PEOPLE AND PLACE

Copyright notice

Copyright Monash University and the author 2006
Within the limits laid down by the Fair Dealing provisions of the *Australian Copyright Act 1968* as amended, you may download, save and print article files for the purpose of research or study and for the purposes of criticism or review, and reporting news, provided that a sufficient acknowledgment of the work is made. If you are obtaining an article on behalf of someone else, you may forward a printed copy but not an electronic copy of the article to them. Other than this limited use, you may not redistribute, republish or repost the article on the internet or other locations, nor may you create extensive or systematic archives of these articles without prior written permission of the copyright owner.

For further information contact:
Centre for Population and Urban Research
PO Box 11A
Monash University
Clayton VIC 3800
Australia
Phone: (+61 3) 9905 2965
Fax: (+61 3) 9905 2993
email: <peopleandplace@arts.monash.edu.au>

MONASH University

THE RISE OF THE OLDER MOTHER

Rebecca Kippen

In Australia, declining fertility among younger women is partly off-set by increasing fertility among women over 30. Women born in 1971 are projected to have an average of 1.9 children each, with almost half their children born after the age of 30. Levels of childlessness for these women will be much less than previously estimated. Future levels of fertility will depend on whether birth rates at older ages continue to rise. From a demographic perspective there is potential for further increase, since probably half of women are still fecund at age 40. From an individual perspective, women should have children before age 35 if circumstances are conducive.

INTRODUCTION

For the first time in Australia's recorded history, women are now more likely to give birth in their thirties or forties than in their teens or twenties.[1] Over the past 30 years, birth rates under the age of 30 have dropped 50 per cent, while rates over age 30 have risen by more than half. The mean age of mothers at birth has steadily increased over the same period, from 26.7 years in 1974 to 30.0 years in 2004.[2] Almost half of all 30-year-old women in 2004 had not had children,[3] up from 20 per cent in 1981.[4] However most of these women still expect to have children at some time in the future.[5]

One fundamental question is whether fertility at younger ages will continue to decline and, if so, whether these declines will be offset in the future by increasing birth rates at older ages. This leads to another question about women's capacity to continue delaying childbearing given that the vast majority of women hit a reproductive impasse in their late thirties or forties.

This paper briefly discusses the causes and possible consequences of delayed motherhood. It then examines long-term trends in Australian fertility by age and long-term patterns of parity distribution, the implications of these for future fertility, and the potential for future increase in fertility rates at older ages.

CAUSES AND IMPLICATIONS OF DELAYED MOTHERHOOD

The trend to delayed parenting has been attributed to several factors. Research in Australia and elsewhere shows a strong correlation between education and deferred parenthood. For example, Australian women born between 1945 and 1964 delayed their first birth by 0.75 years for every extra year of education between the ages of 15 and 24 years.[6] Thus, increasing levels of education herald further delays in childbearing. Rising levels of female labour force participation are also associated with postponed parenthood.[7] McDonald argues that the trend to delayed parenting is because—in an increasingly competitive labour market—young people need to build up human capital based on education and work experience before taking on the parental role.[8]

Related to this, young Australians are leaving home, gaining financial independence and forming stable relationships progressively later in life, delays which inhibit the commencement of family formation.[9] Overarching all these factors are scientific advances. These have resulted in greater reproductive autonomy, allowing potential parents to delay childbearing or to avoid parenthood altogether.

Although the trend to deferred

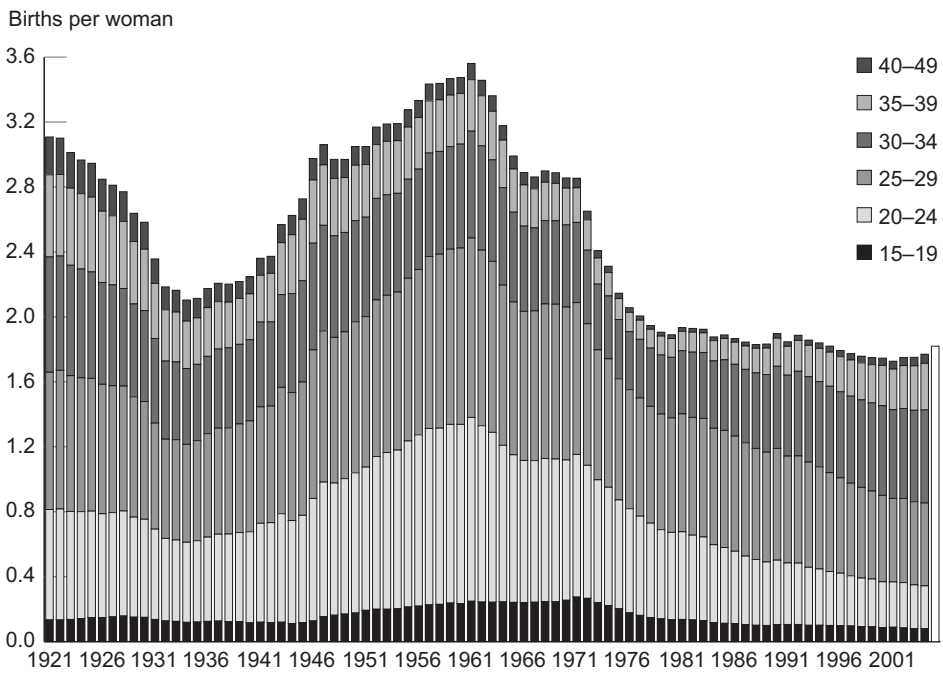
motherhood is tied to rising levels of education, labour force participation and reproductive autonomy, all of which are laudable changes, the trend itself is of concern for several related reasons.

First, some women who defer motherhood run out of time and end their reproductive years childless, or with fewer children than they had intended to have. Cannold documents the heartache of 'thwarted mothers': women whose desire to have children has not been realised.[10]

Second, all else being equal, older mothers (35 years and over) are at greater risk of health problems during pregnancy. Age is also associated with an increased likelihood of chromosomal abnormalities, premature birth, miscarriage and perinatal mortality. On the positive side, older mothers and their babies today enjoy significantly better outcomes than their counterparts of 20 years ago[11] and, overall, the risks are small.[12]

The third reason concerns Australia's birthrate, as mentioned above. Studies show that age at first birth is strongly negatively correlated with completed fertility.[13] That is, on average, the later you start, the fewer you have. In Australia, women's average age at first birth increased from 25.6 years in 1981 to 28.3 years in 2000.[14] Progressively later entry into parenthood implies a continuing decline of Australian fertility, a possibility which attracts widespread public concern.[15] Substantial falls in fertility could lead to hyper-ageing of the population, contraction of labour supply and spiralling population decline.[16]

Figure 1: Total Fertility Rate by contribution of each age group, Australia, 1921 to 2005



Sources: Author's calculations from Single-year-of-age fertility rates, Australia,1921–1997, unpublished birth registration data, ABS, Canberra, 1999; *Australian Demographic Statistics*, December 2005, Catalogue no.3101.0, ABS, Canberra, 2006; *Births Australia*, Catalogue no. 3301.0, ABS, Canberra, various years; *Population by Age and Sex, Australian States and Territories*, Time Series Workbook, Catalogue no. 3201.0, ABS, Canberra, 2005

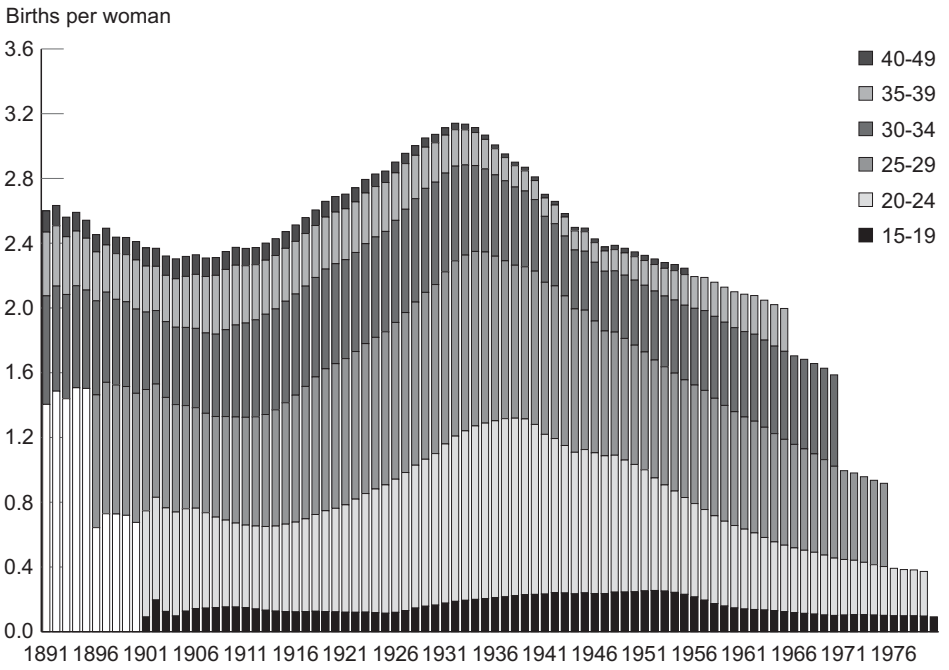
LONG-TERM TRENDS IN AUSTRALIA'S FERTILITY

The most commonly cited measure of fertility internationally is the Total Fertility Rate (TFR). For any one year, the TFR gives the average number of births a woman would have over her lifetime if she were to experience the age-specific fertility rates of that particular year. Age-specific fertility rates are calculated as the annual number of births to women of a particular age divided by the mid-year female population of that age. The TFR is thus a hypothetical measure of the average number of children born over a woman's lifetime, since it refers to cross-sectional (or period) data on births rather than to births of a real cohort of women. Its advantage is that it requires only one year of data and gives a very current view of fertility.

Australia's TFR over the years 1921 to 2005 is shown in Figure 1, disaggregated by age group.[17] The interpretation of these rates is straightforward. For example, a hypothetical group of women experiencing the age-specific fertility rates of 2004, would have had, on average, 0.1 of a child each in their teens, 0.3 at age 20–24, 0.5 at age 25–29, 0.6 at age 30–34, 0.3 at age 35–39, and 0.1 in their forties, making for a total of 1.8 births each over their (hypothetical) lifetimes.

In the 1920s, fertility rates at all ages were higher than they are today. What is particularly striking is the level of fertility over the age of 35 years, which is more

Figure 2: Cohort Fertility Rate by contribution of each age group, Australian women born 1891 to 1980



Sources: Author's calculations from Women by Age by Children Ever Born, special tabulation of the 1981 Australian Census of Population and Housing, ABS, 2005; Single-year-of-age fertility rates, Australia,1921–1997, unpublished birth registration data, ABS, Canberra, 1999; *Births Australia*, Catalogue no. 3301.0, ABS, Canberra, various years; *Population by Age and Sex, Australian States and Territories*, Time Series Workbook, Catalogue no. 3201.0, ABS, Canberra, 2005

than twice that of 2004 (the most recent year for which age-specific data are available). The 1930s depression saw a contraction of fertility at all ages. In the 1940s and 1950s fertility increased at all ages under 40, and particularly under age 30. The collapse of fertility through the 1960s and early 1970s was associated with declining fertility at every age bar the teenage years.

Over the period 1984–2005, Australia's TFR sat between 1.7 and 1.9 births per woman. This is the lowest it has been since national-level data collection began in 1921. Although aggregate fertility has varied little over the past two decades, fertility at different ages has changed greatly. Since 1984, fertility under the age of 30 years has fallen by more than one-third. This decline has been partly compensated for by increases at older ages, such that women in their thirties now have more children than do women in their twenties.

A question raised in the introduction to this paper is whether fertility at younger ages will continue to decline and, if so, whether these declines will be offset in the future by increasing birth rates at older ages. This can be better understood by considering fertility on a cohort basis, rather than on a cross-sectional basis.

Cohort fertility is calculated by tracing actual groups of women (usually those born in the same year) through time, tabulating their births at each age of their reproductive lives. Figure 2 gives the Cohort Fertility Rate (CFR)—an equivalent measure to the TFR—for Australian women born 1891–1980. As with Figure 1, the contribution of each age group to the fertility rate is shown. The white bars for cohorts 1891–1900 indicate unknown fertility by age group at the younger ages. The author was able to calculate age-specific fertility rates at the older ages for these cohorts from period fertility data collected from 1921, and to estimate the CFR in total from census data. For cohorts born after 1955, age-specific fertility rates at older ages are missing, since fertility at these ages for these women is yet to occur.

Figure 2 shows that fertility rates at younger ages are continuing to fall, leading to lower completed fertility. Fertility rates under age 30 have declined for every cohort since the mid-1930s. Although the trend slowed slightly for cohorts born in the early 1970s, it shows no sign of stopping. It is also clear from Figure 2 that past declines in cohort fertility at younger ages were not fully compensated by increases in fertility at older ages, leading to a long-term decline in the CFR. For example, women born in 1966 had, on average, 1.2 children each by their thirtieth birthdays. Their completed fertility—assuming negligible levels in their forties—will be just over two children each. In contrast, women born 30 years earlier in 1936 had had an average of 2.3 children each by age 30 and 3.0 children each on average in total. If this trend extends into the future, cohort fertility will continue to decline.

The delay in fertility has led to lower fertility overall for more recent cohorts. However this delay has not substantially increased the proportion of women who have never had children. Rather, it means that most women still have a first and second child, but that fewer go on to have third and subsequent children. This is illustrated in Figure 3, which shows the CFR for Australian women born between 1891 and 1961 by the contribution of first, second, third and higher-order births.[18]

Figure 3 may also be interpreted as showing the proportion of women who have at least one, two, or three births over their lifetimes.[19] The bottom section of the chart shows the contribution of first births to the cohort fertility rate, or the proportion of women in each cohort who had at least one child. This has been remarkably constant at around 80–90 per cent for cohorts born over 70 years. Eighty to 90 per cent of women

with at least one child means that 10–20 per cent of women do not have any children.[20] For example, from the figure, 86 per cent of women born in 1961 had at least one child. Therefore 14 per cent of this cohort remain childless.

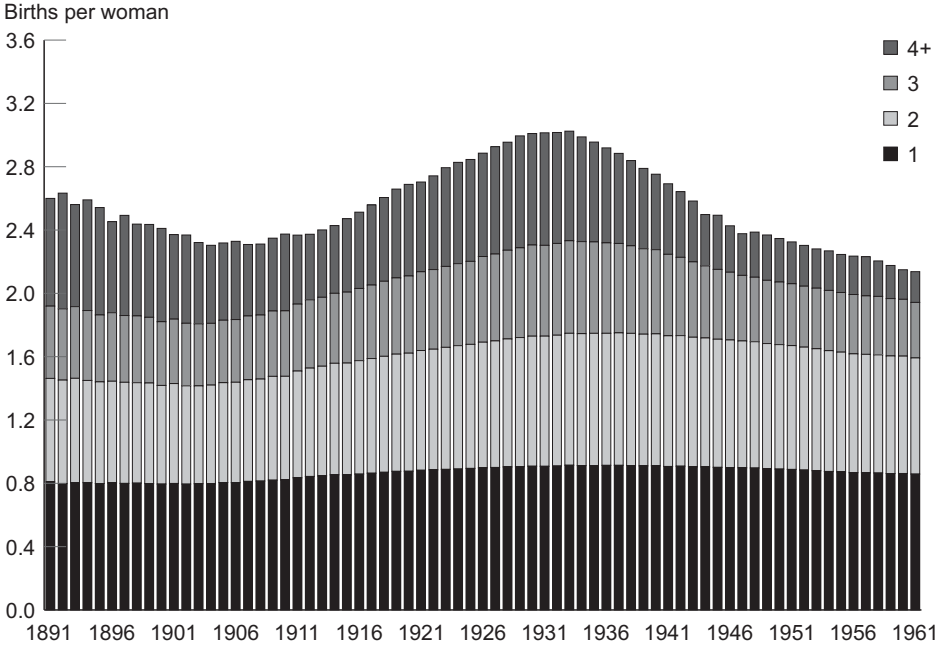
The second set of bars shows the proportion of each cohort with at least two children. This peaked at 83 per cent for cohorts born in the 1930s and has been declining since. However for the latest cohort shown—women born in 1961—73 per cent have had at least two children. This is higher than for every cohort born 1891–1919.

The proportion of women with three or more children over time mirrors almost precisely changes in the CFR, reinforcing the fact that changes in Australian fertility levels are the result of shifts in the proportion of women with larger families. In recent times, the fall in the proportion of women with three or more children (Figure 3) is strongly associated with declining fertility at younger ages (Figure 2).

FERTILITY, DEFERRED CHILDBEARING AND CHILDLESSNESS

It is likely that fertility will continue to decline at younger ages and increase at older ages as more recent cohorts of women progressively postpone motherhood. Table 1 shows the distribution of parity (number of

Figure 3: Cohort Fertility Rate by contribution of each birth order, Australian women born 1891 to 1961



Sources: Author's calculations from Women by Age by Children Ever Born, special tabulations of the 1981, 1986 and 1996 Australian Censuses of Population and Housing, ABS, Canberra, 1999 and 2005; Single-year-of-age fertility rates, Australia,1921–1997, unpublished birth registration data, ABS, Canberra, 1999; *Births Australia*, Catalogue no. 3301.0, ABS, Canberra, various years; *Population by Age and Sex, Australian States and Territories*, Time Series Workbook, Catalogue no. 3201.0, ABS, Canberra, 2005; Annual Births by Age of Mother by Previous Issue, 1991–2000, unpublished data from the Perinatal Data Collection, Australian Institute of Health and Welfare, Sydney, 2001 and 2003

births per woman), and average births for women born between 1941 and 1971. It gives these figures at the women's thirtieth and fiftieth birthdays. For the 1956–1971 cohorts, values at age 50 are estimated by applying projected age-parity-specific fertility rates to the most recent known age-parity distributions of these cohorts.[21] The table shows that the average number of births per woman by age 30 fell more than 50 per cent over the period illustrated, from 2.2 for women born in 1941 to 1.0 for women born in 1971. This fall was associated with a substantial rise in the proportion childless at age 30, such that almost half of women born in 1971 had not had any children by their thirtieth birthdays.

In contrast, assuming that recent fertility trends continue, differences between the cohorts in completed fertility are not so dramatic—although still substantial. The CFR declines by 30 per cent from 2.7 births per woman for the 1941 birth cohort to 1.9 births per woman for women born in 1971. Fertility recuperation appears to be strong in Australia. That is, cohorts who delayed having children through their twenties have higher fertility in their thirties to compensate.[22] Despite the fact that more recent cohorts have progressively higher proportions childless at age 30, most of these women will be able to recoup some of this missing fertility at older ages, so that fewer than 20 per cent of women end their

Table 1: Parity distribution (per cent) and average births per woman by 30th birthday and by 50th birthday, Australian women born 1941–1971

Year of birth	1941	1946	1951	1956	1961	1966	1971
Number of children by 30th birthday (per cent distribution)							
0	—	—	21	28	35	41	46
1	—	—	18	19	20	21	21
2	—	—	37	32	28	24	21
3	—	—	18	15	12	10	8
4+	—	—	6	6	4	4	4
Total	—	—	100	100	100	100	100
Average births per woman by 30th birthday							
	2.2	1.9	1.7	1.5	1.3	1.2	1.0
Number of children by 50th birthday (per cent distribution)							
0	9	10	11	13	14	15	16
1	8	10	11	12	13	14	15
2	32	38	39	38	38	40	42
3	28	26	25	24	23	20	18
4+	23	16	14	13	12	11	9
Total	100	100	100	100	100	100	100
Average births per woman by 50th birthday (cohort fertility rate)							
	2.7	2.4	2.3	2.2	2.1	2.0	1.9
Per cent fertility after 30th birthday							
	20	21	26	32	38	43	48

Sources: Author's calculations from Women by Age by Children Ever Born, special tabulations of the 1981, 1986 and 1996 Australian Censuses of Population and Housing, ABS, Canberra, 1999 and 2005; Single-year-of-age fertility rates, Australia,1921–1997, unpublished birth registration data, ABS, Canberra, 1999; *Births Australia*, Catalogue no. 3301.0, ABS, Canberra, various years; Annual Births by Age of Mother by Previous Issue, 1991–2000, unpublished data from the Perinatal Data Collection, Australian Institute of Health and Welfare, Sydney, 2001 and 2003

reproductive lives without children. Projected childlessness for the 1971 cohort—at 16 per cent—is lower than that estimated by McDonald[23] (22 per cent) and Merlo and Rowland[24] (19 per cent). It is also much lower than the figure of 28 per cent calculated by the Australian Bureau of Statistics[25] which attracted widespread media attention in the late 1990s.[26] This is because the estimates of lifetime childlessness here are based on a reasonable assumption of continuing increases in fertility at older ages. This assumption implies that, on average, the 1971 cohort will have almost as many children after age 30 (0.9) as before age 30 (1.0). Most births after age 30 will be first and second births; 30 per cent of this cohort is projected to have a first birth, and 36 per cent a second birth, after turning 30.[27]

In order for the 1971 cohort to achieve a CFR of 1.9 births per woman, fertility rates at older ages will need to keep rising. If fertility increases at older ages taper off, this will result in lower completed fertility for the 1971 cohort than is projected. For more recent cohorts of women, how many children they have in their thirties will be crucial in determining whether cohort fertility continues to fall. For example, women born in 1976 are likely to have, on average, 0.9 children each by their thirtieth birthdays. In order to match the completed fertility of women born in 1971, they would need to have, on average, 1.0 child each after turning 30. If this does not occur, then the CFR, and, by extension, the TFR, will continue their long-term decline.

This leads to a question which looms large in the minds of potential parents, reproductive scientists and demographers: as posed by Menken, how late can you wait?[28]

FECUNDITY AND THE FUTURE

Although the onset of menopause is a clear marker of the end of reproductive capacity, the ability to reproduce declines over time and generally terminates five to 10 years before the cessation of menses.[29] Levels of fecundity—the biological capacity to produce offspring—by age are difficult to measure. In contemporary populations with high levels of birth control use, consideration must be limited to those not using birth control. However this group is probably biased towards low fecundity, since highly fecund women have more incentive to limit their fertility.[30]

To overcome this problem, researchers have looked to historical populations in which it is believed no birth control was practised. In these populations, the fertility of married women can be used as a proxy for fecundity. That is, a married woman will have had a child if, and only if, she was fecund. For example, a study of English women married in their teens over the period 1550 to 1849 who remained married until the end of their reproductive lives, found that 87 per cent had borne at least one child after the age of 25 years, 77 per cent after age 30, 65 per cent after age 35 and 42 per cent after age 40.[31] Thus 42 per cent of married women were still fecund at age 40, as they had at least one child thereafter.

One problem with this type of study is that fertility levels are associated with marital duration as well as with age. All else being equal, women married at younger ages tend to have fewer children at older ages than do women married relatively late. This may be due to a decrease in coital frequency or to reproductive problems caused by many births.[32] A study of seventeenth-century Northwestern Europe controlled for length of marriage by considering women who married at different ages. This study found that 85 per cent of women marrying at age 30–34 years had at least one child thereafter. Commensurate figures for ages 35–39 and 40–44 were 70 and 36 per cent respectively.[33]

Recent research based on historic French data indicates that, of women who begin trying to conceive naturally at age 30, 75 per cent will have a conception within one year resulting in a live birth, and 91 per cent within four years. For 35-year-old women, the figures are 66 and 84 per cent respectively, and for 40-year-old women, 44 and 64 per cent.[34]

The relevance of these analyses for modern populations is difficult to determine. In earlier populations, less healthy people and those with lower fecundity may have died off before adulthood, thus biasing those who survived to the more fecund (compared to contemporary populations).[35] Conversely, levels of fecundity may be higher in modern populations because people are healthier[36] and some medical conditions that may have caused reproductive health problems for earlier populations can now be diagnosed and remedied.[37] Additionally, assisted reproduction technology (ART) is extending fecundity. Currently, around three per cent of all births in Australia are facilitated by ART.[38] Other points of difference may be coital frequency, the level of breastfeeding, which temporarily dampens fecundity, and the prevalence of sexually transmitted infections which can cause subfecundity or sterility.[39] Also, despite the absence of modern birth control methods, some childlessness may have been by choice in these historical populations, or couples may have acted to limit their fertility.[40]

All studies agree that, for women, fecundity falls through the twenties and early thirties. However the incidence of sterility is not much greater in the early thirties than in the twenties. The main effect of age here is a modest increase in the time to conception.[41] The vast majority of women under the age of 35 years are able to conceive and carry a pregnancy to term. However fecundity declines much more sharply after the mid-thirties.[42] This appears to be mainly caused by ageing of the ova,[43] since women are born with all the eggs they will ever have.

Despite recent high-profile cases of women giving birth in their fifties and into their sixties with the help of medical science,[44] current reproductive technology is not able to fully compensate for the decline in fecundity with age.[45] Future developments in egg donation and in the cryopreservation of eggs may allow many more women to delay childbearing in the future, even past the age of menopause.[46] However advances in ART that extend the age boundaries of childbearing may not be the panacea envisaged by some. It is unlikely that large numbers of women will wish to become new mothers in their fifties and beyond (coping with teenagers in their seventies). Cannold speculates that the removal of women's 'biological imperative' may perversely limit their reproductive options, as societal institutions adjust to the concept that childbearing can be put off almost indefinitely, thus reversing any gains in family-friendly policies.[47]

CONCLUSION

From a demographic perspective, there is plenty of potential for an increase in fertility rates at older ages, even without any future advances in reproductive science. Although precise estimates are impossible to make, it appears that the vast majority of women under the age of 35 years are able to naturally conceive and bear a live child. Fecundity tapers off rapidly thereafter, but probably half of 40-year-olds are still fecund, although with some increase in health risks for both mother and child.

In the early 1920s—the earliest period for which Australia-level data are available—fertility at age 30 and above was more than 50 per cent higher than it is currently (Figure 1). Additionally, earlier Australian cohorts—who were not all exposed to the risk of conception—had

much higher fertility in their thirties and forties than is recorded today (Figure 2). The difference is that, in the past, fertility was higher at older ages because some women had large numbers of children, extending childbearing from their twenties into their late thirties or forties. The recent and projected trend to older-age fertility is due to delayed first births.

From an individual perspective, the general consensus is that if circumstances are conducive, women should have children before age 35. The fact that half the population is still able to bear children at age 40 is good news for Australia's demography but a tragedy for women wanting a child who are in the wrong 50 per cent.

Australian women are entering parenthood progressively later in life. They are delaying fertility through the twenties and, though they are compensating for this somewhat by increases in the thirties, the result of delay is lower completed fertility. It is likely that the birth rate at younger ages will continue to decline, given—among other factors—the competing demands of education and work. It is also likely that fertility over the age of 30 will continue to rise, leading to more older mothers. Whether these rises will be sufficient to stave off long-term decreases in total fertility is yet to be seen.

Acknowledgements

For helpful comments and discussion, the author thanks Katharine Betts, Bob Birrell, Ann Evans, Edith Gray, Peter McDonald, Don Rowland and anonymous referees.

References

1 This paper deals primarily with women, although the author recognises that men are essential to the process of reproduction. Unfortunately, there is very little information on men's fertility in Australia. See E. Gray, 'What do we know about men's fertility levels in Australia?', *People and Place*, vol. 10, no. 4 , 2002, pp. 1–10; P. Corr and R. Kippen, 'The case for parity and birth-order statistics', *Australian and New Zealand Journal of Statistics*, vol. 48, no. 2, 2006, pp. 171–200. For example, the Australian census asks women, but not men, their number of children. This is the only census question that is asked of one sex only.

2 These measures are independent of population age structure. Author's calculations from *Births Australia*, Catalogue no. 3301.0, Australian Bureau of Statistics (ABS), Canberra, 1974 and 2004; *Population by Age and Sex, Australian States and Territories, Time Series Workbook*, Catalogue no. 3201.0, ABS, Canberra, 2005

3 Author's calculations from *Women by Age by Children Ever Born*, special tabulation of the 1996 Australian Census of Population and Housing, ABS, 1999; *Births Australia*, Catalogue no. 3301.0, ABS, Canberra, various years; *Annual Births by Age of Mother by Previous Issue*, 1991–2000, unpublished data from the Perinatal Data Collection, Australian Institute of Health and Welfare, Sydney, 2001 and 2003

4 *Women by Age by Children Ever Born*, special tabulation of the 1981 Australian Census of Population and Housing, ABS, 2005

5 R. Weston, L. Qu, R. Parker and M. Alexander, *It's Not for the Lack of Wanting Kids: A Report on the Fertility Decision Making Project*, Australian Institute of Family Studies, Melbourne, 2004

6 R. Kippen, 'Trends in age- and parity-specific fertility in Australia', *Working Paper in Demography*, No. 91, The Australian National University, Canberra, 2003

7 R. Kippen, 'Trends in age- and parity-specific fertility in Australia', *Working Paper in Demography*, No. 91, The Australian National University, Canberra, 2003.

8 P. McDonald, 'Australia's population futures', in *Migration: Benefiting Australia*, Department of Immigration and Multicultural Affairs, Canberra, 2002, pp. 21–50

9 *Australian Social Trends*, Catalogue no. 4102.0, ABS, Canberra, 2001

10 L. Cannold, *What, No Baby? Why Women are Losing the Freedom to Mother, and How They Can Get It Back*, Curtin University Books, Fremantle, 2005

11 M. Carolan, 'The graying of the obstetric population: implications for the older mother', *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, vol. 32, 2003, pp. 19–27

[12] K.S. Joseph, 'The perinatal effects of delayed childbearing', *Obstetrics and Gynecology*, vol. 105, no. 6, 2005, pp. 1410–1418

[13] H-P. Kohler, F.C. Billari and J.A. Ortega, 'The emergence of lowest-low fertility in Europe during the 1990s', *Population and Development Review*, vol. 28, no. 4, 2002, pp. 641–680

[14] Author's calculations based on age-parity-specific fertility rates derived from *Women by Age, by Age of Each Own Child in the Household*, special tabulations of the 1981, 1986, 1991, 1996 and 2001 Australian Censuses of Population and Housing, ABS, 2006; *Women by Age by Children Ever Born*, special tabulations of the 1981, 1986 and 1996 Australian Censuses of Population and Housing, ABS, Canberra, 1999 and 2005; *Single-year-of-age Fertility Rates*, Australia,1921–1997, unpublished birth registration data, ABS, Canberra, 1999; *Births Australia*, Catalogue no. 3301.0, ABS, Canberra, various years; *Population by Age and Sex, Australian States and Territories, Time Series Workbook*, Catalogue no. 3201.0, ABS, Canberra, 2005; *Annual Births by Age of Mother by Previous Issue*, 1991–2000, unpublished data from the Perinatal Data Collection, Australian Institute of Health and Welfare, Sydney, 2001 and 2003

[15] This concern emanates from demographers, government and social commentators. See, for example, P. McDonald, 'Low fertility in Australia: evidence, causes and policy responses', *People and Place*, vol. 8, no. 2, 2000, pp. 6–21; P. Costello, Launch of the 2006 Census of Population and Housing, National Press Club, Canberra, 24 July 2006 <www.treasurer.gov.au/tsr/content/speeches/2006/014.asp> accessed September 2006; M. Steyn, 'It's breeding obvious, mate', *The Australian*, 18 August 2006, p. 14.

[16] R. Kippen and P. McDonald, 'Can increased immigration be a substitute for low fertility?', *People and Place*, vol. 12, no. 3, 2004, pp. 18–27

[17] At the time of writing, total births but not births by age were available for 2005, hence age-specific fertility rates could not be calculated. Indirect standardisation was used to give an estimate of the 2005 TFR.

[18] The level of the cohort fertility rate in Figure 3 is slightly different from that in Figure 2. The reason for this is the different sources of data for each figure which each give slightly different results.

[19] For example, the 1891 birth cohort had a CFR of 2.6 births per woman, made up of 0.81 first births, 0.65 second births, 0.46 third births and 0.68 fourth and higher-order births. This means that 81 per cent of this cohort had a first birth (that is, at least one birth), 65 per cent had a second birth (that is, at least two births) and 46 per cent had a third birth (that is, at least three births). A determination cannot be made from the chart about the proportion who had fourth and higher-order births because these figures are aggregated.

[20] For the earlier cohorts, these childlessness estimates are substantially less than those of up to 31 per cent in R. Merlo and D. Rowland, 'The prevalence of childlessness in Australia', *People and Place*, vol. 8, no. 2, 2000, pp. 21–32, but are similar to estimates made in P. McDonald, 'The baby boom generation as reproducers: fertility in Australia in the late 1970s and the 1980s', in *Family Formation, Structure, Values*, Institute of Family Studies, Melbourne, 1984. Merlo and Rowland's estimates may be high because of biases in the data source used, the 1961 Australian census. This census instructed: 'State the number of children (both living and dead) from existing marriage (not including children from any previous marriage)'. The mandate to only include children from current marriages may have inflated childlessness estimates for married women, since women in second and subsequent marriages may not have had children in those marriages, but are likely to have had children earlier in their lives.

[21] The projected rates are based on continuing trends observed over the period 1991–2000. See R Kippen, 'Declines in first- and second-birth rates and their effect on levels of fertility', *People and Place*, vol.12, no. 1, 2004, pp. 28–37; R Kippen, 'Trends in age- and parity-specific fertility in Australia', *Working Papers in Demography*, no. 91, Demography and Sociology Program, The Australian National University, Canberra, 2003

[22] For a cross-country analysis of fertility trends, postponement and recuperation, see R. Lesthaeghe and G. Moors, 'Recent trends in fertility and household formation in the industrialized world', *Review of Population and Social Policy*, vol. 9, 2000, pp. 121–170

[23] P. McDonald, 'Contemporary fertility patterns in Australia: first data from the 1996 census', *People and Place*, vol. 6, no. 1, 1998, pp. 1–12

[24] R. Merlo and D. Rowland, 'The prevalence of childlessness in Australia', *People and Place*, vol. 8, no. 2, 2000, pp. 21–32

[25] *Births Australia 1998*, Catalogue no. 3301.0, ABS, Canberra, 1999

[26] See, for example, D. Gray, 'National birth rate plunging', *The Age*, 17 November 1999, p. 1; '28% of women to be childless', *The Mercury*, 17 November 1999, p. 28; M. Gunn, 'The big baby bust', *The Australian*, 20 November 1999, p. 19; R. Gittens, 'Not just a pregnant pause', *Sydney Morning Herald*, 24 November 1999, p. 21

[27] This can be calculated from Table 1. The proportion of women with no children decreases from 46% to 16% between ages 30 and 50, meaning than 30% (46%–16%) of women have a first birth after age 30. The proportion of women with two or more children increases from 33% (21% + 8% + 4%) to 69% (42% + 18% + 9%), meaning that 36% of this cohort have a second birth after age 30.

[28] J. Menken, 'Age and fertility: how late can you wait?', *Demography*, vol. 22, no. 4, 1985, pp. 469–483

[29] R.P. Jansen, 'Fertility in older women', *IPPF Medical Bulletin*, vol. 18, no. 2, 1984, pp. 4–6

[30] U. Larsen and J.W. Vaupel, 'Hutterite fecundability by age and parity: strategies for frailty modeling of event histories', *Demography*, vol. 30, no. 1, 1993, pp. 81–102; Menken, 1985, op.cit.; J. Menken, J. Trussell and U. Larsen, 'Age and infertility', *Science*, vol. 233, no. 4771, 1986, pp. 1389–1394

[31] U. Larsen and J. Menken, 'Measuring sterility from incomplete birth histories', *Demography*, vol. 26, no. 2, 1989, pp. 185–201

[32] J.A. McFalls, 'The risks of reproductive impairment in the later years of childbearing', *Annual Review of Sociology*, vol. 16, 1990, pp. 491–519

[33] Menken, 1985, op. cit.

[34] H. Leridon, 'Can assisted reproduction technology compensate for the natural decline in fertility with age? A model assessment', *Human Reproduction*, vol. 19, no. 7, 2004, pp. 1548–1553

[35] J.A. McFalls, 'The risks of reproductive impairment in the later years of childbearing', *Annual Review of Sociology*, vol. 16, 1990, pp. 491–519

[36] U. Larsen and J.W. Vaupel, 'Hutterite fecundability by age and parity: strategies for frailty modeling of event histories', *Demography*, vol. 30, no. 1, 1993, pp. 81–102

[37] Menken, 1985, op.cit.; J.A. McFalls, 'The risks of reproductive impairment in the later years of childbearing', *Annual Review of Sociology*, vol. 16, 1990, pp. 491–519

[38] A-M. Waters, J.H. Dean and E.A Sullivan, *Assisted Reproduction Technology in Australia andNew Zealand 2003*, Catalogue no. PER 31, Australian Institute of Health and Welfare, Sydney, 2006; *Births Australia 2003*, Catalogue no. 3301.0, ABS, Canberra, 2004

[39] McFalls, 1990, op. cit.

[40] Menken, 1985, op. cit.

[41] J. McDonald, A. Rosina, E. Rizza and B. Colombo, 'Age and fertility: can we wait until the early 30s?', *Applications and Policy Working Paper A04/22*, Southampton Statistical Sciences Research Institute, 2004; Menken, 1985, op. cit.

[42] McFalls, 1990, op. cit.

[43] L.J. Heffner, 'Advanced maternal age—how old is too old?', *New England Journal of Medicine*, vol. 351, 2004, pp.1927–1929

[44] 'A miracle baby for mum, 52', Daily Telegraph, 8 July 2006, p. 23; O. Duff, 'Doctor aged 62 becomes Britain's oldest mother', *The Independent*, 8 July 2006, p. 15; J. Bone, '59-year-old mother has twins to join her toddler', *The Times*, 4 July 2006, p. 33; S. Goldenberg, 'Woman, 62, gives birth to 12th child', *The Guardian*, 23 February 2006, p. 22; F. Barton, 'The proud new mum—aged 66—disturbing portrait of world's oldest mother', *The Sunday Mail*, 24 April 2005, p. 37

[45] H. Leridon, 'Can assisted reproduction technology compensate for the natural decline in fertility with age? A model assessment', *Human Reproduction*, vol. 19, no. 7, 2004, pp. 1548–1553

[46] E.H. Stephen, 'Demographic implications of reproductive technologies', Population Research and Policy Review, vol. 19, 2000, pp. 301–315; 'Egg freezing set to become more common?', *BioNews*, vol. 9, January, 2006 <www.bionews.org.uk/new.lasso?storyid=2877> viewed September 2006

[47] Cannold, 2005, op. cit.