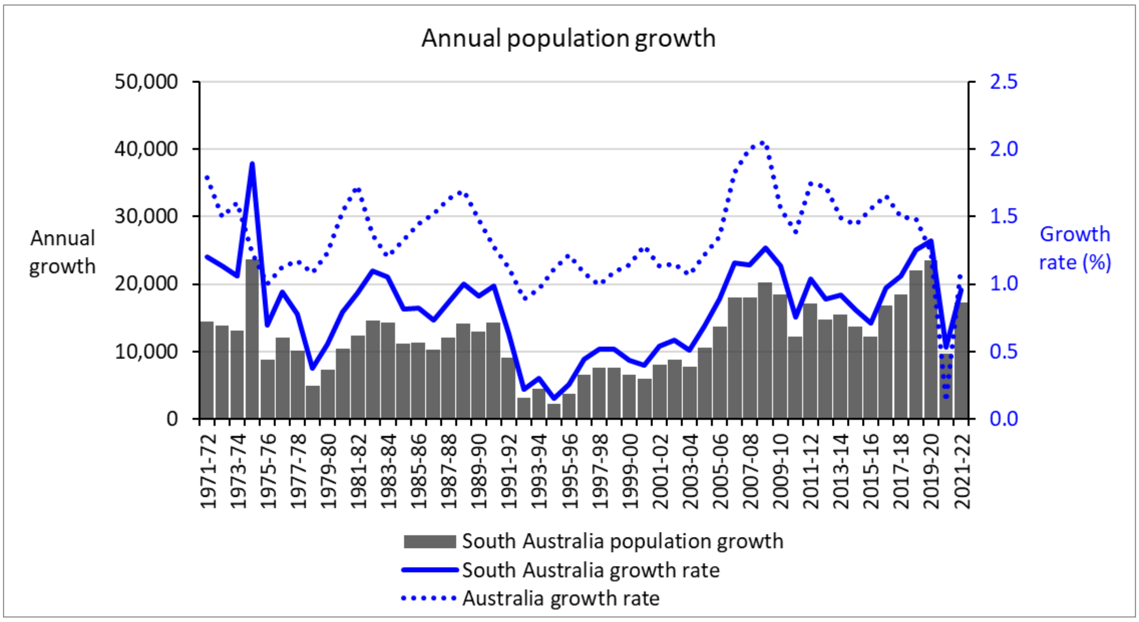
Section 2 of this report provides a brief overview of State population change; section 3 focuses on fertility, and section 4 on life expectancy and mortality. Overseas migration is dealt with in section 5, and interstate migration in section 6. Interstate migration analysis and assumption-setting is especially challenging due to data quality issues with the ABS Medicare-based migration estimates.

2. Overview of population change

South Australia's resident population has grown from 1.20 million in 1971 to 1.80 million in 2021 (Figure 2.1a), an increase of 0.6 million or 50.3% over the 50 year period. The latest preliminary ERP for 2022 is 1.82 million. Figure 2.1b shows annual population growth by financial year as well as the growth rate of the State's population, with the national population growth rate also shown for comparison.



(a) 30th June ERPs



(b) Population growth and growth rate by financial year

Figure 2.1: Population growth in South Australia, 1971-2022

Source: calculated using ABS ERP data

Since the mid-2000s, when net overseas migration increased substantially in Australia, South Australia's population growth has varied between 9,000 and 23,000 per year, averaging about 16,500 or 1% annually. If population projections are based on similar demographic trends to the recent pre-COVID past, then projected State population growth in the short-run should lie close to the middle of this range.

In the low growth year of 2020-21 when Australia's international border was shut due to COVID, national population growth fell to 0.1%, while South Australia's growth fell only to 0.5%. This was because total net migration (overseas and interstate net migration combined) remained positive in the State. Net overseas migration for Australia became negative in this year (due to more emigration than immigration). The strong recovery in net overseas migration in 2021-22 has been the main driver in the resumption of population growth to 17,300 (equivalent to just under 1.0% growth compared to 1.1% nationally).

Figure 2.2 shows the annual population growth data from Figure 2.1 but with a breakdown into its natural change and total net migration contributions. Natural change, defined as births minus deaths, is shown by the orange-red bars. Total net migration is shown by the pale blue bars. The sum of these two components, total population growth, is indicated by the black outline bars. As the graph shows, much of the variability in the State's population growth from year to year is accounted for by net migration.

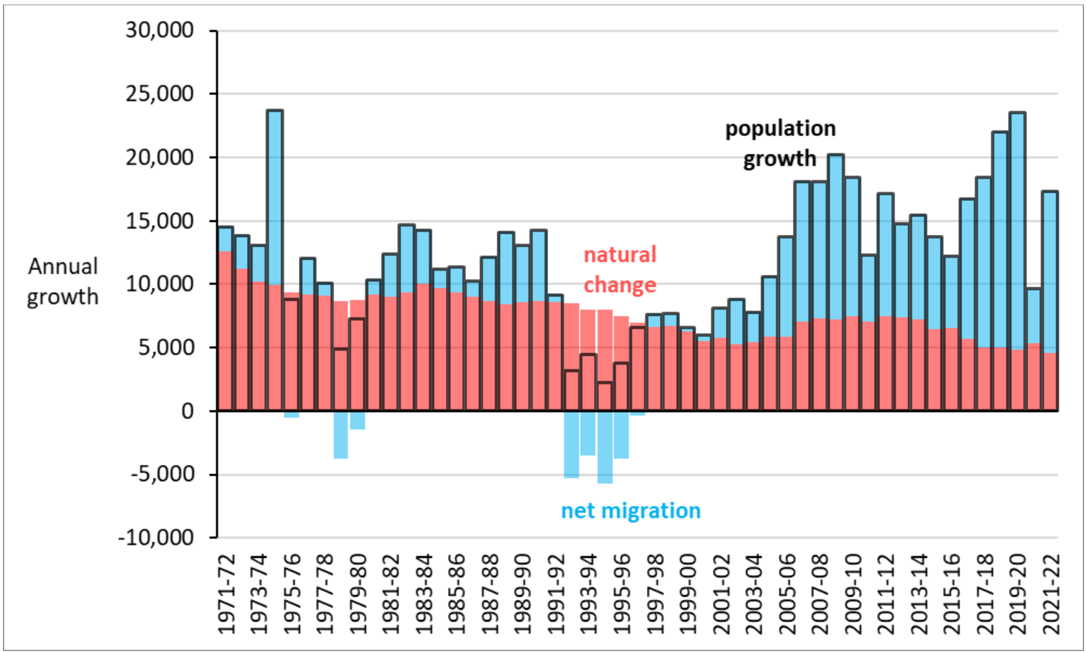


Figure 2.2: Natural change and net migration in South Australia, 1971-2022

Source: calculated using ABS ERP, births, and deaths data

Note: net migration calculated as the population growth remaining after natural increase

Changes to the age structure of South Australia's population over the last three decades are summarised in Figure 2.3. A key feature is the expansion of the population at older ages – population ageing resulting from the large baby boom generation getting older over time along with huge improvements in survival in the older ages. It is followed by similarly large generations behind it. Although fertility rates fell following the baby boom, the number of births generated by the baby boomers was considerable because of the sheer size of their generation. The population projections should show this population ageing trend continuing, along with characteristic peaks and troughs in the population age structure. These are created by previous fluctuations in numbers of births from year to year, as well as a net gain from migration in the young adult ages.

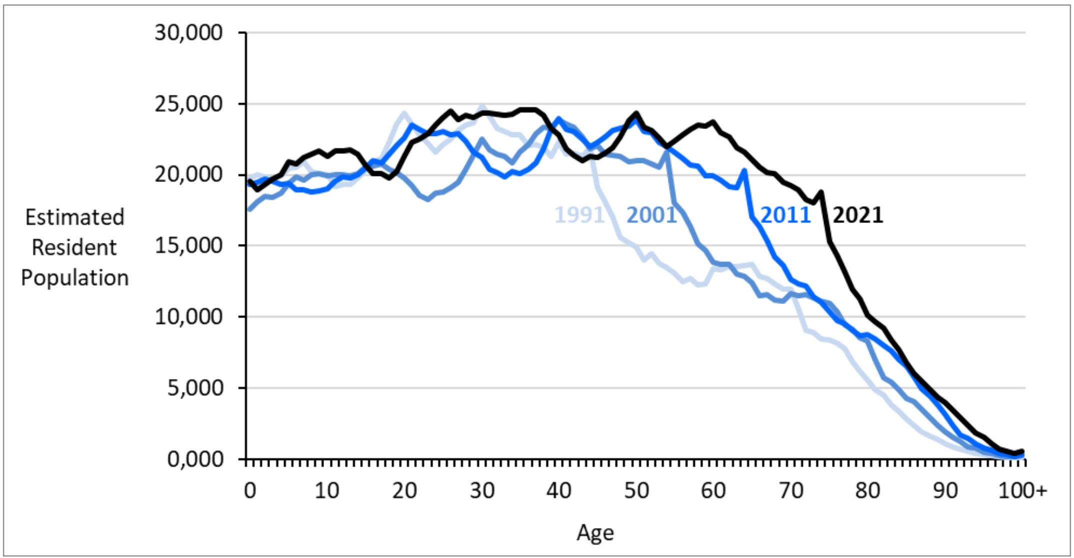


Figure 2.3: The age structure of South Australia's population, 1991, 2001, 2011 and 2021
Source: ABS ERP data

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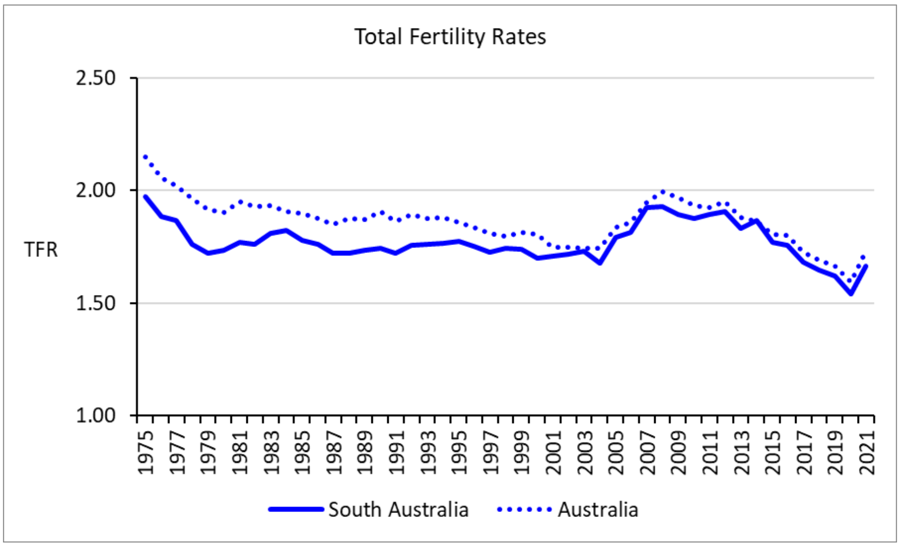
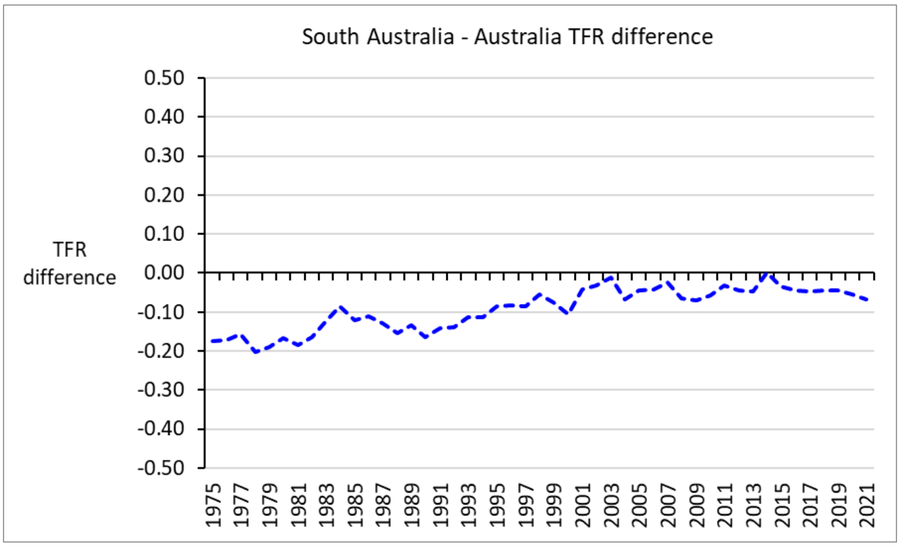
3. Fertility

3.1. Total Fertility Rates

South Australia's fertility has been relatively low since the decline of fertility in Australia during the early 1970s following the 1950s and 60s baby boom. Figure 3.1 presents trends in the Total Fertility Rate (TFR) for South Australia and Australia from 1975 onwards (part a) along with the TFR difference between the State and Australia (part b). During the 1980s and 90s fertility in the State remained fairly steady, increasing or decreasing only slightly and generally keeping within the range 1.70 to 1.80, as shown in Figure 3.1(a).



(a) Total Fertility Rates



(b) Total Fertility Rate difference between South Australia and Australia

Figure 3.1: Total Fertility Rates, 1975-2021

Source: calculated using ABS births and ERP data

The increase in fertility in the early 2000s is thought to be due to a 'catch up' effect from women in older childbearing ages due to earlier birth postponement together with increases in disposable incomes[1]. The baby bonus is not thought to have had any significant influence in increasing fertility. More recently, the TFR dropped slightly in 2020 due to uncertainty about the future at the start of the COVID pandemic[2], followed by a recovery in 2021.

The State has long experienced fertility below the national average, as demonstrated in Figure 3.1. Figure 3.1(b) shows how the gap between State and national fertility gradually narrowed until the beginning of the present century. A small gap has persisted since then, with State fertility tracking just below national fertility. Over the 2001-21 period the TFR difference averaged 0.044.

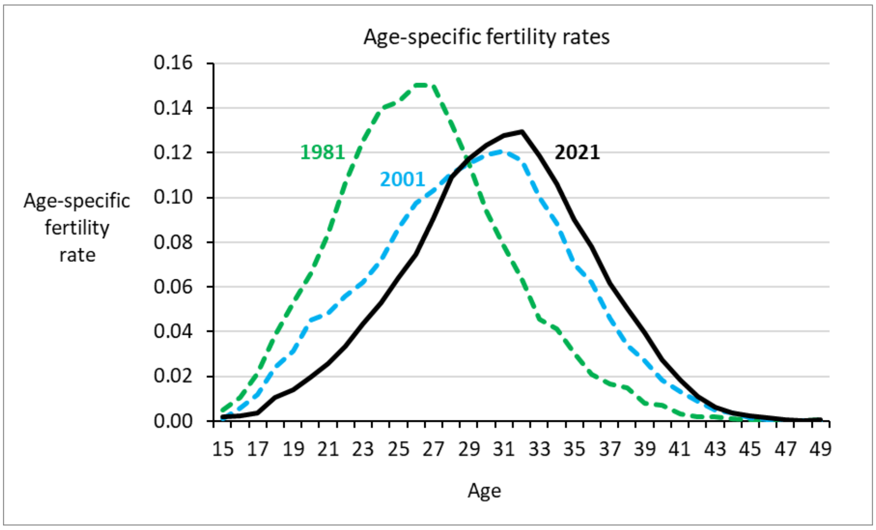
3.2. Age profile of fertility

Over time, the age profile of South Australia's fertility has become older. A similar trend has been occurring in other jurisdictions in Australia and in most developed countries around the world. Figure 3.2(a) illustrates the extent of the shift by presenting age-specific fertility rates for the years 1981, 2001 and 2021. In South Australia, this ageing of the fertility age profile has occurred without large changes in the TFR since the end of the 1970s. For the three years depicted in the graph the TFR was actually quite similar: 1.77 in 1981, 1.71 in 2011 and 1.66 in 2021.

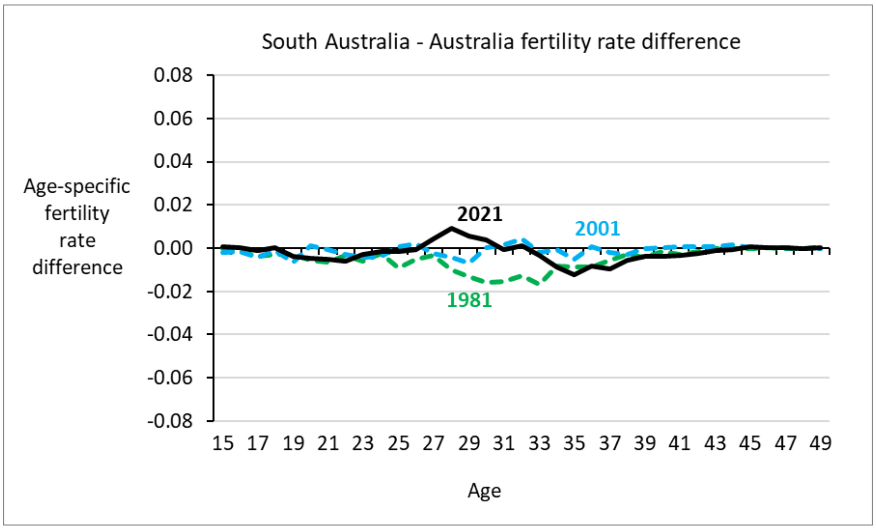
The age pattern and rightward shift in the State's fertility age profile mirrors the national trend closely. The difference in fertility rate age profiles between South Australia and Australia is shown in Figure 3.2(b).

To summarise the fertility ageing phenomenon, it is useful to calculate the mean age of childbearing and the share of the TFR contributed by fertility at ages 30 and above. The TFR share for those aged 30+ rose from 24.3% in 1981 to 49.0% in 2001 and 60.0% by 2021. Figure 3.2(c) shows the mean age of childbearing in South Australia and Australia. The mean age of childbearing in the State increased in a near-linear trend from 26.3 years in 1975 to 31.2 years in 2021.

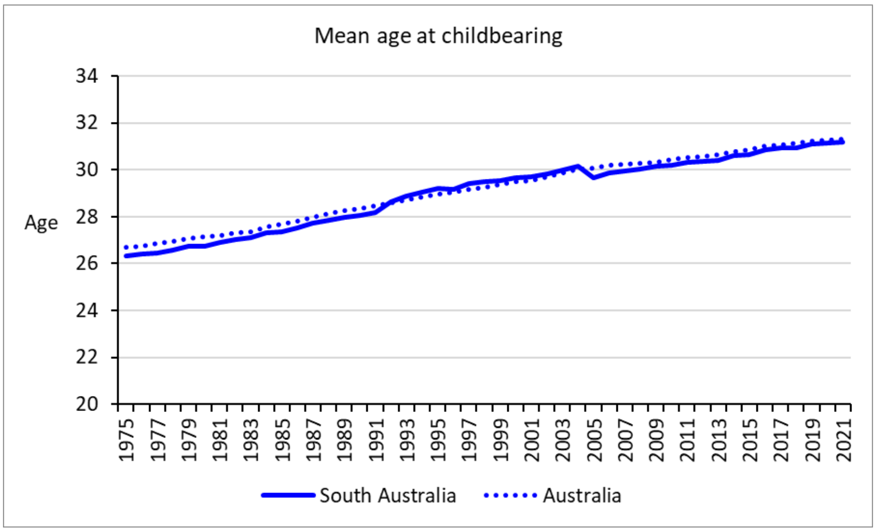
[1] Parr & Guest (2011) The contribution of increases in family benefits to Australia's early 21st-century fertility increase: An empirical analysis. *Demographic Research*. https://doi.org/10.4054/DemRes.2011.25.6
[2] Gray et al. (2021) Having babies in times of uncertainty: first results of the impact of COVID-19 on the number of babies born in Australia. *Australian Population Studies*. https://doi.org/10.37970/aps.v6i1.101



(a) Age-specific fertility rates in South Australia



(b) Age-specific fertility rates differences between South Australia and Australia



(c) The mean age of childbearing

Figure 3.2: Changes to the age pattern of fertility
Source: calculated using ABS births and ERP data

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3.3. Cohort fertility

As demonstrated in Figure 3.1(a), period fertility – the fertility occurring year by year – can change fairly quickly over just a few years. However, cohort fertility – the fertility experienced by a group of women born in a specific year – tends to change more gradually over time. Cohort fertility describes the fertility experienced by each cohort as it passes through its childbearing ages over a period of about 35 years. Figure 3.3 below illustrates the cumulative fertility in South Australia of women born in 1960, 1970, 1980, 1985, 1990, and 1995. The lines on the graph describe the average number of babies born per woman by the time members of the cohort have reached specific ages. The lines are incomplete for cohorts born from 1980 onwards because age-specific fertility at older ages has not yet occurred for these cohorts.

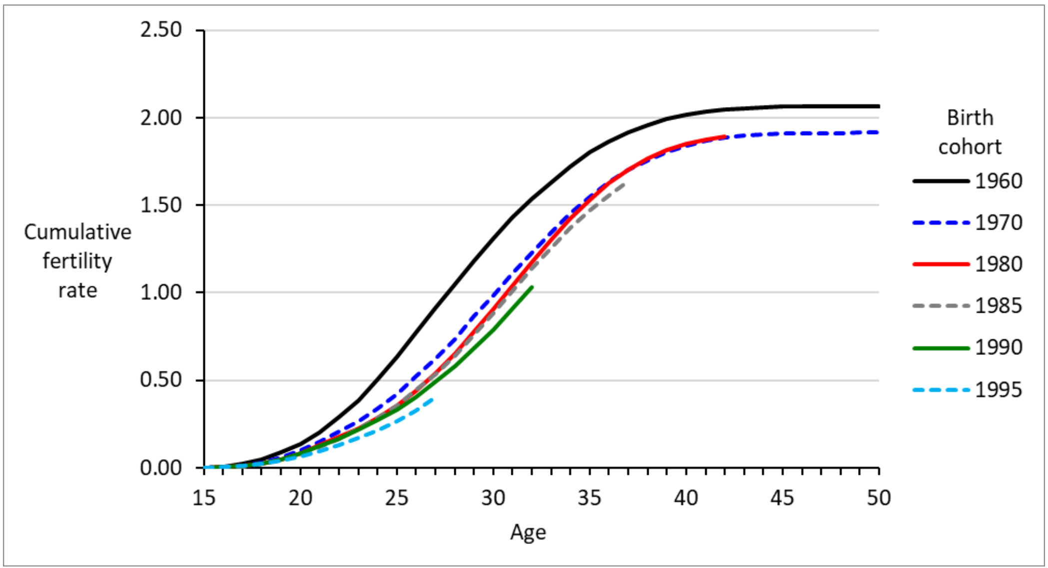

Figure 3.3: Cumulative fertility rates in South Australia, selected female birth cohorts
Source: calculated using ABS births and ERP data

The cumulative fertility shown in Figure 3.3 by the end of the childbearing ages at age 50 is the cohort fertility rate (or completed family size). This can be interpreted like the TFR – the average number of babies per woman. The birth cohort of 1960 has a cohort fertility rate of 2.06; the equivalent for the 1970 cohort is 1.91. The 1980 cohort is close to completing its childbearing and appears on track to achieve a similar cohort fertility rate. Notice how the 1980 cohort had lower cumulative fertility by age 30 than the 1970 cohort, but caught up in its later childbearing years. The 1985 cohort experienced a similar cohort fertility trend to the 1980 cohort up to about age 30, but now appears to be heading for a lower cohort fertility rate – unless it experiences a substantial catch up effect as its members reach their late 30s and 40s.

For the 1990 and 1995 cohorts, it is too soon to draw any definite conclusions, but unless their current trajectories alter markedly, they will attain lower cohort fertility rates than older cohorts. It has been shown that the older that women have their first birth, the lower the fertility[3]. This is because the chance of conceiving declines with age.

However, the disadvantage of cohort analysis is that cohort and period fertility may differ considerably for long periods of time due to shifts in the timing of childbearing (primarily the ageing of the fertility age profile), and population projections require period fertility assumptions. Cohort fertility patterns should therefore be viewed as only one part of a complex picture of likely future annual fertility.

3.4. Determinants of fertility

The determinants of the level of fertility as measured by the TFR or cohort fertility rate are many and not fully understood. There is no one dominant theory of fertility, and no mathematical model which can calculate the TFR based on a series of variables which influence fertility. The diagram in Figure 3.4 summarises some of the key influences mentioned in the demographic literature. An important distinction is between individual (or micro-level) factors and broader social and economic (macro-level) influences within which the decisions of individual and couples are made.

At the individual level, important influences on fertility include:

- A person's relationship status, especially being partnered versus being single
- Their attitudes to children and personal preferences about the number of children they would like to have
- Their disposable income, which influences their views on the affordability of children
- Their desired education and career path
- Their views on economic (un)certainty over the coming years
- Their own fecundity (how fertile they are)
- Use of birth control.

Individual decisions are made within the context of the labour market, the housing market, workplace practices and norms, government family policies, social norms, higher education participation, and available medical technology, amongst others. Gray et al. highlight the importance of financial incentives, child care, and parental leave on decisions about having children. Their review of the literature found better child care availability and affordability, and parental leave and other policies supporting employment and child rearing, are associated with fertility gains in other countries.

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[3] Gray et al. (2022) Impacts of Policies on Fertility Rates. School of Demography, Australian National University. https://population.gov.au/sites/population.gov.au/files/2022-03/ANU_Impacts-of-Policies-on-Fertility-Rates-Full-report.pdf

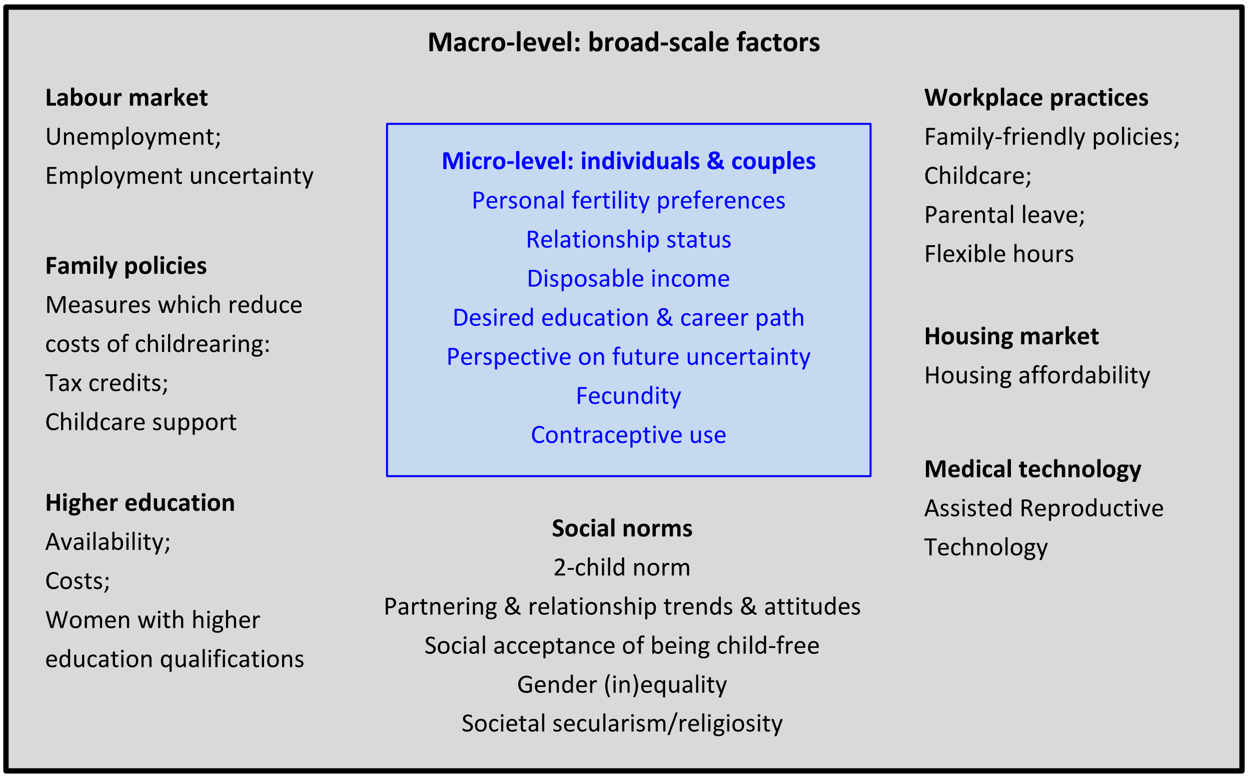


Figure 3.4: Some of the main factors affecting the level of fertility

Source: Based loosely on many sources, including Gray et al. (2022), Latimore[4] (2008), and McDonald (2020)

3.5 Fertility projection assumptions

In formulating projection assumptions, it is worth considering that South Australian fertility is very similar to national fertility, so many of the analyses and arguments applied to national fertility are likely to be relevant for State fertility.

The age profile of South Australia's fertility is gradually ageing (Figure 3.2a) with the mean age at childbearing slowly shifting to higher ages. It would be reasonable to assume that this trend will continue. A shift to later childbearing is often associated with lower fertility. This would point to possibly lower fertility in the future in South Australia (barring any major medical breakthroughs that make conception at older ages much easier). From a cohort perspective, female cohorts born from the mid-1980s onwards appear to be heading for lower completed cohort fertility than earlier cohorts.

What have other forecasters assumed for the future of fertility? Fertility forecasts prepared by Peter McDonald for the Centre for Population, Commonwealth Treasury, include a TFR for South

[4] Lattimore (2008) Recent Trends in Australian Fertility. Productivity Commission Staff Working Paper. https://www.pc.gov.au/research/supporting/fertility-trends.

Australia gradually declining to 1.58 by 2031-32[5]. This assumption was used in the Centre for Population's 2021 Population Statement[6] as well as the 2021 Intergenerational Report[7]. Fertility forecasts for Australia by the United Nations Population Division assume a TFR slowly increasing from 1.60 in 2022 to 1.65 by 2050[8].

However, past experience provides a stark warning: fertility forecasting does not enjoy a glorious track record of accuracy[9]. Therefore, despite the current knowledge about fertility and its drivers, and thinking about likely future developments, current fertility forecasts may well turn out to be quite inaccurate. There is clearly a need for research to try to develop more reliable fertility forecasting methods, at least for about the next 5 years ahead which is a common planning period for school enrolment forecasts.

For the first year of the projections, 2021-22, it would be helpful to make a slight adjustment to the assumed TFR to ensure that the projection model generates the actual number of births reported for that year. If possible, it would also be useful to determine if there is more timely births data available locally than published by the ABS. Births notifications from the State's perinatal data collection might provide these statistics.

Ultimately, a decision must be made about the fertility rates used to create population projections. The highly regarded forecaster, J. Scott Armstrong, has proposed a 'golden rule' of forecasting[10] which is to "be conservative by adhering to cumulative knowledge about the situation and about forecasting methods" (p. 1718). This is especially recommended when the situation is uncertain and complex. One interpretation of this rule for fertility forecasts is to:
(1) set a future TFR not too much lower than the TFRs of recent years;
(2) assume moderate continuation of fertility rate age profile ageing.

Erring very slightly on the generous side for fertility assumptions would probably be useful given the asymmetric cost of incorrect birth projections, and the fact that births tend to be amongst the

[5] McDonald (2020) A Projection of Australia's Future Fertility Rates. Centre for Population, Australian Government. https://population.gov.au/research/research-fertility
[6] Centre for Population (2021) Population Statement. Australian Government. https://population.gov.au/publications/statements/2021-population-statement.
[7] Australian Government (2021) 2021 Intergenerational Report. Australian Government. https://treasury.gov.au/publication/2021-intergenerational-report.
[8] United Nations Population Division (2022) World Population Prospects. https://population.un.org/wpp/
[9] See for example: Statistics Norway (2021) The accuracy of Statistics Norway's national population projections. https://www.ssb.no/en/forskning/discussion-papers/the-accuracy-of-statistics-norways-national-population-projections.
https://www.researchgate.net/publication/366390252_Visualising_the_shelf_life_of_population_forecasts_a_simple_approach_to_communicating_forecast_uncertainty
[10] Armstrong et al. (2015) Golden rule of forecasting: be conservative. *Journal of Business Research*. http://dx.doi.org/10.1016/j.jbusres.2015.03.031

most inaccurately forecast of all demographic variables[11]. Slight overcapacity in child health services, school places, and maternity hospitals, etc. is probably better than the consequences of insufficient capacity.

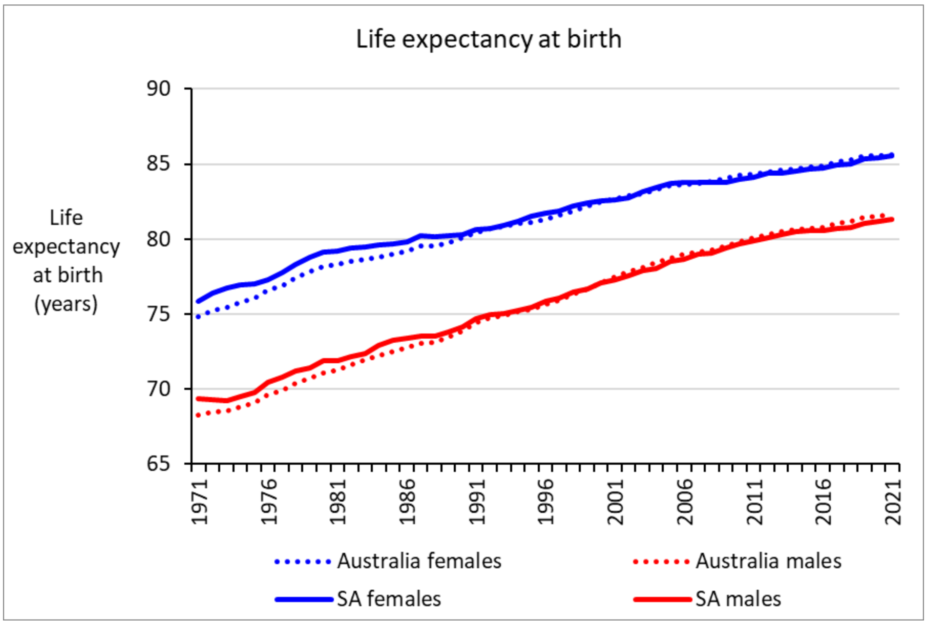
For high and low TFR assumptions, it is recommended that they are trended in over the first 2-5 years of the projection horizon with 0.15-0.2 difference in TFR from the main assumption.

[11] Wilson (2022) Visualising the shelf life of population forecasts: a simple approach to communicating forecast uncertainty. https://www.researchgate.net/publication/366390252_Visualising_the_shelf_life_of_population_forecasts_a_simple_approach_to_communicating_forecast_uncertainty

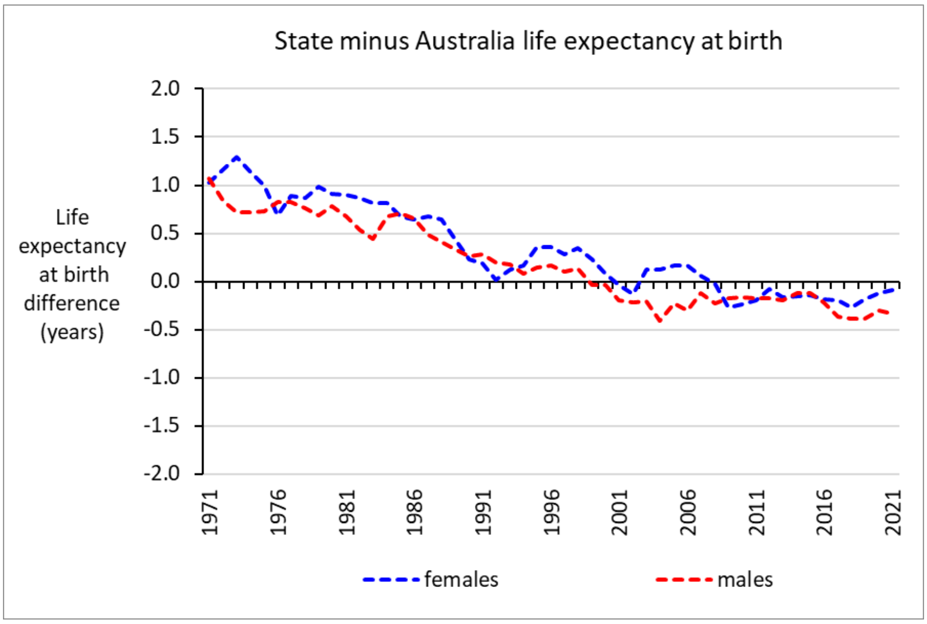
4. Mortality

4.1. Life expectancy at birth

Life expectancy at birth by sex in South Australia over the period 1971 to 2021 is shown in Figure 4.1 below. Part (a) depicts life expectancy at birth while part (b) shows the difference between State and national life expectancy.



(a) Life expectancy at birth



(b) Difference between State and national life expectancy

Figure 4.1: Life expectancy at birth, 1971-2021
Source: life tables calculated using ABS deaths and ERP data

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In South Australia, life expectancy at birth for females increased from 75.9 years in 1971 to 85.6 years in 2021 (+9.7 years); for males the equivalent figures are 69.4 years and 81.3 years (+11.9 years). Although minor year-to-year fluctuations are apparent, the trend consists of a reasonably smooth long-run increase in life expectancy. As the graphs show, the State's life expectancy trend has remained close to national life expectancy, though it was about 1 year higher in 1971 and is now is a fraction of a year below national life expectancy. Over the 2001-21 period, the State's life expectancy at birth averaged 0.09 years below the national figure for females, while for males it was 0.24 years lower.

4.2. Age-specific death rates

In terms of age-specific death rates, South Australia and Australia mostly experience very similar rates. A selection of death rates at ages where they are highest – and therefore affect population size the most – are shown in Figure 4.2. At many ages, the long-run trend closely approximates exponential decline.

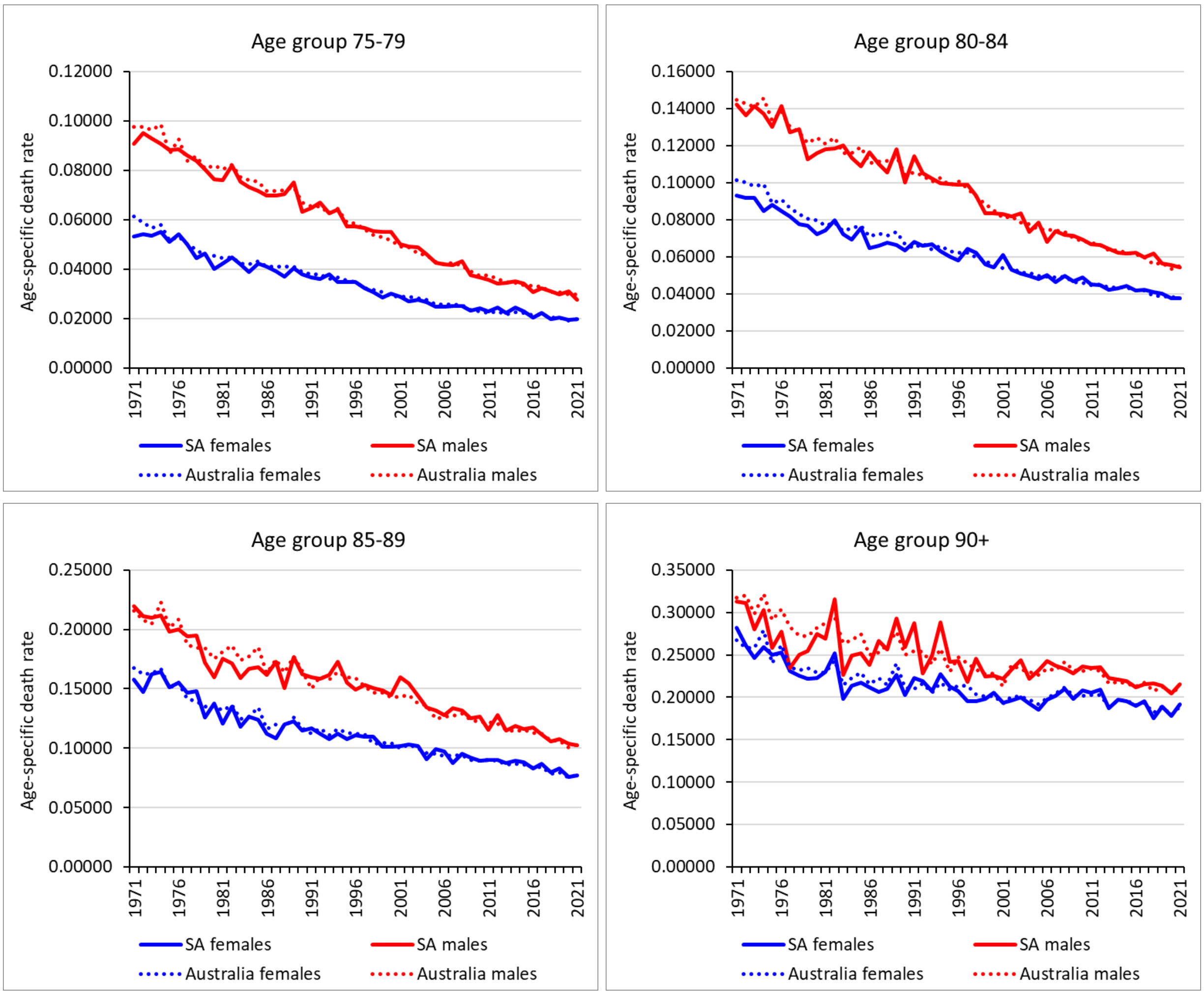


Figure 4.2: Selected age-specific death rates by sex, South Australia, 1971-2021

Source: life tables calculated using ABS deaths and ERP data

At ages 90+ the downward trend is less smooth, but it should be remembered that the age composition of the 90+ population itself has been ageing over the period shown – effectively making it a population-weighted average of mortality rates at very high ages. For projection assumptions, it is reasonable to assume that the long-run trend of declining mortality will continue.

At some middle-age age groups, the decline in death rates has stalled in recent years (Figure 4.3). This is particularly the case for the 45-49 and 50-54 age groups, and males aged 55-59. This is a concerning development, but thankfully death rates at these ages are low (all well below 1% per year). For the purposes of projections, death rates can be assumed to resume their long-run trend of decline. Because the rates are low at these ages, mortality exerts only a very modest impact on population size, so even if the rates were forecast with large percentage errors, the effect on population projections would be very small. The key to accurate forecasts of deaths is accurate forecasts of age-specific death rates at the highest ages.

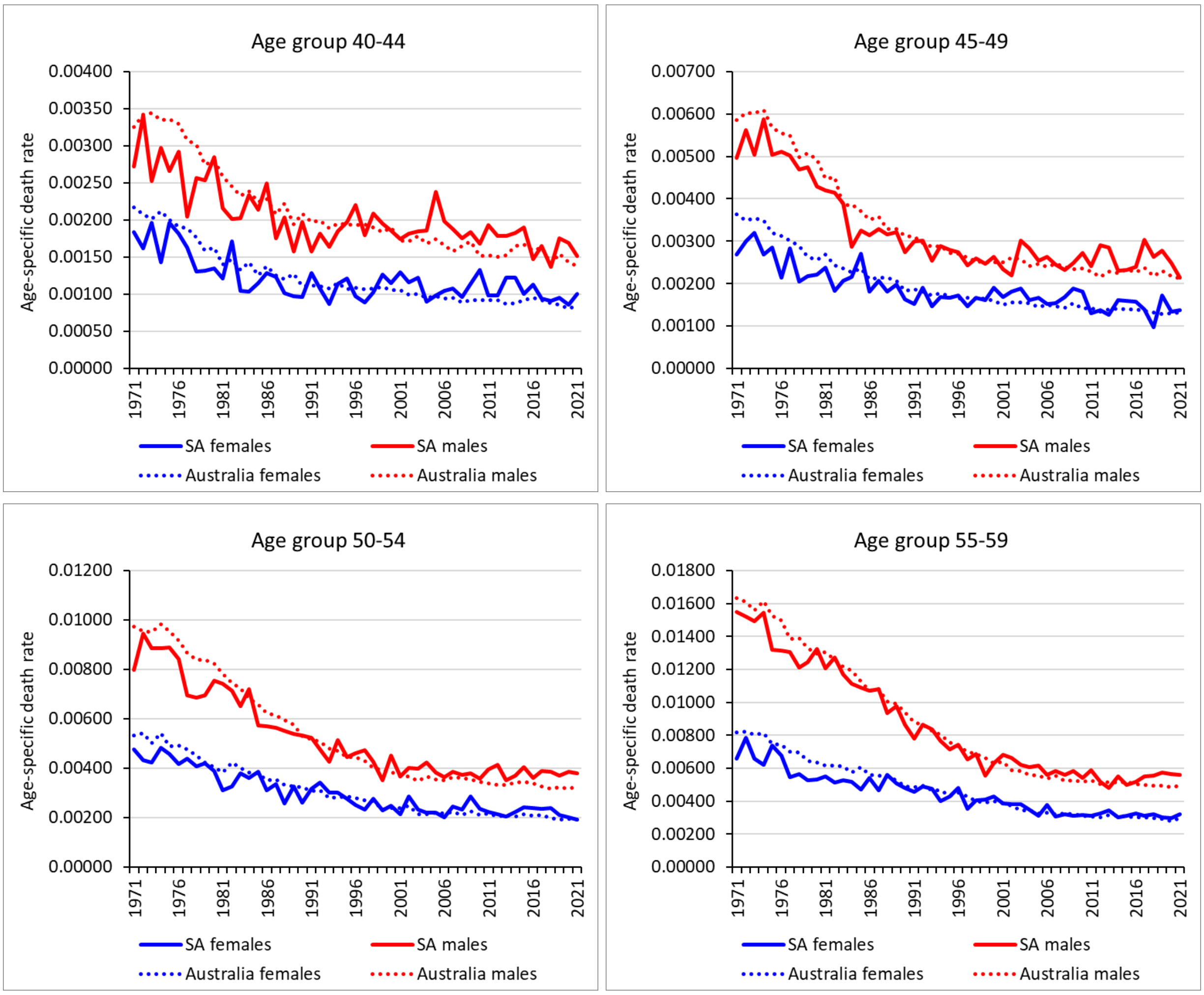


Figure 4.3: Selected age-specific death rates by sex, South Australia, 1971-2021

Source: life tables calculated using ABS deaths and ERP data

4.3. Mortality projection assumptions

Mortality tends to be more predictable than fertility because it is influenced by slow-moving macro-scale trends in health behaviours and medical science. Most mortality forecasting models are extrapolative, though a few models now explicitly take into consideration smoking rates, alcohol consumption, and rising obesity[12]. These models require considerable amounts of input data and assumptions about the future trajectories of smoking, alcohol use, and obesity. The practical approach, therefore, would be to follow most demographers and use an extrapolative model assuming that mortality will continue its long-established near-exponential decline in age-specific death rates over the long-run.

The default option in SASPOPP is to make use of a national mortality surface to project age-specific death rates. This consists of national age-specific mortality from recent decades and mortality projected many decades into the future. The model used for the projections is Ediev's extrapolative model of mortality, which essentially applies exponential extrapolation to age-specific death rates with some clever consistency constraints added to ensure plausible smooth projected trends[13]. Using a national mortality surface minimises the amount of noise in the data and in particular avoids problematic death rates of zero. SASPOPP selects the appropriate age profile of mortality from the mortality surface for each assumed life expectancy at birth value. Given the similarity between South Australian and national mortality patterns, this approach is recommended.

For the life expectancy at birth assumptions for the State, it is recommended that they mirror national life expectancy projections from the Ediev model. However, these life expectancy projections for the State should incorporate the minor difference with national life expectancy observed over recent years. The suggested approach is to set State life expectancy by sex as the national life expectancy projection minus the average difference observed over the previous decade or so. The projection therefore assumes that State life expectancy does fall any further below national trends.

Special consideration must be given to COVID. COVID has disrupted long-run mortality trends, presenting a non-trivial challenge for forecasting, at least in the short run. While Australia avoided the huge increases in mortality observed in many other countries during the first two years of the

[12] Janssen et al. (2019) Future mortality in selected European countries, taking into account the impact of lifestyle epidemics. Joint Eurostat/UNECE Work Session on Demographic Projections. https://pure.rug.nl/ws/portalfiles/portal/100697354/Janssen_et_al_2019_Eurostat_UNECE_WP.pdf

[13] Ediev (2008) Extrapolative projections of mortality: towards a more consistent method. Part I: the central scenario. Vienna Institute for Demography Working Paper 3/2008. https://www.oeaw.ac.at/fileadmin/subsites/Institute/VID/PDF/Publications/Working_Papers/WP2008_03.pdf

pandemic[14], provisional mortality data for late 2021 and January-September 2022 shows elevated numbers of deaths, many due to COVID[15]. Although these deaths data do not represent a full count of deaths, they are sufficiently high to guarantee that the number of deaths which will later be published for 2022 will be markedly greater than the long-run trend would suggest.

For South Australia, deaths in 2022 up to the end of September were 14% above the ABS 'baseline average'. This baseline average is defined by the ABS as the average annual number of deaths in the years 2017, 2018, 2019 and 2021. Unfortunately, this baseline does not reflect the likely numbers of deaths which would have occurred in 2022 in the absence of COVID because population growth and ageing are generating rising numbers of deaths even in the context of declining age-specific death rates. Nonetheless, the mortality assumptions ought to include at least a short-run adjustment to account for elevated COVID mortality.

For the population projections, it is therefore recommended that life expectancy at birth projections for the first year of the projection horizon, 2021-22, are iteratively adjusted to match the published number of deaths for South Australia by the ABS[16]. For the next few years, some above-trend adjustments could also be considered. One option would be to measure the difference between the adjusted life expectancy in 2021-22 and the projected trend-based life expectancy for that year, and then gradually reduce the differences to zero over the next few years.

In addition, a briefing from SA Health on the likely direction of the pandemic over the next few years, and its impacts on mortality, would probably be beneficial.

There is less need for high and low assumptions for mortality due to it being more forecastable than the other demographic processes. However, alternative scenarios could be created which consider alternative COVID trajectories over the next few years.

[14] Schöley et al. (2022) Life expectancy changes since COVID-19. *Nature Human Behaviour*. https://doi.org/10.1038/s41562-022-01450-3
[15] ABS (2022) Provisional Mortality Statistics. Jan - Sep 2022. https://www.abs.gov.au/statistics/health/causes-death/provisional-mortality-statistics/latest-release
[16] In ABS (2022) National, State & Territory Population. https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/jun-2022

5. Overseas migration

5.1. Net overseas migration

The trend in South Australia's net overseas migration (NOM) from 1971 to 2022 is shown in Figure 5.1. The blue bars show the published NOM values for each financial year while the red outline bars show adjusted NOM between 2001 and 2021. This adjusted NOM was calculated by modifying published interstate and overseas migration estimates for five-year intercensal periods to match residual total net migration for the period. Residual total net migration is the population growth remaining after taking into account natural change. The method is based on the assumption that census year ERPs and intercensal natural change are correctly estimated, an assumption which is unlikely to hold perfectly. It is stressed that the adjusted NOM values are not necessarily more accurate than published NOM figures, they are just consistent with natural change, adjusted NIM and population growth measured by ERPs.

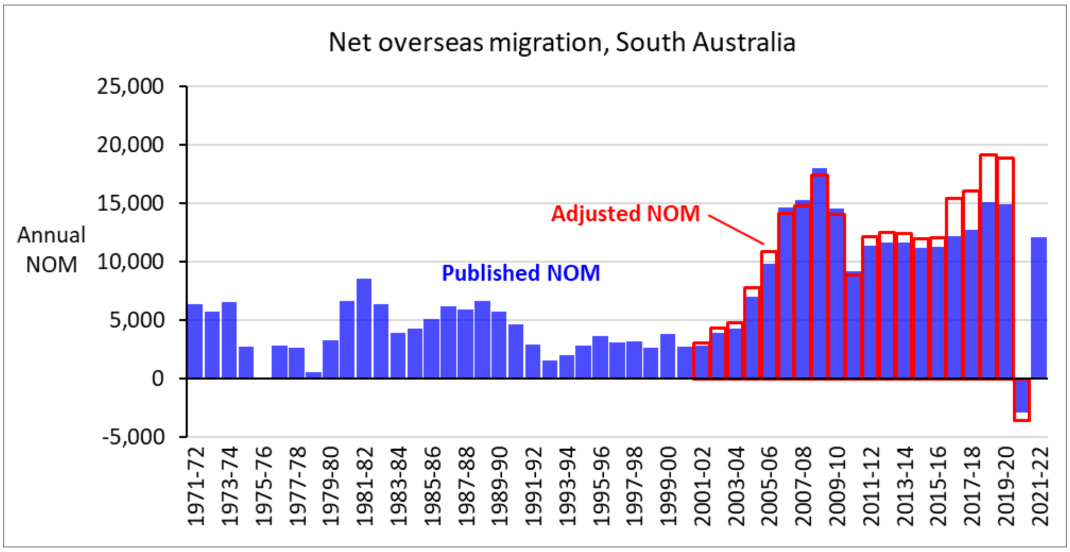


Figure 5.1: Net overseas migration, South Australia, 1971-2022
Source: ABS overseas migration data (published); calculated using iterative proportional fitting from ABS migration, births, deaths and ERP data (adjusted)

As a result of an upward revision to the State's ERP in 2021 following the 2021 Census, the adjusted NOM is notably higher than published NOM for most years in the 2016-21 period. The exception is 2020-21 when the Australian border was shut and large numbers of temporary migrants returned to their countries of origin. Emigration exceeded immigration, resulting in negative NOM. Over the 2006-19 high migration period, NOM averaged 12,986 per year (published data) or 13,920 (adjusted data).

Another way of examining NOM trends is to calculate South Australia's share of national NOM. Figure 5.2 presents both published and adjusted NOM percentages. Adjusted NOM percentages make use of residual national NOM in the denominator. The adjusted percentages are similar for 2001-16 but noticeably higher over 2016-21 reflecting the higher NOM numbers for this period (Figure 5.1). The average annual published NOM percentage over 2006-19 is 5.7% but 6.3% for the adjusted migration data.

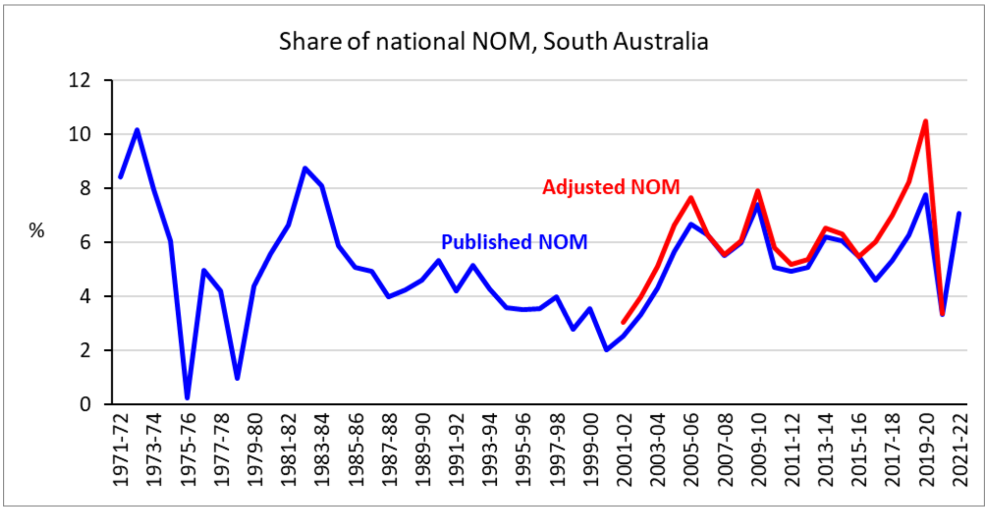


Figure 5.2: Share of national net overseas migration, South Australia, 1971-2022

Source: ABS overseas migration data (published); calculated using iterative proportional fitting from ABS migration, births, deaths and ERP data (adjusted)

In analysing overseas migration trends, it is useful to consider net overseas migration as the total of various component migration flows – net permanent migration, net temporary migration, New Zealand citizens, and Australian citizens. Much of the year-to-year fluctuation in NOM is due to temporary migration, especially international student migration. Figure 5.3 illustrates South Australia’s annual NOM by broad visa/citizenship category over recent years. Net permanent migration is indicated by the black line. Net temporary migration is shown by the red line, with the subset of that group comprising international students shown by the dashed red line. The green line shows the NOM of Australian citizens.

The rise in the State’s NOM in the mid-2000s (Figures 5.1 and 5.3) followed the national trend of increasing NOM due to more temporary migrants, especially international students, and an increase in the Migration Program intake. Over the last few years, international migration trends have been hugely disrupted. Although there was marked drop in net permanent migration during the period of the national border closure and COVID restrictions, and also a rare net gain in Australian citizens, the drop in temporary migration was far more dramatic. This caused overall NOM to become negative. The recent recovery in 2021-22 was also stronger for temporary migration, with international students contributing most of the recovery.

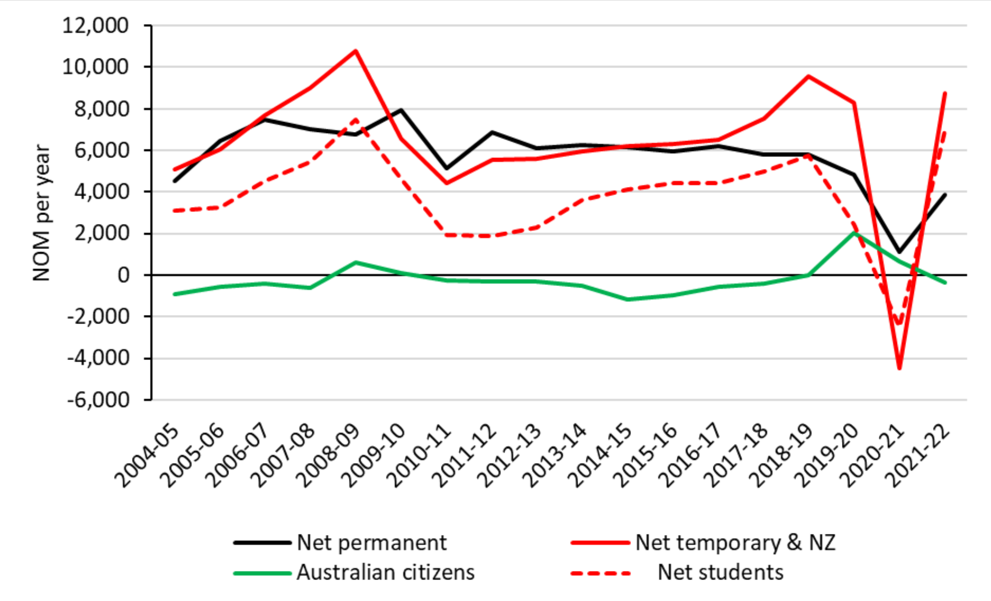


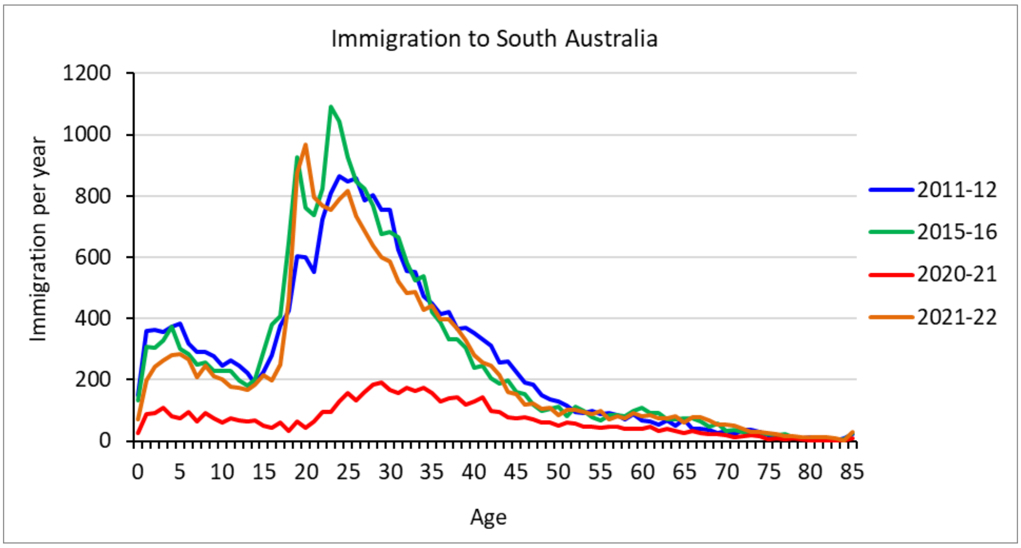
Figure 5.3: South Australian published NOM by broad category, 2004-05 to 2021-22

Source: ABS overseas migration

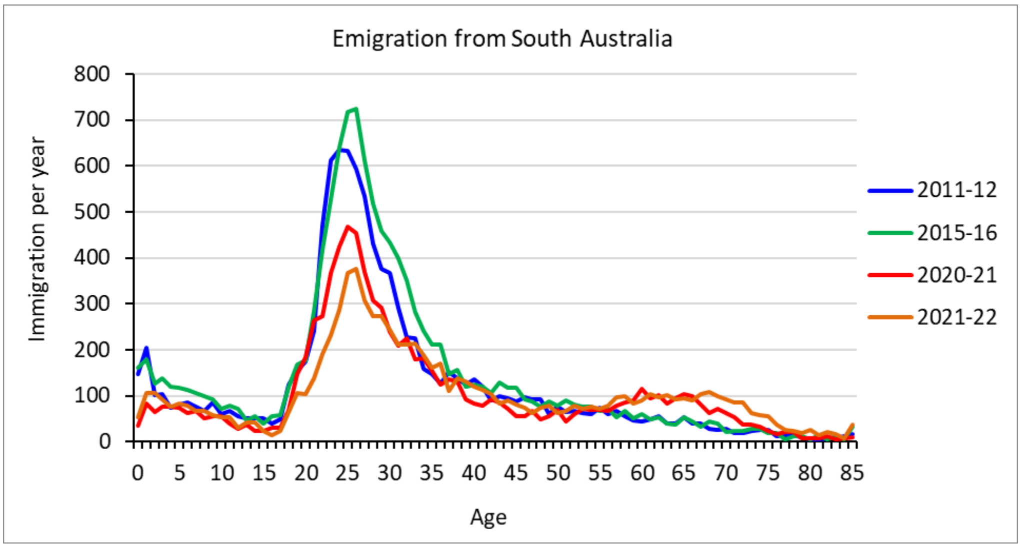
5.2. Overseas migration age profiles

The age profile of immigration to South Australia, as recorded by ABS Overseas Migration Arrivals, is shown in Figure 5.4(a). The graphs show data for persons and not males and females separately because there is mostly little difference by sex. The immigration age profiles for 2011-12 and 2015-16 represent 'normal' patterns of immigration, while those for 2020-21 and 2021-22 are unusual. Immigration in 2020-21 occurred during the period when the international border was closed due to COVID. Perhaps the only remarkable feature of immigration in this year was how high it was given the border closure. In 2021-22 immigration recovered strongly, with the peak at the student ages in the late teens and early 20s being higher than the labour market peak in the mid-20s. This is due to the dominance of international student migration in this year.

The age profile of emigration from South Australia, as recorded by ABS Overseas Migration Departures, is shown in Figure 5.4(b). As with immigration, the emigration profiles for 2011-12 and 2015-16 represent 'normal' patterns of emigration, while the two most recent years shown are unusual. Emigration in 2019-20 and 2020-21 was dominated by temporary migrants. In 2021-22 the amount of emigration remained low even though immigration experienced a strong recovery. This is probably due to the relatively small stock of temporary migrants currently in Australia; when current temporary migrant arrivals finish university courses and work contracts, emigration is likely to increase. In both 2020-21 and 2021-22 there was noticeably more emigration in the older ages – some were possibly visitors trapped in Australia for longer than anticipated during the border closures.



(a) Immigration flows



(b) Emigration flows

Figure 5.4: Overseas migration to and from South Australia recorded by the ABS
Source: ABS overseas migration

5.3. NOM assumptions

Net overseas migration is notoriously difficult to predict, even over the short-term. It is affected by, amongst other factors,

- the size of the annual Migration Program announced each year
- the annual Humanitarian Program
- the proportion of permanent visas issued onshore to people who have already migrated to Australia
- demand for temporary workers, including working holiday makers
- the international student market.

All these influences on migration are themselves affected by the state of the Australian and global economies, policy related to international students (including work rights after graduation and routes to permanent residence), public opinion on migration, the competitiveness of Australian higher education, and so on.

Given the current Australian Government's pro-immigration stance, it seems likely that over the next few years NOM will remain high and roughly comparable to the years immediately prior to the COVID pandemic. This stance is especially evident by the increase in the 2022-23 Migration Program planning level from 160,000 to 195,000[17]. The NOM of assumption of 235,000 per year assumed by the Australian Government's Centre for Population in their projections[18] could be interpreted as high levels of migration being viewed as desirable by the government. The extent to which this translates to higher NOM is difficult to predict because of the approximate relationship between NOM and Migration Program planning levels, as shown in Figure 5.5. The number of visas issued sometimes falls short, and sometimes exceeds, the planning levels. NOM is also influenced by the proportion of onshore permanent visa grants, emigration, temporary migration flows, and the Humanitarian Program.

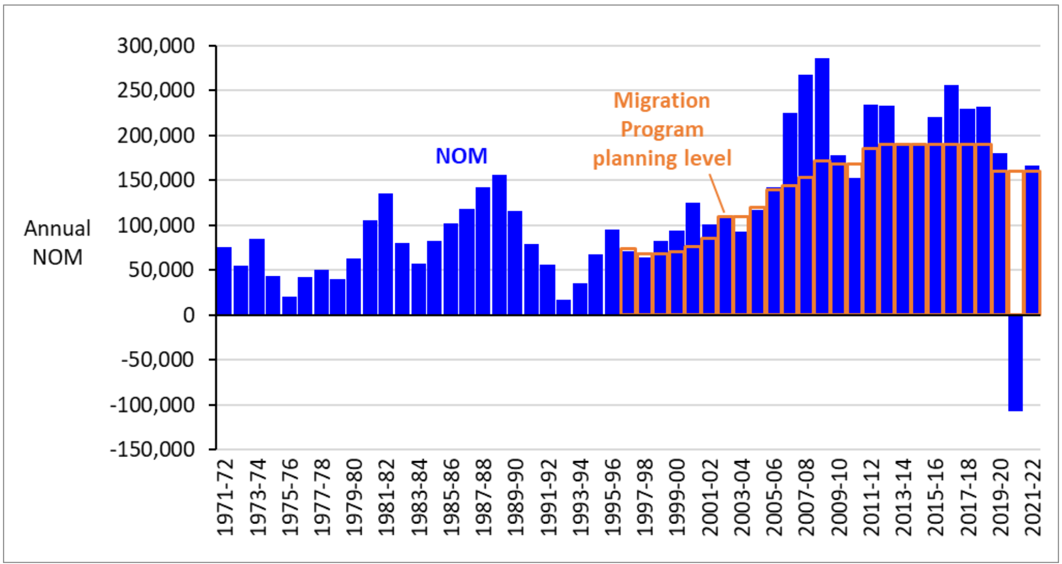


Figure 5.5: The relationship between adjusted NOM and the Migration Program planning levels, Australia

Source: as for Figure 5.1 (adjusted NOM); Department of Home Affairs (Migration Program planning levels)

Note: NOM shown here is adjusted NOM

[17] https://minister.homeaffairs.gov.au/ClareONeil/Pages/australias-migration-future.aspx

[18] Centre for Population (2021). 2021 Population Statement. https://population.gov.au/publications/statements/2021-population-statement

For the purposes of preparing projection assumptions, it would be sensible to include the published 2021-22 figure of 12,077 for South Australia and a higher NOM assumption for 2022-23. This is for two reasons.

(1) Although the association between NOM and the Migration Program Planning level is approximate, there is still a broad-brush relationship evident and it is useful to calculate the NOM which occurred when the planning level was set close to the 2022-23 level, which was 190,000 for all years 2012-13 and 2018-19. Over this period, annual average adjusted NOM was 221,395 nationally and 14,227 for South Australia. On average over the 1996-2019 period, NOM was about 1.2 times the Migration Program planning level.

(2) Australia is currently experiencing strong intakes, but low departures of, temporary migrants. These low emigration numbers are due to the relatively small stock of migrants and because there is a time lag between arrival and departure while temporary migrants undertake courses of study or are engaged in fixed-term employment.

One possibility for NOM assumptions is to assume about 250,000 nationally for 2022-23 with at least 6.4% of this (the average annual adjusted NOM share for 2012-19) allocated to South Australia. If the higher level of migration is expected for future years, annual NOM of around 15,000-18,000 could be kept constant. If the Migration Program planning level returns to 160,000 then perhaps a national NOM of 193,000 per year could be assumed with 6.4%, or 12,400, of this going to South Australia.

Given the volatility of NOM, high and low scenario assumptions which cover much of the range of NOM over the 2006-19 period are advised. These might be 3,000-4,000 above and below the main assumption.

In terms of overseas migration age profiles, it is recommended that migration profiles for the COVID-affected period are not used for projections. These are specific to a very unusual period of migration. An average of migration age profiles over several pre-COVID years is recommended to smooth out noise in the data.

6. Interstate migration

6.1. Net interstate migration

The future of interstate migration is subject to the greatest uncertainty among all the demographic components of change because (a) it fluctuates in response to economic and social conditions, and (b) it is not directly measured, but instead based on proxy data of changes of address which are notified to Medicare, plus some defence force data on movements. Figure 6.1 shows annual net interstate migration (NIM) for South Australia as published by the ABS (blue bars) and adjusted NIM, calculated as the remaining population change once natural change and adjusted NOM are accounted for. Adjusted NIM should not *necessarily* be regarded as more accurate than the published NIM. It is simply consistent with ERPs, births, deaths and adjusted NOM data.

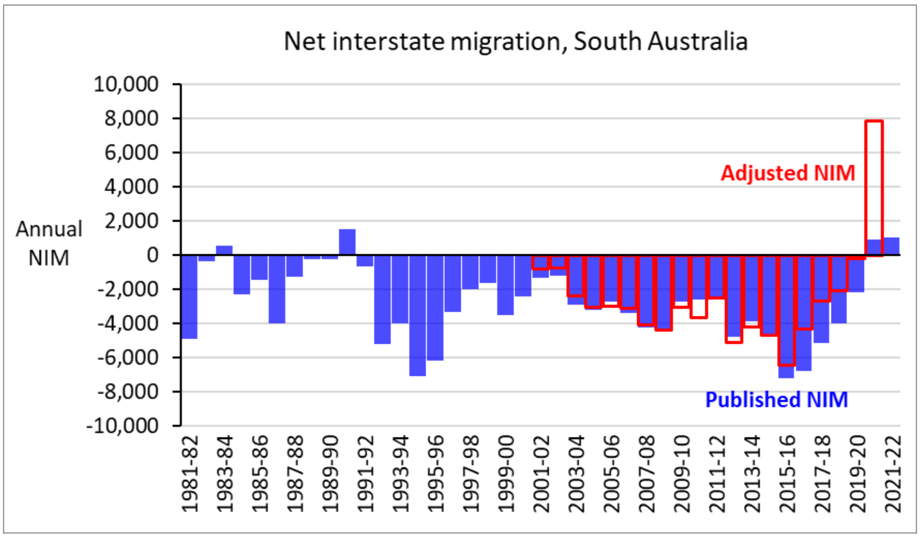


Figure 6.1: Net interstate migration, South Australia, 1981-2022
Source: ABS interstate migration data (published); calculated as a residual using adjusted NOM, births, deaths and ERP data (adjusted)

Differences with the published NIM statistics are clearly greatest for the 2016-21 period due to the upward revision of the 2021 ERP following the 2021 Census. The magnitude of these differences is concerning. There is a strong case for statisticians to investigate alternative data sources for measuring internal migration in Australia, including those derived from mobile devices and banking records.

Fortunately, the census can shed some light on the level of interstate migration in 2020-21, and other one year periods prior to each census. It is important to note that census migration data differs from the Medicare-based migration estimates in several ways: (1) it is conceptually different because migration is derived from counts of people with a different address at two points in time rather than counts of moves, (2) it excludes the migration of newly-born infants, (3) it excludes people who move but then leave the Australian population just before the census (through death or emigration), (4) it suffers a little from underenumeration (people missed by the census) and item non-response (people not answering the migration questions), and (5) the period it refers to is not a financial year, but the one year period prior to census night in early August 2021. Census-type migration data therefore tends to be a little lower than direct measures of the number of moves if they were available. However, its great strength lies in the fact that it is based directly from a question on usual address one year ago and is not based on proxy data. It therefore offers a useful comparison with the annual Medicare-based migration estimates. The census data can be easily adjusted for census undercount to be consistent with the ERP.

Figure 6.2 below compares the ABS annual migration estimates of NIM with ERP-consistent census NIM. For 2020-21, the ERP-consistent census NIM estimate is +5,679 compared to 895 from the Medicare-based migration estimates. It seems very likely that in the 2020-21 financial year South Australia experienced a sizeable net gain in population through interstate migration.

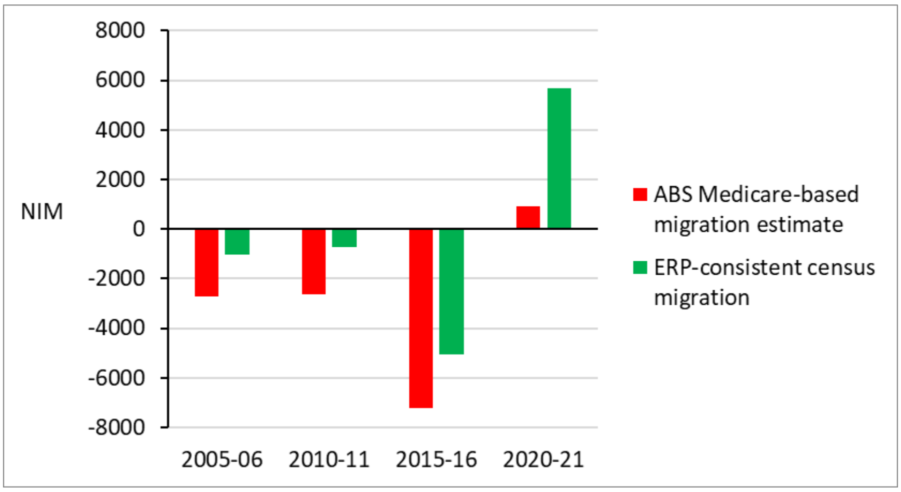


Figure 6.2: Net interstate migration, South Australia

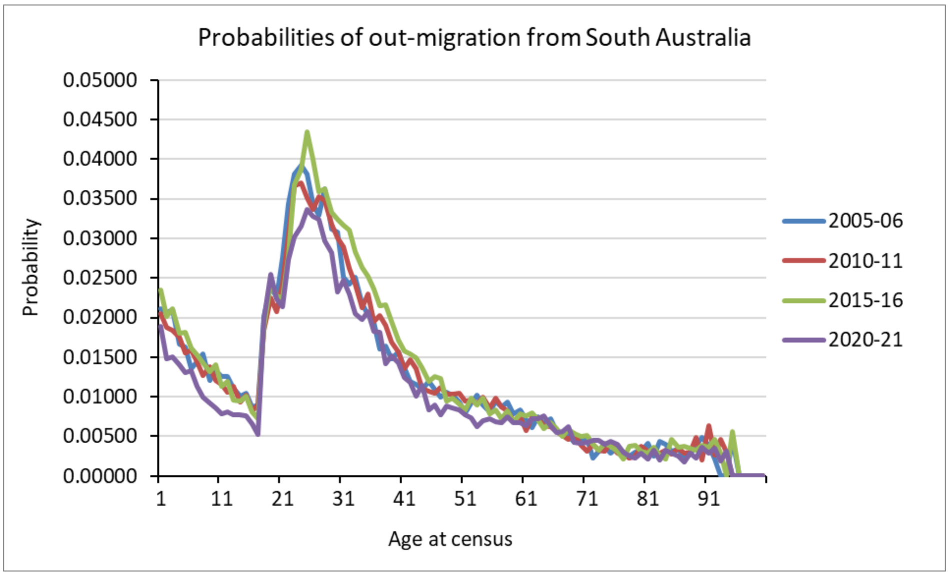
Source: ABS interstate migration estimates; ABS census data

Note: Medicare-based migration estimates are for financial years; census migration covers the one year period prior to the census in early August.

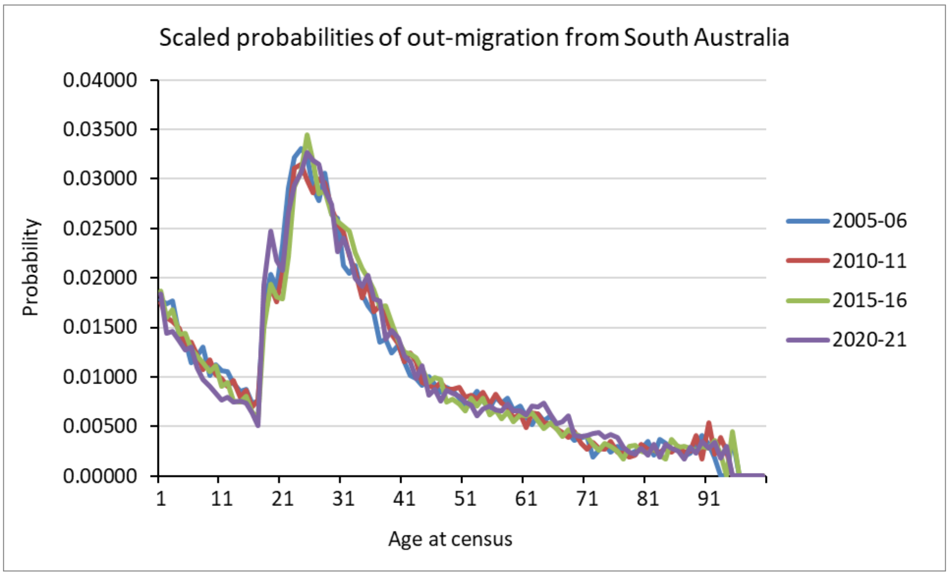
6.2. Interstate migration age profiles

The age profiles of migration are vitally important in creating accurate population projections. Census data provide the best data source for reliable migration age profiles. Figure 6.3 shows the probabilities of interstate out-migration from South Australia to other parts of Australia, calculated from census data. Part (a) shows out-migration probabilities, while part (b) shows probabilities scaled to sum to 1 across all ages so that the shape of the profiles can be compared. Part (a) indicates that the level of migration has shifted up and down a little over time, though part

(b) demonstrates remarkable continuity in the *shape* of the migration age profiles over time, with just minor differences evident in the 2020-21 age profile.



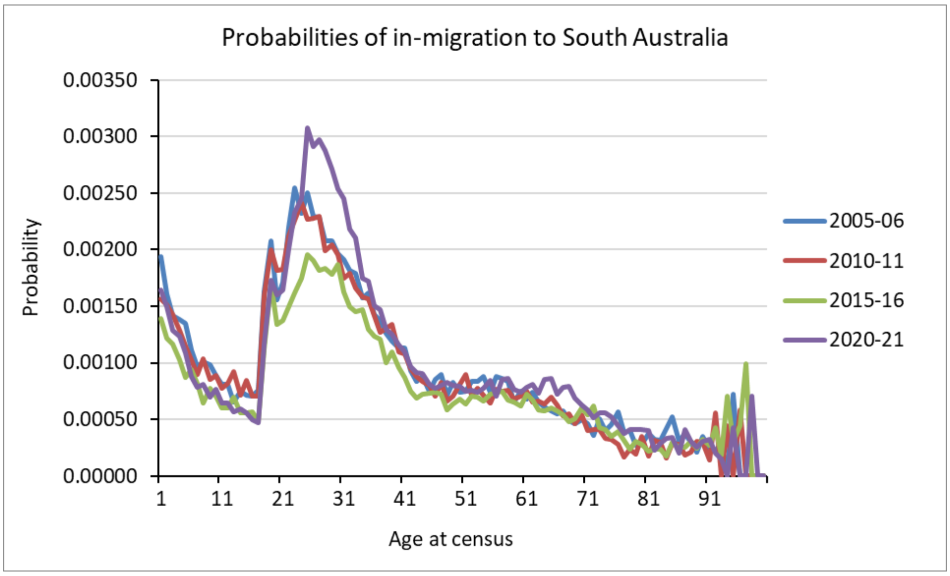
(a) Interstate out-migration probabilities



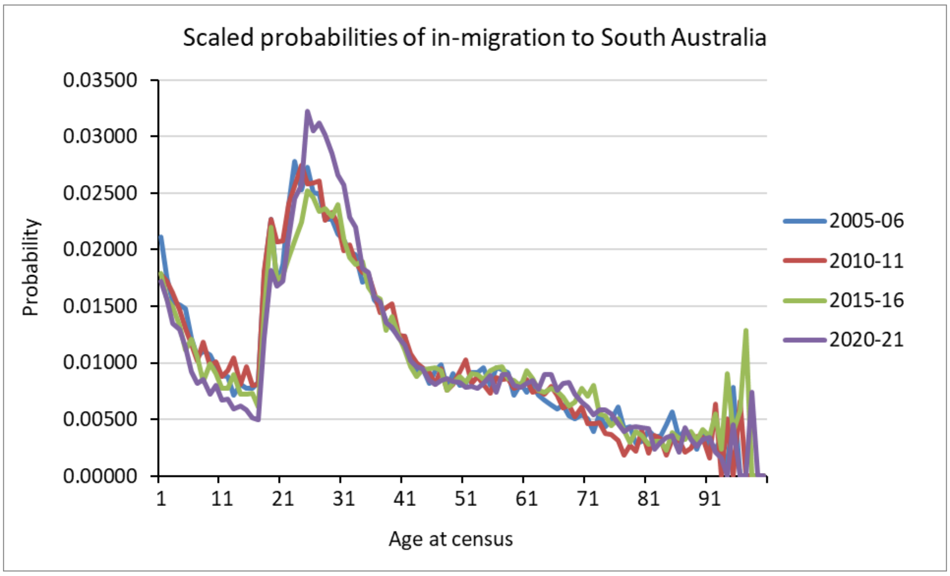
(b) Out-migration probabilities scaled to sum to 1 across all ages

Figure 6.3: Census-based interstate probabilities of out-migration from South Australia
Source: ABS census data

Figure 6.4 shows the equivalent probabilities of interstate *in*-migration to South Australia from other parts of Australia. The level of in-migration has varied more than out-migration (part a). But when the shapes of the age profiles are compared (part b), those for 2005-06, 2010-11 and 2015-16 are quite similar. The shape of the 2020-21 in-migration profile is different in the childhood and young adult ages, but this is not surprising given the unusual COVID-related circumstances at the time.



(a) Interstate in-migration probabilities



(b) In-migration probabilities scaled to sum to 1 across all ages

Figure 6.4: Census-based interstate probabilities of in-migration to South Australia
Source: ABS census data

6.3. NIM projection assumptions

Given the volatility of net interstate migration, the recent switch to positive NIM in South Australia associated with the COVID-related disruption to 'normal' migration patterns, and data quality problems, formulating projection assumptions for NIM is especially difficult. The annual average adjusted NIM from 2001-2019 was -3,346. Yet during the few years prior to COVID there was a strong upwards trend of diminishing net migration losses. One approach is to assume that 2020-21 was a unique period which adjusts back to some sort of 'normal' over the subsequent 2 to 3 years. But what sort of normal is plausible? A compromise between the average NIM of the last two decades and the recent trend of reduced net migration losses might involve an assumption somewhere in the range bounded by the long-run value (-3,346) and alternative estimates of NIM for 2021-22.

Given the uncertainty surrounding NIM, high and low scenario values which are considerably above and below the main assumption are advised, and probably on opposite sides of zero.

For the age profiles of interstate migration, it is recommended that the average of the 2010-11 and 2015-16 census migration age profiles be used. Using averages helps to smooth out some of the noise in the data. Along with overseas migration flows, these interstate migration age profiles will be subject to minor adjustments in the data preparation process to ensure that population change by cohort over recent intercensal periods matches population change as measured by the ERP.