Journal of Population Ageing
https://doi.org/10.1007/s12062-020-09319-x

Projections of Older European Migrant Populations in Australia, 2016–56

Tom Wilson[1] · Jeromey Temple[1] · Bianca Brijnath[2] · Peter McDonald[1] · Ariane Utomo[3]

Received: 1 June 2020 / Accepted: 24 November 2020/Published online: 19 January 2021

Abstract
Many of the European migrant populations which settled in Australia in the three decades after World War Two are now much older, and their aged care and health care needs are changing. While there is a considerable literature on *individual* aspects of ageing in many migrant groups (particularly as it pertains to culturally appropriate aged care), little research attention has been given to *population* aspects of ageing and its implications. The aim of this paper is to address this lacuna by presenting projections of Australia's Europe-born older migrant population from 2016 to 2056. The population projections were created by a cohort-component model modified to accommodate multiple birthplace populations. Findings show the older Europe-born population is projected to experience a slight increase over the next few years, reach a peak of just under one million in the early 2030s, and then undergo a gradual decline thereafter. The Europe-born share of Australia's 65+ population will fall, from 25.5% in 2016 to 10% by 2056. Populations born in Western and Southern Europe are likely to decline throughout the projection horizon while, the Northern Europe-born and Ireland-born older populations are projected to grow continually. The populations born in the UK and South Eastern Europe initially grow before decline sets in. To a large extent the future population size of these older migrant groups will be the result of cohort flow. We discuss the implications of the coming demographic changes for government policy and culturally appropriate service provision.

Keywords Migrant populations · Australia · Europe-born · Population projections · Population ageing

✉ Tom Wilson
wilson.t1@unimelb.edu.au

Extended author information available on the last page of the article

Introduction

European immigration has long played a fundamental role in the growth and development of Australia's population. In the early colonial days almost all immigration came from the UK (Jupp 1995, 2002). Non-European migrants were viewed as undesirable, and from 1901 immigration legislation – informally the 'White Australia policy' – prohibited entry to anyone who was not European, with the strong preference being for UK migrants (McDonald 2019). In the immediate post-war years, the government launched a population growth strategy to rapidly increase Australia's population for the purposes of defence and nation building, aiming for 1% population growth per year from European immigration (Department of Immigration and Border Protection 2017). The first Minister for Immigration, Arthur Calwell, stated that Australia must "populate or perish"! In 1945 the government began sponsoring migrants from the UK (the 'ten pound Poms'), and in the late 1940s and early 1950s created similar schemes for those from many other European countries. Between 1947 and 1954, the Australian government also assisted about 170,000 people from continental Europe displaced by war to migrate to Australia (York 2003).

With the dismantling of the racist White Australia policy in the late 1960s and early 1970s, the origins of Australia's immigration intake broadened, and later increased in volume following the introduction of new temporary migration visas in the 1990s (Hugo 2014). But immigration from Europe did not disappear, remaining an important part of Australia's total immigration intake (Raymer et al. 2018). According to the 2016 Census, 15% of those who migrated to Australia over the 2011–16 period were born in Europe. However, populations from some countries in Europe experienced relatively little migration to Australia after the 1960s (e.g. Germans and Dutch), whilst migration flows from other parts of the continent remained strong (e.g. Ireland). Levels of emigration from Australia of the Europe-born also varied between country of birth populations and over time (Raymer et al. 2018). The result is a variety of population sizes and age structures amongst Australia's various European origin populations today.

Despite being such a high immigrant-receiving country, researchers and policy analysts have paid surprisingly little attention to the *future* of Australia's immigrant populations in recent years. Particularly, with the Europeans who moved to Australia during the era of mass European migration from the late 1940s to the 1960s now in later life, there have been scant demographic analyses and projections of *population ageing*. This is in strong contrast to the detailed gerontological studies examining aspects of *individual ageing*. For example, research has examined the association between migrant health and duration of residence, care and service needs and preferences of older migrants, mental health among older migrants, care practices, language reversion and dementia (Anikeeva et al. 2010; Brijnath et al. 2019; Kourbelis 2016; Minas et al. 2007; Rao et al. 2006; Rojas-Lizana and Cordella 2020; Stanaway et al. 2010; Tipping and Whiteside 2015). These studies have also considered numerous European source countries including, among others, Italy, Macedonia, Spain, UK, Malta, Greece and the Netherlands. Collectively, these studies highlight that cultural and linguistic diversity is very important in ageing and aged care. Diversity is about more than just access to multilingual staff and services; it also encompasses the prerequisite knowledge staff and services need to meet the care, cultural, nutritional, spiritual, and end of life needs of older migrants. All of these needs are influenced by culture, religion, health, socio-economic status and other demographic covariates. Without this information, the provision of equitable health and aged care is very difficult.

In contrast to the gerontological evidence base on individual ageing, there is a lacuna of evidence on the future size and population ageing of Australia's migrant populations. Australia's official statistical agency, the Australian Bureau of Statistics (ABS), does not produce projections by country of birth or by ethnic group[1] as part of its regular population projections output. We focus here on country of birth for two reasons: (i) for many policy, service provision, and research purposes, country of birth is the relevant category, and (ii) because Australia has plentiful data by country of birth but not ethnicity. The most recent projections by birthplace we are aware of are those by Gibson et al. (2001) who published projections of the older Culturally and Linguistically Diverse (CALD)[2] population of Australia from 1996 to 2026. Although there is no shortage of research on the demography of historical and contemporary immigration trends and immigrant populations in Australia, the focus of these studies has not been directly on examining population ageing of migrant groups in Australia (for example Raymer and Baffour 2018; Hugo 2006, 2014; Khoo et al. 2011; Wilson and Raymer 2017; Markus 2014; Tang et al. 2014; Productivity Commission 2016; Parr and Guest 2019; Jupp 2001; Department of Immigration and Multicultural Affairs 1999).

In this paper we seek to fill the research gap in the likely demographic future of Australia's older populations from Europe. The older population is defined here as those aged 65 years and above, and we divide the Europe-born into seven main categories based on the ABS classification of birthplaces: the UK, Ireland, Western Europe, Northern Europe, Southern Europe, South Eastern Europe, and Eastern Europe. Countries in each of these categories are listed in Appendix Table 6. In addition to Ireland, we also present projections for selected individual European countries of birth with relatively large populations in Australia in 2016, namely England, Scotland, Germany, Italy, Greece, and the Netherlands. In the paper, we seek to address two questions:

(1) How much will Australia's Europe-born populations age in coming decades?
(2) What demographic factors lie behind the projected changes?

We examine both *numerical* population ageing – the extent to which the population in the older ages increases in number – and *structural* population ageing – the extent to which the population in the older ages increases as a proportion of all age groups. Following the presentation of our results, we consider some of the substantive implications of our findings with respect to policy and service provision and future demographic and gerontological studies.

[1] While the Australian Bureau of Statistics produces a range of statistics on populations by country of birth, there are no official ethnic group population statistics with the notable exception of the Aboriginal and Torres Strait Islander population.

[2] The term 'culturally and linguistically diverse' (CALD) is used widely in Australian policy and refers to people born overseas, people with limited English proficiency, children of people born overseas, refugees and asylum seekers (Australian Institute for Health and Welfare 2018a).

Data and Methods

Projection Model

The population projections were created by a cohort-component model modified to accommodate multiple birthplace populations. The model was operationalised in an Excel/VBA workbook which contains all input data, VBA code, projection assumptions, and detailed projection outputs. The outputs include population projections for males and females by sex and single year age groups, projected demographic components of change (births, deaths, immigration, and emigration), as well as a range of derived statistics (such as median age and population growth rates). In this paper, we present projections for a 40-year projection horizon from 2016 to 2056. The Excel workbook is available on request from the corresponding author.

At the heart of the projection model is a set of population accounting equations based on the movement population accounts framework (Rees 1984; Rees and Willekens 1986). Populations are projected in single year age groups from 0 to 104 (plus 105+) and in one-year time intervals from 30th June 1 year to 30th June in the next. For all cohorts, except babies born during each projection interval, the projections are calculated using the accounting equation:

$$P^i_{s,a+1}(t+1) = P^i_{s,a}(t) - D^i_{s,a\to a+1} + I^i_{s,a\to a+1} - E^i_{s,a\to a+1}$$

where P = population, D = deaths, I = immigration, E = emigration, i = birthplace, s = sex, a = age group, t = point in time, t, $t+1$ = the 1 year projection interval beginning at time t and ending at t+1, and $a\to a+1$ = the period-cohort which ages from a to a+1 during the projection interval. For Australia-born babies, the start-of-interval population in the equation above is replaced by births:

$$P^{Aus}_{s,0}(t+1) = B^{Aus}_{s}(t,t+1) - D^{Aus}_{s,b\to 0} + I^{Aus}_{s,b\to 0} - E^{Aus}_{s,b\to 0}$$

where B = births, Aus = Australian-born, and $b\to 0$ = the infant period-cohort which ages from birth to age 0 during the projection interval. For overseas-born babies, there is no births term (because this population consist of babies who immigrated to Australia soon after birth in another country). The accounting equation is simply:

$$P^i_{s,0}(t+1) = I^i_{s,b\to 0} - E^i_{s,b\to 0} - D^i_{s,b\to 0}$$

Emigration and deaths are calculated by multiplying rates by the number of person-years at risk, where the latter is approximated as the average of start- and end-of interval populations:

$$D^i_{s,a\to a+1} = d^i_{s,a\to a+1}\ \frac{1}{2}\left[P^i_{s,a}(t) + P^i_{s,a+1}(t+1)\right]$$

and

$$E^i_{s,a\to a+1} = e^i_{s,a\to a+1}\ \frac{1}{2}\left[P^i_{s,a}(t) + P^i_{s,a+1}(t+1)\right]$$

where d = death rate and e = emigration rate. The use of end-of-interval populations on the right-hand side of equations is unproblematic because the calculation scheme is iterative. Only for the newly-born infant population is the person-years at risk term slightly different. The person-years approximation of Willekens and Drewe (1984) for low mortality populations, half the end-of-interval population, is used. For example, deaths of newly-born babies are calculated as:

$$D^i_{s,b\to 0} = d^i_{s,b\to 0}\ \frac{1}{2}\left[P^i_{s,0}(t+1)\right]$$

Because immigration is influenced more by migration policies than origin or destination population sizes, it is projected directly as flows.

Births are projected in the standard way by multiplying age-specific fertility rates by the number of person-years at risk. The main difference is that babies born to overseas-born women who give birth in Australia form part of the Australia-born population.

$$B^{Aus} = \sum_i \sum_a \left(b^i_a\ \frac{1}{2}\left[P^i_{f,a}(t) + P^i_{f,a}(t+1)\right]\right)$$

where b = fertility rate and f = females. Births are then divided into males and females using the sex ratio at birth.

Data and Projection Assumptions

Most input data for the projections were obtained from the Australian Bureau of Statistics (ABS). Estimated Resident Populations (ERPs) for 2016 by birthplace, sex and single years formed the jump-off populations of the projections. We utilised five-year age group birthplace ERPs available from the ABS website (Australian Bureau of Statistics 2019c) and disaggregated them to single year age groups using detailed 2016 Census counts.

Our projections assume a continuation of recent demographic parameters, and implicitly a continuation of the Australian Government's migration policies and the broader economic and political environment. We do not include any adjustments for the demographic implications of the COVID-19 pandemic because at the time the projections were prepared in early 2020 they were difficult to determine. Projection assumptions were made for fertility, mortality, immigration and emigration. Age-specific fertility rates by birthplace of women recorded for the 2011–16 period were assumed to remain unchanged for the whole projection horizon.

Data on long-run trends in age and sex-specific mortality rates for birthplace-specific populations were unavailable. Instead, we assumed that mortality rates for the Australian population overall would continue their long-run downward trajectory, and we set birthplace-specific mortality either side of the national projection depending on recent birthplace-specific mortality. National mortality rate and life expectancy projections were prepared using Ediev's (2008) method, which essentially assumes that past exponential declines in age-specific death rates continue into the future. Age and sex-specific mortality rates for birthplace populations were extracted from the national mortality projection at points where the rates aligned with birthplace-specific life expectancy assumptions. National life expectancy at birth for females was assumed to increase from 85.0 years in 2016–17 to 90.5 years by 2055–56, while for males the equivalent assumptions were, respectively, 80.9 years and 88.5 years. Birthplace-specific mortality differentials were calculated on the basis of life expectancy at birth over the 2011–16 period, with the life expectancy differences assumed to remain constant over the projection horizon. Deaths by country of birth, sex and age group are published by the ABS for countries of birth with the largest populations in Australia (Australian Bureau of Statistics 2019b), enabling abridged life tables to be calculated. For the smaller countries of birth not included in the ABS statistics, we used national life expectancy assumptions. A summary of fertility and life expectancy assumptions is given in Table 7 in the Appendix.

Immigration and emigration flows by country of birth, sex and single years of age for the 2011–16 period were purchased from the ABS as a customised table (Australian Bureau of Statistics 2019a). Emigration rates by age and sex for 2011–16 were calculated and assumed to remain constant throughout the projections. The age-sex pattern of immigration from 2011 to 16 was held constant into the future, though the volume of immigration was assumed to gradually increase into the future, continuing the trend of the last decade. The national immigration flow was set at 540,000 for 2016–17 (an observed value), reaching 725,000 by 2055–56. The combination of these immigration and emigration assumptions results in a slow rise in net international migration into the future. A summary of immigration and emigration assumptions is given in Table 8 in the Appendix.

Decomposition

We decomposed projected population change of the older Europe-born populations into the effects of three factors: (i) increases in life expectancy, (ii) net international migration, and (iii) cohort flow over the course of the projection horizon. This last factor refers to the effect of variations in the 2016 age structure of a population, and how different sized cohorts affect the size of the 65+ population over time as larger (or smaller) cohorts enter the older ages at age 65. Figure 1 illustrates the process of cohort flow. The diagram shows selected 10 years interval birth cohorts ageing into the 65+ age group over the course of the projection horizon.

The effects were estimated by creating alternative projection variants with no change in life expectancy and no international migration, similar to the approach in Bongaarts and Bulatao (1999). This is a standard approach to decomposing population change, including changes in population composition, which has been applied by Andreev et al. (2013) to decompose the demographic drivers of the United Nations Population Division population projections, Rees et al. (2013) to understand projections of sub-national ethnic group populations in the UK, Temple et al. (2020) to understand the drivers of projected numerical and structural population ageing in Australia, and Wilson (2016) to decompose the drivers of projected change in Australia's Indigenous population. Table 1 lists the projection variants and how the three effects were calculated. The Standard projection is just the main projection calculated for this study. The Fixed Mortality variant applies the fertility, immigration and emigration assumptions of the Standard projection but fixes life expectancy at jump-off year values. The No Migration variant applies the fertility and increasing life expectancy assumptions of

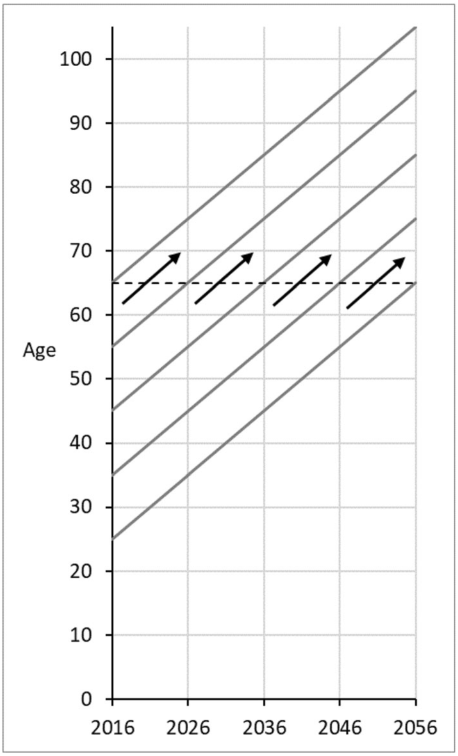

Fig. 1 Lexis diagram illustration of cohort flow into the 65+ age group. Note: The dashed line indicates the lower boundary of the 65+ age group; the grey lines depict the outlines of selected 10 years birth cohorts; the arrows indicate the flow of cohorts into the 65+ age group over time

the Standard projection but sets all immigration and emigration flows to zero. The projected population in 2056 from the Standard projection minus that from the Fixed Mortality variant demonstrates the influence of increasing life expectancy on projected population growth. Similarly, the projected population in 2056 from the Standard projection minus that from the No Migration variant indicates how much the population is expected to grow from international migration. The growth over the projection horizon not accounted for by increasing life expectancy and international migration is assigned to the cohort flow effect.[3] This effect describes how the 65+ population would change in size between 2016 and 2056 if there was no international migration and mortality rates remained unchanged throughout the projection horizon. It demonstrates the impact of the 2016 population age structure on the projections. The cohort flow effect will be positive if increasingly large cohorts reach age 65 during the projection horizon, and negative if smaller and smaller cohorts enter the 65+ age group over time.

[3] Note that our residual method of calculation does contain some approximation because the interaction between mortality and migration is ignored. An alternative would be to estimate the cohort flow effect as the difference between the Standard projection and a separate variant with fixed life expectancy and no international migration, but then the three effects would not sum exactly to total population growth. In fact, we calculated this additional variant but found only minor differences with the residual method.

Table 1 Projection variants created to isolate influences on the growth of the 65+ population, 2016–56

Projection	Summary
Projection variants	
Standard projection	Fertility, increasing life expectancy, immigration, and emigration assumed for the projections
Fixed Mortality	Fertility, immigration, and emigration as in the Standard projection
No Migration	Fertility and increasing life expectancy as in the Standard projection, but immigration and emigration set to zero.
Influences on growth	
Increasing life expectancy	Standard projection minus the Fixed Mortality variant in 2056
International migration	Standard projection minus the No Migration variant in 2056
Cohort flow	Growth from the jump-off year to 2056 in the Standard projection minus the increasing life expectancy and international migration effects

Projections

Projections of the Older Population

The projected sizes of older Europe-born migrant populations in Australia, together with some estimates of past populations, are presented in Table 2. Population numbers for those born in Australia and the remainder of the world are also given for comparative purposes. The older Europe-born population as a whole is projected to experience a slight increase over the next few years, reach a peak of just under one million in the early 2030s, and then undergo a gradual decline thereafter. In the context of rapid population growth amongst the Australia-born and those born elsewhere, the Europe-born share of Australia's 65+ population will fall. In 2016, it stood at 25.5%; by 2056, it is projected to have declined to 10.1%.

Older migrant populations from different parts of Europe are projected to experience a variety of demographic futures. Populations born in Western and Southern Europe are likely to decline throughout the projection horizon while, in contrast, the Northern Europe-born and Ireland-born older populations are projected to grow continually. The populations born in the UK and South Eastern Europe initially grow before decline sets in, while the Eastern Europe-born declines at first but growth resumes later. The reasons for these different demographic trajectories lie in their population age structures (in which are embedded past international migration and mortality trends) and projected trends in international migration and mortality. Among the selected individual countries of birth, only England and Scotland are projected to experience increases in their older populations, and only for the first half of the projection horizon. The older populations born in the other four countries are expected to decline in size over the coming decades.

Table 3 reports the projected extent of structural population ageing (an increase in the proportion of a population in the older age groups). For the Europe-born population overall, modest structural ageing is projected for the next decade ahead, with the percentage of the population aged 65+ increasing from 39% in 2016 to 41% in 2026. Ageing then stops, and the Europe-born population gradually becomes younger, with

Table 2 The estimated and projected size of Europe-born migrant populations aged 65+ in Australia, 1996–2056 (thousands)

Birthplace	Estimates			Projections			
	1996	2006	2016	2026	2036	2046	2056
							thousands
Main groups							
UK	252	290	403	468	527	515	510
Ireland	11	13	17	19	21	25	35
Western Europe	64	87	125	110	88	69	68
Northern Europe	4	6	10	10	11	11	12
Southern Europe	91	135	165	150	112	79	71
South Eastern Europe	59	117	161	165	143	110	94
Eastern Europe	70	61	54	52	51	59	74
Europe Total	550	710	935	974	953	869	863
Individual countries							
England	202	235	330	389	448	444	442
Scotland	38	40	51	57	57	51	48
Germany	28	39	58	49	39	30	29
Greece	26	58	76	69	49	31	23
Italy	78	111	127	108	78	53	48
Netherlands	26	34	46	40	28	17	13
Australia	1514	1739	2290	3113	3933	4489	5011
Rest of world	128	215	448	855	1335	1906	2642
All birthplaces	2192	2664	3672	4942	6221	7264	8516

Source: Based on ABS (2019a); authors' projections

Note: Countries within each of the regional birthplace groups are listed in Table 6 in the Appendix

the percentage aged 65+ falling to 34% by 2056 – less than it was in 2016. For the main birthplace groups shown in Table 3, the rejuvenation effect is greatest for those born in Western Europe and Southern Europe.

Demographic Drivers of Older Population Change

The population pyramids in Fig. 2 below offer clues about why the trends shown in Tables 2 and 3 are projected to occur. Note that all pyramids taper off towards the youngest childhood ages because births to overseas-born populations which occur in Australia are classified as Australia-born. In 2016 the total Europe-born population (shown at the top of Fig. 2) was dominated by those in the middle and older adult ages. The peak in the age structure evident at ages 68 and 69 consists of those born during the spike in births following the end of the Second World War, and the bulge from about ages 50 to 60 is due to the large baby boom cohorts born in the late 1950s and early 1960s. By 2036 the spike will have been reduced by deaths but is still just visible at ages 88 and 89, and the large cohorts born in the 1950s–60s will by then be aged in their late 60s and early 70s.

Table 3 The estimated and projected percentage of Europe-born migrant populations aged 65+ in Australia, 1996–2056

Birthplace	Estimates			Projections			
	1996	2006	2016	2026	2036	2046	2056
							per cent
Main groups							
UK	22	26	33	38	41	39	36
Ireland	20	22	19	17	16	17	21
Western Europe	23	31	46	43	37	29	27
Northern Europe	14	19	27	28	28	26	26
Southern Europe	27	45	60	61	51	39	34
South Eastern Europe	16	31	46	54	56	50	46
Eastern Europe	41	39	36	31	27	28	31
Europe Total	23	30	39	41	41	36	34
Individual countries							
England	21	25	33	37	41	39	37
Scotland	25	29	37	42	43	39	35
Germany	23	31	50	47	41	33	31
Greece	19	45	67	73	68	54	45
Italy	31	51	65	64	53	39	34
Netherlands	26	37	58	63	55	42	34
Australia	11	11	13	16	18	19	19
Rest of world	7	8	10	13	16	20	23
All birthplaces	12	13	15	18	19	20	21

Source: Based on ABS (2019a); authors' projections

Note: Countries within each of the regional birthplace groups are listed in Table 6 in the Appendix

Population pyramids are also presented in Fig. 2 for the largest of the Europe-born population groups. The UK-born population, comprising about half of Australia's Europe-born population in 2016, contributes much of the large post-war birth spike and 1950s–60s baby boom shape to the total Europe-born population. The movement of these cohorts into older ages initially results in an ageing of the UK-born population, but then rejuvenation occurs as older cohorts die out and the population grows at younger ages from immigration. The age structure of the Western Europe-born population is clearly dominated by cohorts born in the immediate post-war period. The progressive depletion of this cohort by mortality as it moves to higher ages, in combination with immigration at younger ages, rejuvenates the Western Europe-born population age structure. The story of the Southern Europe-born population is similar. The South Eastern Europe-born population had a more even distribution of the population in the middle and older adult ages in 2016, spanning ages 45 to 80. These cohorts become older (moving up the population pyramid) and thus increase population ageing for the 2016–36 period. However, smaller projected net international migration results in less population rejuvenation than the others in Fig. 1.

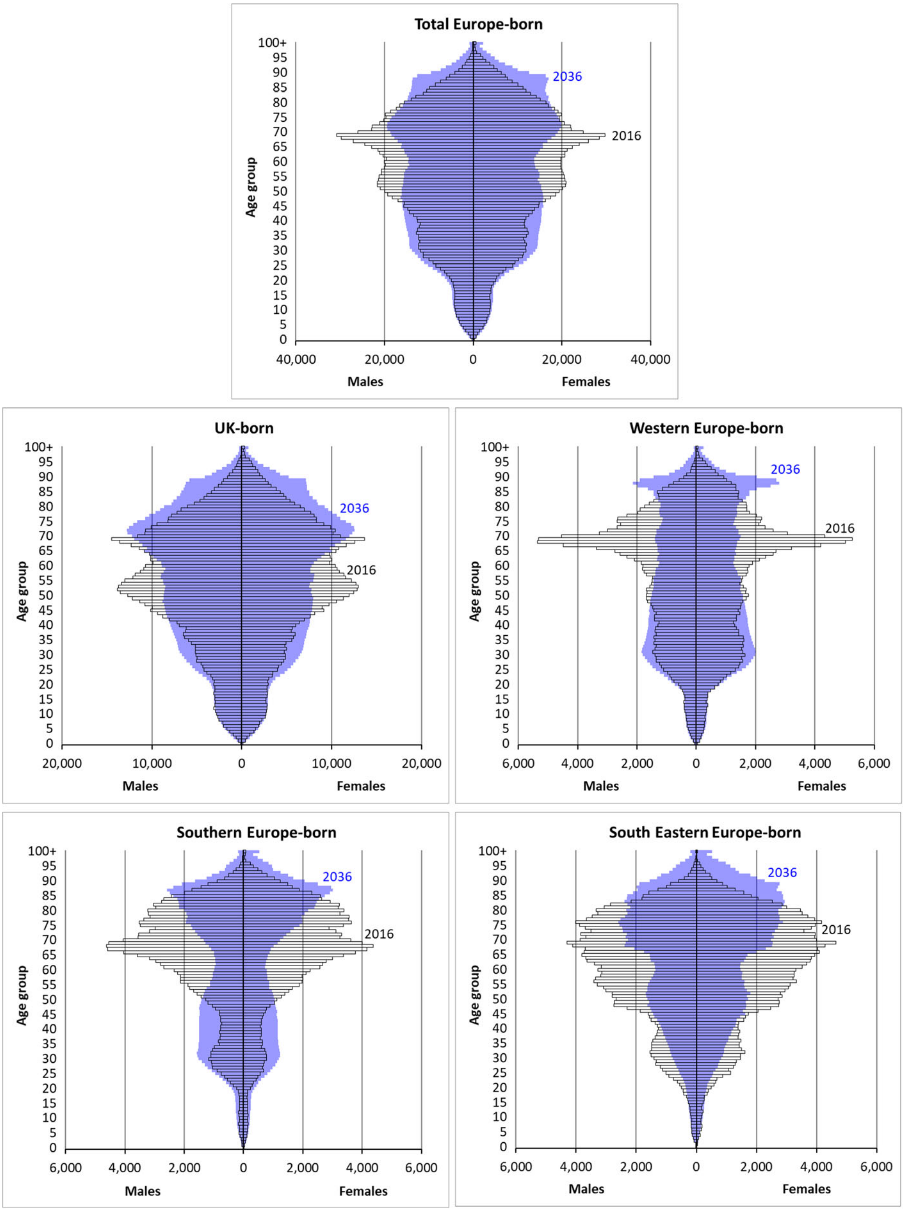

Fig. 2 The age-sex structure of selected broad-level Europe-born populations in Australia, 2016 (estimated) and 2036 (projected). Source: Based on ABS (2019a); authors' projections

Figure 3 presents population pyramids for six individual country of birth populations of Australia. The England-born and Scotland-born populations share many common features, unsurprisingly. The post-war baby spike and 1950s–60s baby boom cohorts are projected to age over time, while continued immigration will increase the population in the younger and middle adult age groups. The Italy-born in 2016 had large

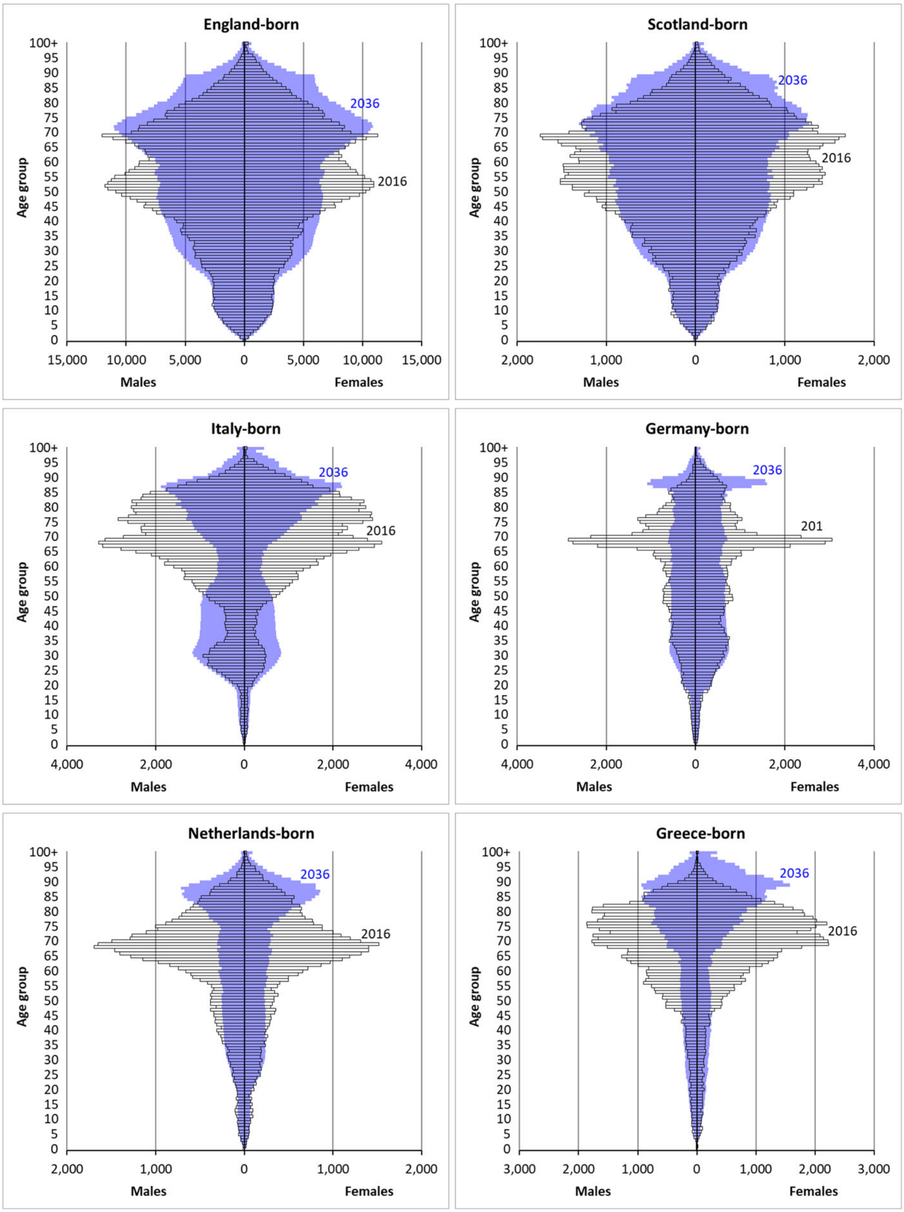

Fig. 3 The age-sex structure of selected individual country of birth populations in Australia, 2016 (estimated) and 2036 (projected). Source: Based on ABS (2019a); authors' projections

cohorts in the older adult ages from twentieth century immigration flows, but also a newer wave of immigration evident by the populations in the younger adult ages. The projections indicate ageing of the older cohorts and continued growth at younger ages due to newer immigration flows. The Germany-born population has large cohorts born in the immediate post-war years which will age up the population pyramid in the coming decades. But net international migration gains are projected to be low in the future and the population is expected to experience only modest growth in the younger and middle adult ages. The Netherlands-born and Greece-born populations are fairly similar in age structure, with large cohorts born during, and either side of, World War 2. These cohorts will age and diminish from mortality over time and be replaced by smaller cohorts in coming years.

To quantify the role of population dynamics in determining the future numbers of older migrants in Australia, we adopt two approaches. Utilising the standard projection variant (Table 1), Table 4 displays summary population accounts for three projection intervals, 2016–17, 2036–37 and 2055–56. For each birthplace population, the end-of-interval population aged 65+ equals the start-of-interval population aged 65+, plus cohorts entering the 65+ age group during the interval, minus deaths, plus immigration, minus emigration.

However, the population accounts do not permit a full evaluation of the relative contributions to projected population change from increasing life expectancy, net overseas migration, and cohort flow from younger ages. For example, it is not possible from the population accounts to assess the role increasing life expectancy plays in population change. To fully appreciate the contributions of these factors, three separate hypothetical variant projections are required: (1) The Standard projection (main projection calculated for this study), (2) Fixed Mortality variant (which fixes life expectancy at jump-off year values) and (3) No Migration variant (which sets all immigration and emigration flows to zero). As explained earlier, differences between these hypothetical projections illustrate the role of particular demographic processes in population growth. For example, the impact of rising life expectancy is determined as the difference in population sizes by 2056 between the Standard projection and the Fixed Mortality variant.

Table 5 provides a quantitative account of the influence of the three key drivers of population change over the full projection horizon. As an example, take the Southern European born population. In 2016 its population aged 65+ numbered approximately 165,000 compared with 71,000 in 2056. This difference over the projection period (−94,000), is due to three main demographic factors which both add to and subtract from this 65+ age group population. Cohort flow, the movement of different size cohorts into the 65+ age group over time, accounts for the majority of decrease in numerical ageing over the projection period (−133,200). This means that progressively smaller cohorts enter the 65+ age group during the projection horizon. Working from the opposite direction, increasing life expectancy (12,900) and international migration (26,300) add to the 65+ population born in Southern Europe over the projection horizon compared to the population change that would have occurred if life expectancy had remained fixed and there had been no migration. All these factors sum to −94,000.

As Table 5 shows, for the Europe-born population as a whole, cohort flow is the largest effect. In other words, the reason behind the decline in the 65+ population between 2016 and 2056 is due to smaller cohorts entering the population at age 65 than previously. Increasing life expectancy and net international migration gains work in the opposite direction but are insufficient to offset the negative cohort flow effect. For all birthplace populations shown in the table, the life expectancy effect is positive, as would be expected given assumptions of increasing life expectancy in the projections. The impact of international migration is mix of positive and negative influences on

Table 4 Population accounts of Europe-born migrant populations aged 65+ in Australia, 2016–17, 2036–37 and 2055–56

		UK	Ireland	Western Europe	Northern Europe	Southern Europe	South Eastern Europe	Eastern Europe
(A.) Start-of-interval 65+ population	2016–17	402,669	17,090	125,136	9590	165,326	160,666	54,209
	2036–37	527,216	20,800	87,742	11,114	112,059	143,074	50,792
	2055–56	509,162	33,874	67,448	11,737	71,070	94,781	72,600
(B.) Entry to 65+age group	2016–17	20,064	955	5164	493	6163	7496	2375
	2036–37	19,483	1092	2606	483	1765	3169	2057
	2055–56	19,737	1849	3051	544	2917	3203	3642
(C.) Deaths	2016–17	14,817	565	4330	301	6085	4928	2975
	2036–37	19,736	717	4679	418	6208	6748	2146
	2055–56	20,606	786	2431	395	3220	4517	2101
(D). 65+ entrants minus deaths	2016–17	5247	390	833	192	78	2568	−600
	2036–37	−253	374	−2073	65	−4443	−3579	−88
	2055–56	−869	1063	620	149	−303	−1314	1541
(E.) Immigration	2016–17	2386	37	310	42	513	500	332
	2036–37	2732	42	355	48	587	572	380
	2055–56	3201	49	416	57	688	670	445
(F.) Emigration	2016–17	1572	138	1158	111	296	878	213
	2036–37	1866	156	630	112	209	684	185
	2055–56	1750	268	608	117	132	481	313
(G.) Net overseas migration	2016–17	814	−101	−848	−69	217	−378	119
	2036–37	866	−114	−275	−64	378	−112	195
	2055–56	1451	−218	−192	−60	555	189	132
(H.) Total population change	2016–17	6061	289	−15	124	295	2190	−481
	2036–37	613	261	−2348	2	−4065	−3691	106
	2055–56	582	844	428	89	252	−1125	1673
(I.) End-of-interval 65+ population	2016–17	408,730	17,378	125,121	9713	165,621	162,856	53,728
	2036–37	527,829	21,061	85,394	11,115	107,993	139,383	50,898
	2055–56	509,744	34,718	67,876	11,825	71,323	93,656	74,273

The definition of the demographic accounting parameters included in Table 4 include:

[a] Start-of-interval population: The population aged 65+ at the start of each period, by birthplace

[b] Entry to 65+ group: The number of people turning age 65 from age 64 the preceding year

[c] Deaths: Total deaths attributable to persons aged 65+

[d] 65+ entrants minus deaths

[e] Immigration: Number of people 65+ added between t and t + 1 through immigration to Australia

[f] Emigration: Number of people 65+ leaving Australia between t and t + 1 through emigration

[g] Net Overseas Migration (NOM) = Immigration minus Emigration

[h] Total population change

[i] End-of-interval 65+ population

Table 5 The demographic drivers of growth in the 65+ birthplace populations of Australia, 2016–56

Birthplace	Increasing life expectancy	International migration	Cohort flow	Total
UK	95,600	174,000	−162,500	107,100
Ireland	4900	−10,400	23,200	17,600
Western Europe	11,500	−2400	−66,400	−57,300
Northern Europe	2000	−700	1000	2200
Southern Europe	12,900	26,300	−133,200	−94,000
South Eastern Europe	18,400	10,000	−95,400	−67,000
Eastern Europe	10,800	20,100	−10,800	20,100
Europe total	156,000	217,000	−444,200	−71,300
Australia	898,800	32,400	1,789,800	2,721,000
Rest of the world	348,100	342,400	1,503,700	2,194,100

Source: authors' projections

Note: Countries within each of the regional birthplace groups are listed in Table 6 in the Appendix

population change, and the largest negative effect is for the Ireland-born. This is because of net international migration losses (more emigration than immigration) in the older age groups for this population. Cohort flow varies the most between population groups and is by far the largest influence on population change for those born in Western, Southern, and South Eastern Europe.

Discussion

European Migration in Historical Context

These projections show that the older Europe-born population will soon peak and then decline in number, with large variations in decline by sub-region and country. To a large extent the future population size of these older migrant groups will be the result of cohort flow (the size of populations at younger ages moving up to the older age group over time). These results stem from migration to Australia over the last century, creating differential age structures.

Specifically, throughout the past 70 years, migration has continued from the United Kingdom and it was the leading source country almost every year until relatively recently (Jupp 1995). However, the United Kingdom alone could not provide immigrants in the numbers that Australia was seeking. At the commencement of the post-Second World War Australian migration program, the large number of displaced persons in Europe provided a ready source of immigrants to Australia, coming mainly from Eastern and Western Europe. Utilising this source, immigration rose to record levels in the early post-war years. In the 1950s and 1960s, the migration intake was widened further to include large numbers of immigrants from Southern Europe to work in manufacturing and construction.

The entry of one million people from countries of Europe other than the United Kingdom changed the face of Australia irrevocably. The main source countries in rank order were Italy, Yugoslavia, Greece, Germany and the Netherlands (Markus et al. 2009). While the White Australia Policy was still in operation, migration from all over Europe served to begin the change in the character of Australia in a way that was gradual and less threatening to those of British origin. From the 1970s onwards, movements to Australia from European countries tailed off except for those arriving from the United Kingdom. There were some significant later movements, mainly of refugees, from Poland and from the countries of former Yugoslavia, but the migration from continental Europe was nowhere near what it had been prior to 1970. The effect of this, of course, is that Australians who were born in continental European countries are today clustered in the oldest age groups.

In the past 20 years, new permanent residents of Australia have been sourced to a large extent from among temporary residents of Australia (McDonald 2019). As a very high percentage of temporary residents come from Asia, particularly international students, this has meant that new immigrants are primarily Asia-born. Even among Working Holidaymakers, most of whom have come from European countries in the past, there is a shift to Asian source countries. This raises the question of the future of European migration to Australia and whether changes in Australia's immigrations composition are likely? While the above policy approaches remain in place, the predominance of migration from Asia will continue and there is little likelihood of a resurgence of migration from Europe.

Implications for Aged Care and Caring Services

The Europeans who moved to Australia from the late 1940s to the 1960s are now in their older years. They comprise the majority of the current third of older Australians who were born overseas (Australian Institute for Health and Welfare 2018b) and are an important segment of the population for aged care policy and service delivery. According to the 2016 Census, the top three non-English speaking countries of birth for older Australians are Italy (3% of all older people), Greece (2%) and Germany (1%). Italian is the most common non-English language spoken at home by people aged 65+, followed by Greek (Australian Institute for Health and Welfare 2018b). The migration trajectories of these cohorts and their immediate pre- and post-migration circumstances affect their ageing. For example, the majority of Greeks who made the decision to emigrate to Australia following the Second World-War were young, unskilled, and had limited formal education and capital (Fanany and Avgoulas 2019). In Australia, they were employed mainly in manufacturing and construction jobs that did not require much linguistic interaction (Fanany and Avgoulas 2019). As they have aged, they have neither assimilated into an Anglo-Australian way of life nor relinquished their own cultural and ethnic identity, instead forging a strong Australian Greek community (Fanany and Avgoulas 2019). Therefore, their expectations and experiences of ageing and aged care are not synchronous with Anglo-Australians or even UK- or Ireland-born older migrants, despite having spent most of their adult life in Australia.

The differences between migrant groups are of relevance to policy and services for several reasons. First, in line with contemporary Australia's multicultural policy focus, there are numerous legislative and policy imperatives mandating the provision of ethno-specific aged care. The current Aged Care Act (Commonwealth Government of Australia 1997) emphasises the right of all Australians, regardless of race, culture, language, gender, economic circumstance or geographic location to be able to access good, inclusive care. The Act also encourages diverse, flexible and responsive aged care services to meet the needs of the diverse consumers and carers, including for people from CALD backgrounds, which it identifies as a 'special needs group' (Commonwealth Government of Australia 1997). Related to the legislation are also a series of policy documents that further cement the Australian Commonwealth Government's commitment to meeting the needs of older CALD Australians. Notable examples include the Department of Health's Aged Care Diversity Framework (Department of Health 2017), the Charter of Aged Care Rights (The Aged Care Quality and Safety Commission 2019), and the Aged Care Quality Standards (The Aged Care Quality and Safety Commission 2019).

All of these documents enshrine, mandate, and regulate respectively the need for culturally appropriate and safe aged care. These documents also matter because the Australian Government is the main funder for health and aged care services in Australia. Co-payments from individual citizens only apply, if they have the means to do so. The government pays aged care service providers to deliver aged care, the vast majority of which is delivered in community-settings to nearly 1 million older Australians in their own homes (Ratcliffe et al. 2020). When their health deteriorates, a smaller number (~230,000) will need higher levels of care, available in residential care facilities (Ratcliffe et al. 2020).

Irrespective of the setting, a broad array of services is included and funded in aged care. This includes assistance with daily living activities such as shopping, cooking, cleaning and gardening, personal care to assist with showering and dressing, nursing care and access to allied health services (e.g. physiotherapists, podiatrists) to maintain and/or improve health, quality of life and wellbeing (Khadka et al. 2019). Culture is imbricated in all of these aspects of care and what is appropriate in one community may be inappropriate or unfamiliar in another. For example, there is a strong cultural preference for family and community care over residential care in many migrant groups (Brijnath 2011; Haralambous et al. 2007; Low et al. 2011). Currently, older Australian migrants are under-represented in residential aged care but over-represented in their use of community aged care services (Aged Care Financing Authority 2013). With acculturation and an acknowledgement that the nature of life in Australia is different to their countries of origin, and that traditional expectations about family care may not be possible, there may be a change in attitudes towards ageing and aged care in some migrant communities (Montayre et al. 2019). Such changes do not necessarily signal an assimilation to an Australian way of ageing or care. Recent research on aged care, health, and housing revealed that much of the broader Australian population lacks the shared cultural identity and community connectedness that supports the way ethno-specific organisations integrate care (Gilbert et al. 2020).

For these reasons, ethno-specific aged care is more than just the provision of care in the relevant language. Rather, it about offering older migrants and their families the benefits and reassurance of culturally familiar care through food, recreation activities, spiritual and religious practices, and end of life care. It is one of the main reasons why ethno-specific care is often preferred over mainstream service by older migrants, irrespective of their English-language proficiency (Shanley et al. 2012). However, access to ethno-specific services varies by location and size of the community. Many of these services have evolved in symbiosis with each of their community's cultural, linguistic and socioeconomic context and depend on social networks and trust within those communities to operate (Gilbert et al. 2020). Presently, most ethno-specific aged care services target older Southern Europeans, mainly Italian and Greek families. Many of these services also tend to be not-for-profit or social businesses, although there are some private providers (especially for residential aged care).

From a commercial point of view, as older clients from particular ethnicities decline in numbers, the viability of some ethno-specific services will diminish. Therefore, these services will need to diversify their services or risk folding. Examples of ways these services could transition include servicing emerging older migrant groups (e.g. from Asia), facilitating the governance and establishment of new ethno-specific services, or developing different missions. However, diversifying to different ageing migrant populations is no easy task as many existing mainstream facilities have also discovered. Common challenges for Western-centred, person-centred, English-speaking services caring for older migrants are language difficulties, different understandings of health and care, the stigma associated with residential aged care, and lack of culturally appropriate services (Giebel et al. 2015; Mukadam et al. 2011; Sagbakken et al. 2017).

The remit of aged care policy and services is thus grappling with shifting care expectations, lifestyles, and demographic change to develop optimal home-based or institution-based models of care that best support the needs of older migrants. Our data show which communities will be affected, by how much, and when; this modelling is crucial not only for policy but also the aged care sector as findings can assist with resource allocation and business continuity planning.

Limitations and Extensions

It is important to note that our population projections contain a number of limitations. As is the case with every set of projections, they will inevitably differ to some extent from the demographic trends which will eventuate over the coming decades (Wilson 2007). In particular, we have not incorporated likely effects of the COVID-19 pandemic because at the time of preparing this paper its effects on birthplace-specific immigration were very difficult to judge. However, at the older ages, projections of population size tend to be more reliable. This is because mortality is the dominant demographic process at higher ages and it tends to be predicted fairly accurately, while hard-to-forecast international migration rates tend to be quite low at older ages. Some of our input parameters have been set at recent values, and these may change over time. For example, several regions exhibiting low fertility rates currently, and in the past, does not guarantee that future fertility will also be low. However TFRs of some country of birth groups have been low for a long time, so continuing low fertility is a reasonable assumption. In addition, TFRs have no impact on the size of the overseas-born population because all births to overseas-born women which occur in Australia form part of the Australia-born population.

Projections also generally become more inaccurate the further into the future they extend and the more detailed the population breakdown considered (such as by birthplace and age group). For about the next two decades we are reasonably confident of our projections of older populations because most of those aged 65+ in 2036 are already living in Australia and they will simply move up to older age groups between then and now (cohort flow). We are also more confident about projections for broader, rather than individual country, birthplace groups.

Our analysis lays the demographic groundwork for future research on the intersections between migration and population ageing in Australia (Warnes and Williams 2006; Coleman 2006, 2008, 2010). Projections by country of birth are methodologically well-defined as they are time invariant – that is, an individual's birthplace does not change over time. However, the broader context of culture, which is central to policy narratives around culturally appropriate care, is a much broader concept. Albeit a difficult concept to define, culture is neither self-contained system nor static, but temporal and dynamic, influenced by interactions between individuals, communities, ideologies, and institutional practices (Bourdieu 1984). As such, culture exerts considerable influence on perceptions of ageing and aged care. This dynamism could be explored in future modelling to include projections of language (or language proficiency) and religion. Unlike country of birth, English proficiency and religious identification may shift over time. This requires the estimation and projection of age-cohort transition probabilities, requiring considerable data needs and methodological sophistication. A further extension is generalising our modelling to the spatial level in Australia to enable a clearer analysis of the geographical spread of future ethno-specific health care provision. Combined with detailed analyses of administrative data on aged care help by the Australian Department of Health, this could inform aged care service provision.

Conclusions

This paper has presented new projections of Australia's Europe-born migrant populations. While the older Europe-born population as a whole is expected to reach a peak in the early 2030s followed by gradual decline, a variety of demographic futures are projected for the separate European birthplace groups shown in Table 1. In terms of structural ageing (referring to the percentage aged 65+), the Europe-born population will soon stop ageing and become younger, and again this will vary considerably between birthplace groups (Table 2). It was shown that the dominant demographic process affecting the future size of the older populations is cohort flow (Table 3). For the Western and Southern Europe-born groups in particular, the reduction in size of older populations is due to the mortality of the large migrant cohorts who arrived in Australia during the 1940s to 1960s and their replacement by smaller cohorts moving up into the 65+ age group in future decades. These projections should help inform assessments of the likely demand for a range of services required at older age groups in coming years, particularly as Australia's older migrant population shifts from a predominately European to Asian composition. Thus, aged care and health care demand will shift as the size and composition of Australia's older population changes, requiring commensurate shifts in culturally appropriate service planning and provision. Australia's era of Europe-born migration is far from over, but the dominance of Europe-born migrants at older ages will soon give way to large older populations from a more diverse range of global origins.

Authors Contributions TW created the population projection model, prepared the projections, and wrote sections of the draft and final manuscript.

JT led conceptualization of the project, project administration and supervision, as well as authoring, editing and redrafting sections of the manuscript.

BB wrote sections of the draft and final manuscript.

PM wrote sections of the draft and final manuscript and reviewed the model results.

AU wrote sections of the draft and final manuscript.

All authors read and approved the final manuscript.

Funding This work was supported by the Australian Research Council's (ARC) Centre of Excellence in Population Ageing Research (CE1101029).

Data Availability The Excel/VBA program used to create the projections, the customised international migration data obtained from the ABS, and the projections reported in the paper, are available on request from the corresponding author.

Compliance with Ethical Standards

Conflict of Interest None declared.

Ethical Approval Ethics approval for this project was provided by the Melbourne School of Population and Global Health (MSPGH) Human Ethics Advisory Group (Ethics ID: 2056200.1).

Code Availability Not applicable.

Appendix

Table 6 The classification of countries of birth

Country/region	Constituent countries/territories
UK	UK (England, Scotland, Wales, Northern Ireland), Channel Islands, Isle of Man
Ireland	Ireland
Western Europe	Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, Switzerland
Northern Europe	Denmark, Faroe Islands, Finland, Greenland, Iceland, Norway, Sweden, Aland Islands
Southern Europe	Andorra, Gibraltar, Holy See, Italy, Malta, Portugal, San Marino, Spain
South Eastern Europe	Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, North Macedonia, Greece, Moldova, Romania, Slovenia, Montenegro, Serbia, Kosovo
Eastern Europe	Belarus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Russian Federation, Slovakia, Ukraine
Australia	Australia
Elsewhere	All other countries

Table 7 Total Fertility Rate and life expectancy at birth projection assumptions

Birthplace	TFR	e_0 2016–17		e_0 2055–56	
		Females	Males	Females	Males
Individual countries					
England	1.79	84.4	80.7	89.9	88.3
Scotland	1.79	84.4	80.7	89.9	88.3
Italy	1.06	87.2	82.2	92.7	89.8
Germany	1.56	85.5	80.6	91.0	88.2
Greece	1.36	88.4	83.4	93.9	91.0
Ireland	1.47	86.7	81.7	92.2	89.3
Netherlands	1.68	85.6	81.2	91.1	88.8
Main groups‡					
Rest of UK	1.79	85.0	80.9	90.5	88.5
Rest of Western Europe	1.58	85.0	80.9	90.5	88.5
Northern Europe	1.67	85.0	80.9	90.5	88.5
Rest of Southern Europe	1.52	85.0	80.9	90.5	88.5
Rest of South Eastern Europe	1.52	85.0	80.9	90.5	88.5
Eastern Europe	1.52	85.0	80.9	90.5	88.5

‡ Main regional birthplace groups minus any individual countries in that group shown above. TFRs for individual countries are averages for the 2011–16 period published by the ABS; for 'Rest of' regional groupings the broad regional TFRs published by the ABS were assumed. TFRs were assumed to remain unchanged for the projection horizon. Base period life expectancy at birth was calculated using abridged life tables based on deaths data for 2011–16 published by ABS for selected countries of birth with large populations in Australia. For other countries and the main regional groups, we took a conservative approach and assumed national life expectancy values. Life expectancy at birth projections, shown in the table for the first and final years of the projection horizon, were created by first preparing national life expectancy projections, and then adding the base period differential between birthplace-specific and national life expectancy

Table 8 Immigration and emigration projection assumptions

Birthplace	Total immigration per annum		Emigration GMR†	
	2016–17	2055–56	Females	Males
Individual countries				
England	38,600	51,800	2.52	2.93
Scotland	4000	5400	2.32	2.65
Italy	6200	8300	3.41	3.99
Germany	5100	6900	5.07	6.13
Greece	1400	1900	1.55	2.19
Ireland	9300	12,500	4.58	5.34
Netherlands	1600	2200	4.05	4.88
Main groups‡				
Rest of UK	2500	3300	3.70	3.81
Rest of Western Europe	8200	11,000	5.66	6.75
Northern Europe	3100	4200	6.08	6.56
Rest of Southern Europe	2400	3300	2.72	3.07
Rest of South Eastern Europe	2800	3800	0.91	1.15
Eastern Europe	7400	10,000	1.95	2.57

‡ Main regional birthplace groups minus any individual countries in that group shown above

†Gross Migraproduction Rate (the sum of all age-specific rates) over ages 0–100. GMRs were assumed to remain unchanged for the projection horizon. The table shows immigration totals for the first and final years of the projection horizon.

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Affiliations

Tom Wilson [1] **· Jeromey Temple** [1] **· Bianca Brijnath** [2] **· Peter McDonald** [1] **· Ariane Utomo** [3]

[1] Demography and Ageing Unit, Melbourne School of Population and Global Health, The University of Melbourne, 207 Bouverie St, Melbourne, VIC 3010, Australia

[2] National Ageing Research Institute (NARI), Melbourne, Australia

[3] School of Geography, Faculty of Science, University of Melbourne, Melbourne, Australia