NEW STATE AND REGIONAL POPULATION PROJECTIONS FOR NEW SOUTH WALES

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The New South Wales Department of Planning recently published state and regional population projections for 2006 to 2036. This paper provides an overview of the key projection results, the assumptions made and the model used. The projections put the state's population at 9.07 million by 2036, an increase of 33 per cent on the 2006 population of 6.82 million. Sydney statistical division is projected to capture three quarters of the state's population growth to 2036, increasing from 4.28 million residents in 2006 to 5.98 million by 2036. Nearly all of the remaining population increase in New South Wales is expected to occur in the other coastal regions.

INTRODUCTION

This paper presents an overview of the 2008 release state and regional population projections for New South Wales that were released in October by the New South Wales Minister for Planning. Projections have been produced for the state and 13 major regions for a projection horizon spanning 2006 to 2036. They suggest that:

- the state's population is projected to reach 9.07 million by 2036, an increase of a third on the 2006 Estimated Resident Population (ERP) of 6.82 million
- New South Wales is expected to grow at a slightly slower rate than the rest of Australia, thus reducing the state's share of the national population from 32.9 per cent in 2006 to 30.3 per cent in 2036
- population ageing will continue: the proportion of the population aged 65 years and over is projected to increase from 13.5 per cent in 2006 to 21.5 per cent by 2036
- Sydney is projected to attract about three quarters of the state's population growth and increase to 5.98 million residents by 2036
- most of the remaining quarter of the state's population increase is expected to occur in the other coastal regions.

These projections form the official set of New South Wales Government population projections. The Department of Planning is keen to stress that these figures are simply projections based on assumptions which may or may not eventuate. They are certainly not policy targets, neither should they be interpreted as precise forecasts.

The paper begins by giving a brief outline of the projection model used to prepare these new projections. Then follows a discussion of the various projection assumptions, including reasons for choosing considerably higher fertility and net overseas migration assumptions compared to the previous 2005 release projections.[1] In the subsequent section the new population projections are presented.

PROJECTION MODEL

The population projections were produced by the Department of Planning's multiregional cohort-component population projection model. This model projects the population of New South Wales as a whole and for the 13 regions shown in Figure 1. The regions are based on the 2006 Australian Standard Geographical Classification and consist of one or more statistical divisions or statistical subdivisions.

The model handles the population by sex and single year age groups from 0 to 120, moving forward in time in single year intervals. Migration is modelled as

migration events (described formally as the movement measure of migration) rather than by changes of address between points in time as captured by the census (the transition measure of migration). The model incorporates place-to-place moves, though it is subject to net migration constraints to ease assumption-setting. A summary of the projection model is given in the report *New South Wales State and Regional Population Projections, 2006–2036*;[2] a detailed technical paper setting out the equations of the model is also available on request.[3]

PROJECTION ASSUMPTIONS

Projection assumptions were first prepared for New South Wales as a whole and then for the 13 regions. Assumptions were formulated initially in terms of the total fertility rate (TFR), life expectancy at birth, net interstate migration, net intra-state migration (between the 13 regions) and net overseas

Figure 1: New South Wales projection regions

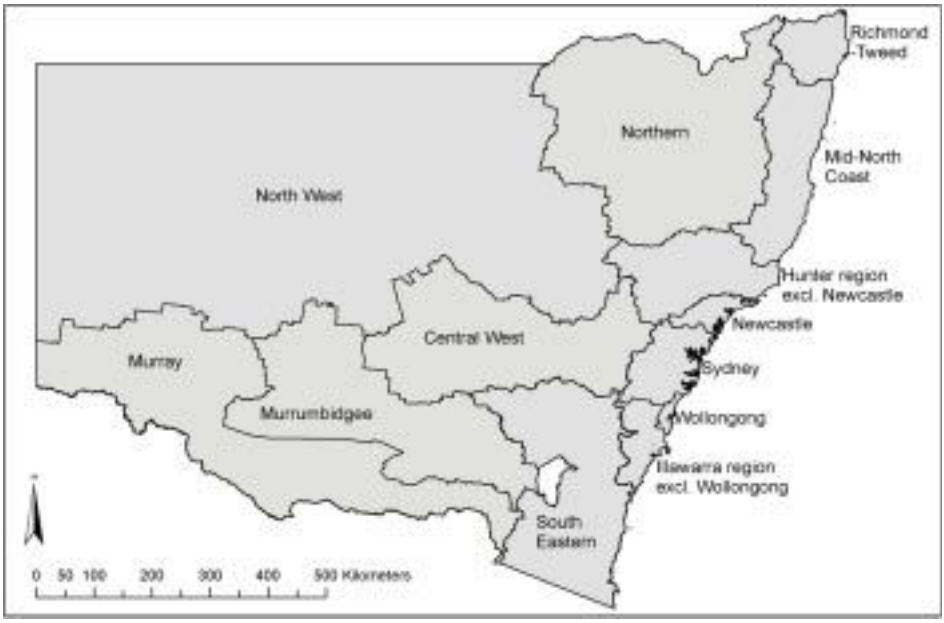


Table 1: Summary of New South Wales long-run[a] projection assumptions

Demographic indicator	Assumption
Total fertility rate	1.85
Life expectancy at birth, males	79.1 years in 2006-07 rising to 85.6 years by 2035–36
Life expectancy at birth, females	84.0 years in 2006-07 rising to 89.1 years by 2035–36
Net interstate migration	-20,000 per annum
Net overseas migration	+50,000 per annum

Note: [a] Assumptions for the total fertility rate, net interstate migration and net overseas migration are trended in to the long-run assumptions from recent observations over the first few years of the projections.

migration. These headline assumptions were expanded later to include directional migration flows and age- and sex-specific assumptions. The state-level headline assumptions were set in consultation with the Population Projections Group (PPG), a forum for discussion about the projections involving the Department of Planning and several other New South Wales Government agencies. These discussions are important because the Department of Planning's projections are used on a whole-of-government basis. A summary of long-run state projection assumptions is given in Table 1.

Overseas migration

Net overseas migration is always a challenging assumption to prepare, but it was particularly difficult for this set of projections. Aside from the difficulty of projecting a variable that fluctuates so much from year to year, there were two additional challenges on this occasion. First, the Australian Bureau of Statistics (ABS) introduced a new method of measuring net overseas migration in 2006, resulting in a break with historical data. For New South Wales the new method appears to have increased the net overseas migration figures substantially. Second, even accounting for the change in method, net overseas migration in recent years has departed significantly from long-run trends, reaching historically high levels. Advice on the possible future trajectories of net overseas migration was sought from the Australian National University (ANU), and the report[4] provided provoked a lively discussion at PPG meetings. The eventual decision was to assume a long-run level of 50,000 per annum for net overseas migration to New South Wales, an assumption at the upper end of historical trends for the state, but not as high as that discussed in the ANU report.

The assumption of 50,000 per annum was chosen for several reasons. First, earlier in the year the Commonwealth Government announced a large increase in the number of places in the 2008–09 Migration Program compared with the previous year. Despite recent calls for cuts to next year's Migration Program in the wake of the global economic slowdown, there appears to be an underlying policy framework supportive of high immigration. Second, in the medium and longer term there will be changes to the state's (and Australia's) age structure. The number of people leaving the working age groups will rise in coming decades as the baby boomers shift into retirement. If net overseas migration were to continue at the average levels of the last few decades, growth in the labour-force-aged population would be much slower than in the past. Third, the ANU report argues that the long-run outlook for the Australian economy is positive. Factors such as a national infrastructure backlog, mining expansion, rising living standards, and expanding health care employment will continue to generate strong labour demand. These influences together suggest a sustained period of long-term high net overseas migration.

Regional net overseas migration assumptions were formulated on the basis of census immigration data and judgement.

Fertility

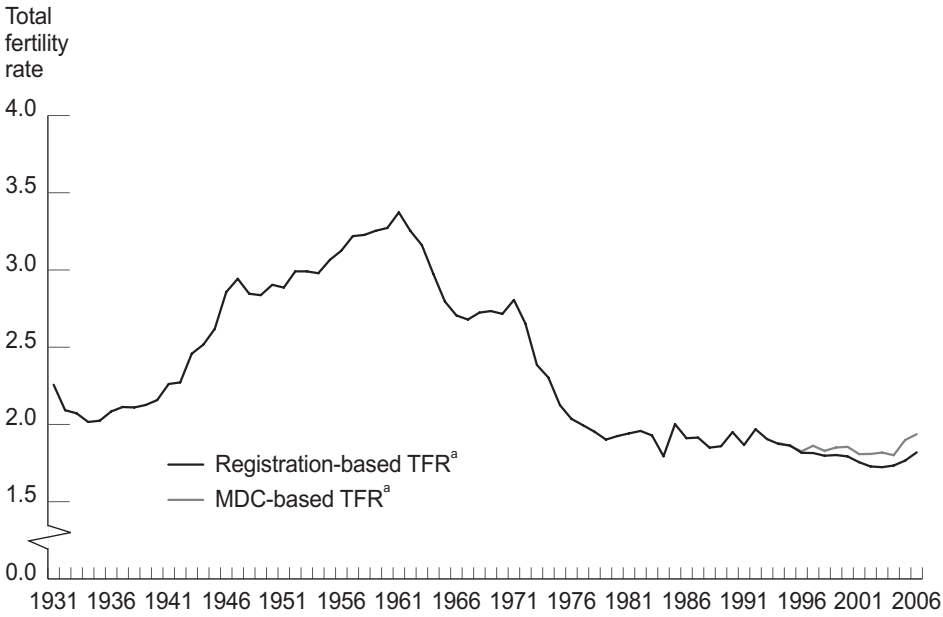
The state-level TFR assumption was informed by fertility data from both the standard birth registration statistics (as published by the ABS) and the New South Wales Midwives Data Collection (MDC). The MDC is administered by NSW Health and contains details of both hospital and home births occurring in New South Wales from 1994 onwards. Counts of births to mothers usually resident in NSW (required to be conceptually consistent with the ERP) can be found by subtracting births to mothers usually resident interstate which take place in NSW, and adding in births

to NSW resident mothers which occur interstate.

The reason the MDC data were consulted is due to the apparent non-registration of a significant minority of births. Worryingly, the divergence between the number of births in the registration system and the number recorded by the MDC has been widening over the last decade. In 2006, for example, the number of MDC births (adjusted for mothers' usual residence) exceeded the number of registrations by 5,700 (or 6.5 per cent). The MDC birth counts are probably the more accurate data source for two reasons. First, births are notified to NSW Health as a matter of course by doctors or midwives attending a birth. In contrast, birth registration requires a parent to make a particular effort to do so. Second, births in the MDC are carefully audited by NSW Health to remove duplication.

Figure 2 shows how fertility in NSW has varied over the period 1931 to 2006. Note how, based on the MDC data, some of the fertility decline of the 1990s and early 2000s disappears. In light of this revised picture of recent fertility trends a long-run TFR of 1.85 for NSW was assumed for these projections. This was also based on several other factors. It is believed that the state (and Australian) economy will remain fundamentally robust, despite some downturn in the global economy. In addition, progress in enabling both members of a couple to combine work with raising children is expected to continue. And finally, at some point the shift of childbearing to older ages will reach biological limits bringing cohort and period

Figure 2: The total fertility rate of New South Wales, 1931 to 2006



Note: [a] The registration-based TFR is the official TFR for NSW published by the ABS based on birth registrations (prior to 1971 annual TFR figures for NSW are not available so the graphed data are approximate estimates based on adjustments to the Australian TFR); the MDC-based TFR is based on births data from the Midwives Data Collection supplied courtesy of NSW Health (available from 1994 onwards).

closer together, probably resulting in the TFR increasing slightly.

Regional TFR assumptions were prepared by maintaining the regional/state ratios observed over the last five years.

Mortality

Mortality projections were prepared by extrapolating historical time series of age-specific mortality rates. Four steps were involved. First, mortality rates were calculated by sex and age groups 0, 1–4, 5–9, 10–14, . . . , 80–84 and 85–89 for the period 1975–76 to 2005–06.

Second, to each age-sex-specific time series of rates was fitted an exponential curve of the form:

mortality rate (y) = a e^{-by}

where y denotes year, e is the constant 2.71828 etc. and a and b are parameters to be estimated. These curves were found to provide good fits to historical data (except for ages 30–34 and 35–39 because the trends for these age groups have been erratic).

Third, mortality rate projections were produced by extrapolating these curves out to 2036. Mortality rate projections for age groups 30–34 and 35–39 were created by interpolating between projections for adjacent age groups. It is interesting to note that Ediev[5] supports simple extrapolative approaches such as this for mortality projection, rather than the more statistically complex methods such as Lee-Carter.

Fourth, life expectancy at birth projections were obtained by calculating life tables from the projected age-specific mortality rates. NSW life expectancy at birth by 2035–36 is expected to reach 85.6 years for males and 89.1 years for females, up from 79.1 years and 84.0 years respectively in 2006–07. These projections indicate a very gradual slowdown in annual life expectancy increases over time.

Regional mortality was projected using state age-specific mortality rates scaled up or down using standardised mortality ratios, calculated from the most recent five years' worth of data.

Internal migration

Although the projection model uses directional interstate and intra-state migration flows, internal migration assumptions were first specified as annual net totals. For New South Wales as a whole, data for the previous 35 years show that net interstate migration has fluctuated between about

-10,000 and -20,000 per annum for most years, albeit with periodic interruptions of much larger outflows. Since 2001, however, net interstate migration from New South Wales has exceeded -25,000 per annum, probably due to economic factors. For the current projections a long-run net interstate migration value of -20,000 per annum has been set, trended in over several years from recent values.

For the 13 regions migration assumptions were first of all prepared for combined net migration (net overseas plus net interstate plus net intra-state migration). These assumptions were based on a combination of past trends, consultations with local government on future economic and housing developments and consultations with the Department of Planning's regional offices. Combined net migration was then split into the three migration types largely on the basis of recent census migration data.

NEW POPULATION PROJECTIONS

Population projections: New South Wales

The state's population is expected to grow from 6.82 million in 2006 to 9.07 million by 2036, an increase of 2.25 million or 33 per cent. Annual average increases in population are expected to vary between 72,000 and 77,000 over the 2006 to 2036 projection horizon.

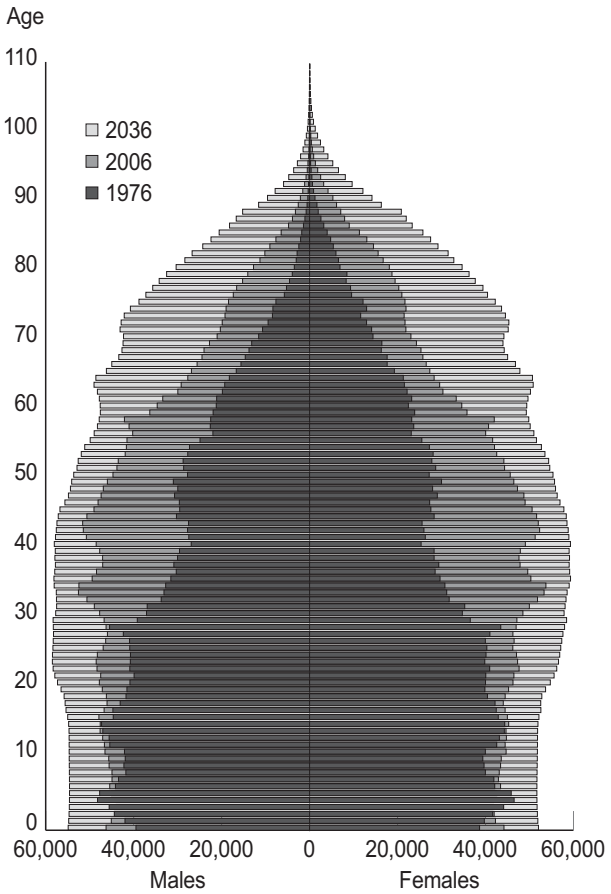
Three-fifths of the growth to 2036 is projected to be driven by natural increase, with the remaining two-fifths of growth coming from net migration gains. The large contribution from natural increase is due to a healthy fertility rate and a relatively large population in the childbearing ages, which overseas migration plays a part in maintaining. It is also the result of net migration overall being set at only +30,000 per year, as high net overseas migration gains are offset to some extent by net interstate migration losses.

In common with other parts of the western world, the population of New South Wales will continue to age in coming decades. Figure 3 shows the age-sex profile of the population in 1976, 2006 and its projected profile in 2036. While all age groups are projected to increase in size, proportionally the greatest increases will occur in the elderly ages. The population aged 65 and over is expected to increase by about one million, or 111 per cent, over the period, rising from 0.92 million in 2006 to 1.95 million by 2036. Members of the baby boom generation will play a major role in the growth of this segment of the population; they will be celebrating their 65th birthdays between 2012 and 2030.

As a proportion of the total population, the 65 and over age group will increase its share from 13.5 per cent in 2006 to 21.5 per cent by 2036. While this is a significant shift in age composition, compared to the populations of other parts of the western world it will remain a relatively low proportion. Projections prepared by the United Nations Population Division suggest that, for more developed regions as a whole, this age group will comprise 23.9 per cent of the population by this time.[6]

Ageing will also occur within the 65 and over population. Figure 4 shows the projected numbers and annual growth of the population aged 85 years and over-an age group particularly important in policy

Figure 3: The age-sex profile of the New South Wales population in 1976, 2006, and 2036 (projected)



Source: 1976 and 2006 data—Australian Bureau of Statistics; 2036 projections—Department of Planning.

terms because of its specific housing and health care needs. From a total of 111,000 in 2006 this age group is projected to grow to 353,000 by 2036.

Population projections: regional scale

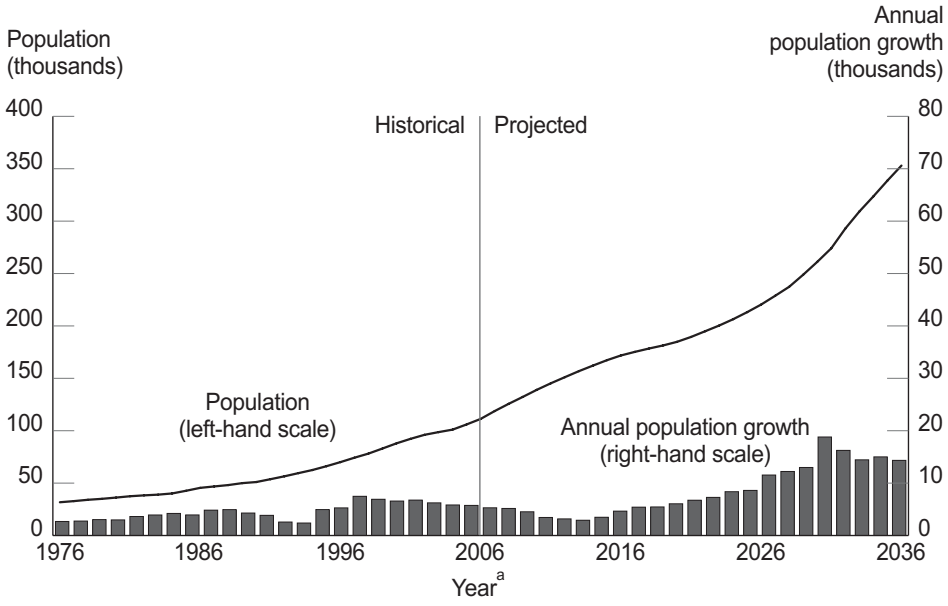
Table 2 presents a summary of the regional population projections, along with approximate estimates of past populations. As might be expected, the majority of the state's population increase between 2006 and 2036 is projected to occur in Sydney (76 per cent of all growth, higher than its 2006 population share of 63 per cent). Nearly all of the remaining 24 per cent of growth is expected to occur in the other coastal regions. In terms of percentage change between 2006 and 2036 those regions projected to grow more than the state as a whole (33 per cent) are: Sydney (40 per cent), Illawarra region excluding Wollongong (39 per cent), South Eastern (38 per cent) and Richmond–Tweed (37 per cent).

Projected changes in regional age-sex profiles vary considerably across the state. Four examples are shown in Figure 5. Sydney maintains a distinct age profile from all other regions due to substantial net migration gains in the younger adult ages and net migration losses in the older adult ages. As a result Sydney's population will remain the youngest of all the regions.

The age profiles of Newcastle and Wollongong are fairly similar and are projected to grow to roughly even numbers of people in most age groups, with the exception of slight indentations at the young adult ages. These are due to net migration gains in the late teenage years and net migration losses in the early 20s, probably education-related.

Typical of coastal non-metropolitan regions is the Mid-North Coast. This region's age profile is shaped by significant

Figure 4: The past and projected population of New South Wales aged 85 and over, 1976 to 2036



Source: Historical data—Australian Bureau of Statistics; projections—Department of Planning.

Note: [a] For population numbers (left-hand scale) 'Year' refers to the 30th June of each year; for annual population growth (right-hand scale), it denotes the 12 month period ending 30th June of the year shown.

net out-migration in the young adult ages for employment and education reasons, and large net migration gains in the retirement ages. Along with the Illawarra region excluding Wollongong, the Mid-North Coast is projected to have 34 per cent of its population in the 65 and over age group by 2036, the highest percentage of all regions in the state.

The age profiles of many inland regions, such as the Central West, are shaped by significant net out-migration at the young adult ages and modest net gains or net losses at other ages. Over time natural increase diminishes considerably as the population of childbearing age declines and the elderly population grows.

The relative importance of natural increase and net migration in driving population change varies enormously between regions. Most of Sydney's projected population growth over the 2006 to 2036 period will be due to natural increase (69 per cent) with the remaining 31 per cent coming from net migration. The young age structure of the population (Figure 5) will help maintain the dominance of natural increase. Over the whole 2006 to 2036 period natural increase is also the main contributor to population growth in Wollongong (63 per cent) and Murray (69 per cent), and the only contributor to population growth in the Central West and Murrumbidgee due to net migration losses. In the non-metropolitan coastal regions growth will be driven largely by net migration gains. Natural increase in these regions will be limited or negative, largely due to the age structure of these populations.

Table 2: NSW regional population estimates, 1976 to 2006, and projections, 2016 to 2036

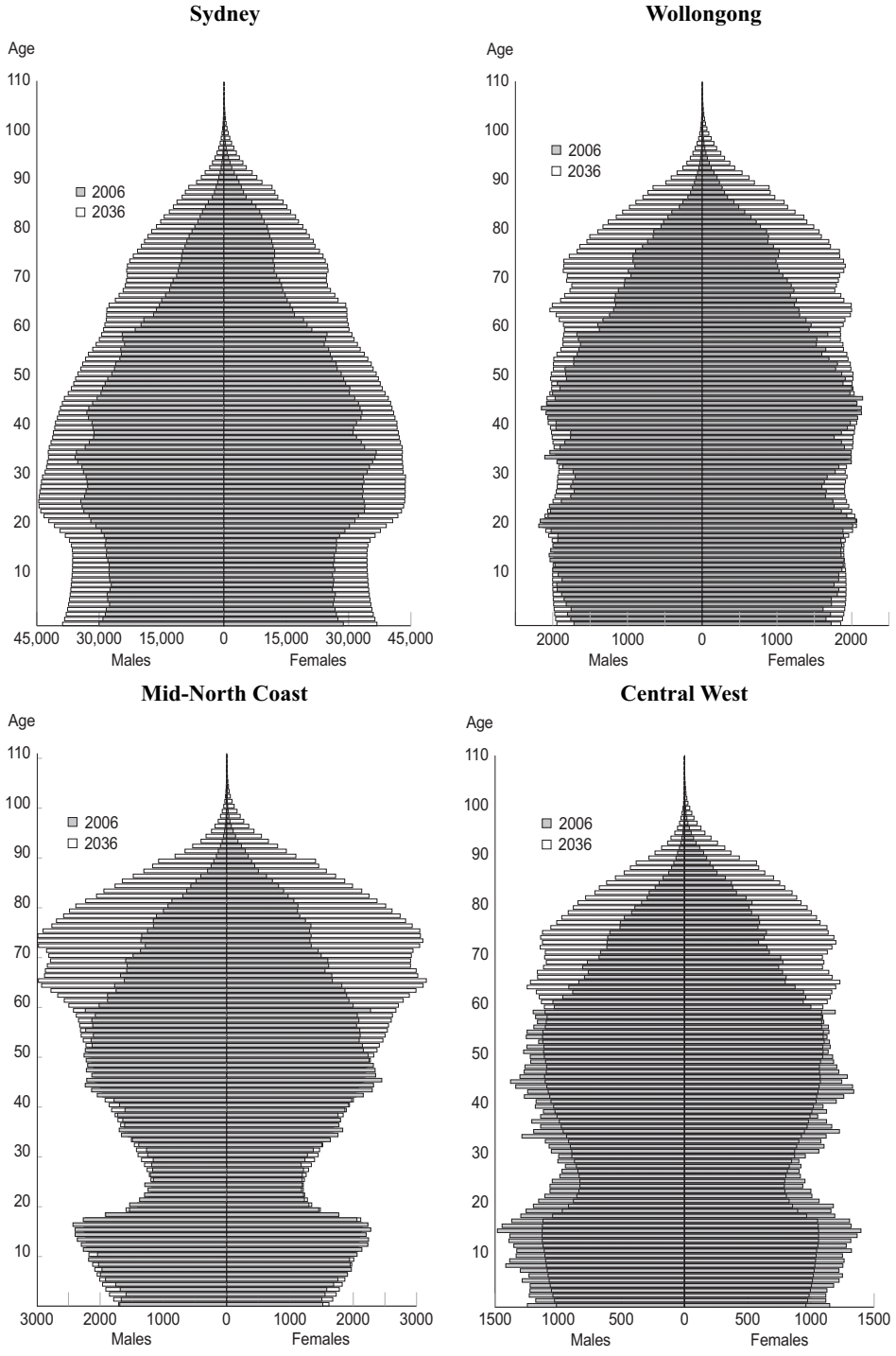
Region	1976[a]	1986[a]	1996[a]	2006	2016	2026	2036	2006–36 change[b]
	Estimates				Projections			
	'000	'000	'000	'000	'000	'000	'000	'000
Sydney	3,144	3,472	3,881	4,282	4,822	5,395	5,982	1,700
Newcastle	381	417	463	518	573	627	676	158
Hunter excl. Newcastle	60	77	91	100	110	120	128	28
Wollongong	222	233	256	278	300	320	339	61
Illawarra excl. Wollongong	61	86	117	137	156	174	190	53
Richmond-Tweed	109	152	201	230	260	289	316	85
Mid-North Coast	144	207	262	297	331	362	387	90
Northern	175	182	179	180	179	175	168	-12
North West	136	140	143	139	135	130	123	-16
Central West	162	165	173	179	182	184	183	5
South Eastern	131	153	179	207	235	262	287	80
Murrumbidgee	140	144	149	154	159	163	165	11
Murray	95	105	111	115	120	122	121	6
New South Wales	4,960	5,532	6,205	6,816	7,560	8,323	9,066	2,250

Source: estimates—Australian Bureau of Statistics; projections—Department of Planning.

Notes: [a] Population estimates for these years are approximate for some regions due to boundary changes.

[b] May not be the exact difference between the 2036 and 2006 populations in the table due to rounding.

Figure 5: The age-sex profile of selected regional populations in 2006 and 2036 (projected)



Source: 2006 data—Australian Bureau of Statistics; 2036 projections—Department of Planning.

Comparison with the new ABS projections

In September 2008 the ABS released a new set of population projections for Australia, and the states and territories, including a capital city/balance of state breakdown.7 The ABS Series B projections of the total population for New South Wales and Sydney are remarkably close to the Department of Planning's new projections. By 2036 the ABS projects a total population of 9.09 million for New South Wales (compared to 9.07 million according to the Department of Planning). For Sydney, the ABS projects a population of 5.98 million by 2036 (the same as the Department of Planning).

However, differences between the two sets of projections become apparent when projections by broad age group are examined. The population aged 0–17 is lower in the ABS projections due to lower assumed fertility (the New South Wales TFR is assumed to fall gradually to 1.73 by 2020–21). The ABS projects marginally more people aged 18–39, probably due to slightly higher assumed net overseas migration (56,700 per year), whilst the numbers aged 40–64, 65–84 and 85 and over are almost identical to the Department of Planning projections until the mid-2020s.

CONCLUSIONS

Like other states and territories, New South Wales will experience significant population growth in coming decades, albeit with gently declining growth rates. Growth is expected to slow as a result of population ageing. Although life expectancy is projected to rise, the number of deaths will increase as the elderly population grows substantially. Growth in the annual number of deaths will exceed that of births, and natural increase will decline slightly. These changes form part of Australia's continued demographic transition to lower mortality and, what now appears to be the case, high net overseas migration and just below-replacement fertility. The projections also indicate that the decades-old gradual shift of the state's population geography towards the coast in general, and Sydney in particular, is set to continue.

The changing size, age composition, and spatial distribution of the state's population over the next 30 years clearly presents a multitude of challenges for planners and policy-makers. But it is important not to overstate the demographically-generated challenges which lie ahead. In many ways the demography of New South Wales (and Australia generally) is more favourable than in other parts of the western world (especially southern Europe and the former Soviet-bloc countries). Our fertility rates are relatively healthy, life expectancy is amongst the highest in the world and high overseas migration will ensure a soft landing in the coming slowdown in the labour-force-age-group growth rate, plus a steady supply of new talent to the labour force.

Population projections contribute just one part of the complete set of information required for successful social and economic planning, albeit a very important part. Whilst projections will never be able to provide precise predictions of future population, they provide a broad indication of how the state's demographic landscape is shifting. By providing such information, government, business and the community can put in place long-term plans for infrastructure, services and policies for the future economic and social development of New South Wales.

Note

The author writes in a personal capacity. Any views expressed in this paper are not necessarily those of the New South Wales Department of Planning.

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