The impact of monetary incentives on general fertility rates in Western Australia

Amanda T Langridge,[1] Natasha Nassar,[1,2] Jianghong Li,[1,3] Peter Jacoby,[1] Fiona J Stanley[1]

[1]Telethon Institute for Child Health Research, Centre for Child Health Research, University of Western Australia, Perth, Australia
[2]Kolling Institute of Medical Research, University of Sydney, Australia
[3]Centre for Developmental Health, Curtin University of Technology, Perth, Australia

Correspondence to
Dr Amanda Langridge, Telethon Institute for Child Health Research, PO Box 855, West Perth WA 6872, Australia; amandal@ichr.uwa.edu.au

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ABSTRACT

Background There has been widespread international concern about declining fertility rates and the long-term negative consequences particularly for industrialised countries with ageing populations. In an attempt to boost fertility rates, the Australian Government introduced a maternity payment known as the Baby Bonus. However, major concerns have been raised that such monetary incentives would attract teenagers and socially disadvantaged groups.

Methods Population-level data and generalised linear models were used to examine general fertility rates between 1995 and 2006 by socioeconomic group, maternal age group, Aboriginality and location in Western Australia prior to and following the introduction of the Baby Bonus in July 2004.

Results After a steady decline in general fertility rates between 1995 and 2004, rates increased significantly from 52.2 births per 1000 women, aged between 15 and 49 years, in 2004 to 58.6 births per 1000 women in 2006. While there was an overall increase in general fertility rates after adjusting for maternal socio-demographic characteristics, there were no significant differences among maternal age groups (p=0.98), between Aboriginal and non-Aboriginal women(p=0.80), maternal residential locations (p=0.98) or socioeconomic groups (p=0.68). The greatest increase in births were among women residing in the highest socioeconomic areas who had the lowest general fertility rate in 2004 (21.5 births per 1000 women) but the highest in 2006 (38.1 births per 1000 women).

Conclusions Findings suggest that for countries with similar social, economic and political climates to Australia, a monetary incentive may provide a satisfactory solution to declining general fertility rates.

INTRODUCTION

Fertility rates are declining around the world and have been doing so for more than 25 years. A recent Unicef report stated that between 1970 and 2006 the crude birth rate fell by 35% in industrialised countries, 39% in developing countries and 34% in the least developed countries.[1] Many factors have been suggested as contributing to the decline, such as delayed childbearing,[2] higher educational attainment among women [3] and increased costs associated with raising children.[4]

Governments from many industrialised countries have implemented a range of policies and strategies in attempts to boost fertility rates, including monetary incentives, parental leave, workplace flexibility and more widely available and subsidised childcare.[5–10] However, the success of these policies has varied across countries and by the type of strategy implemented.[11–14] While policy can influence birth rates, evidence suggests that social, economic and demographic factors such as the economic climate, unemployment rates, tax offsets and increases in women's educational attainment and labour force participation[2 3 15–17] can also impact, directly or indirectly, on fertility.

In May 2004, the Australian Government announced the introduction of a fertility policy in the form of a maternity payment known as the Baby Bonus. The payment is paid to the primary carer following the birth of a child (Box 1). It was paid for all births from 1 July 1 2004 and was not means-tested. In July 2007, parents under the age of 18 years and families deemed to be vulnerable received the payment in fortnightly instalments.[18] The payment was introduced at AUD$3000 (€1500, USD$2000) per baby in July 2004, increased to AUD$4000 (€2000, USD$2500) in July 2006 and increased again to AUD$5000 (€2500, USD$3200) in July 2008.

The announcement of the Baby Bonus sparked extensive discussion and concerns were raised that such monetary incentives would attract teenagers and socially disadvantaged groups. With the availability of population-level birth data for Western Australia (WA) from 1995–2006, the aim of this study was to investigate whether the introduction of the Baby Bonus was associated with increased general fertility rates among teenagers and socially disadvantaged groups.

METHODS

Data sources

The population used for this study comprised all births in WA between 1995 and 2006 (N=308 544). For the multivariate regression analyses this was reduced to births between 1 January 1 2004 and 31 December 31 2006 (N=81 179) as the required denominator (stratified by maternal socio-demographic characteristics) was not available prior to 2004. Data were obtained from the Midwives' Notification System (MNS), a statutory collection of all births in WA, with complete and validated birth information from 1980 onwards.[19] Data available from this collection include demographic information about the mother (eg, age, marital status, ethnicity), pregnancy (eg, complications and medical conditions), labour and delivery, and infant (eg, gender and birth weight).

Maternal and social characteristics

General fertility rates were examined in relation to pre and post Baby Bonus years by various maternal

Box 1 Baby Bonus eligibility criteria

- Primary carer and infant meeting Australian residency requirements;
- Formal registration of the birth (effective from 1 July 2007); and
- Primary carer to be legally responsible for the health and welfare of the child.[42]

All eligibility requirements had to be met within the first 13 weeks of the birth and is paid for all births, including stillbirths and early neonatal deaths.

characteristics. Maternal age was divided into six categories:15–19, 20–24, 25–29, 30–34, 35–39, 40–44 and 45–49 years. Maternal Aboriginality was obtained from the MNS and verified by self-reported information from the birth registrations. Parity was calculated using data from the MNS (ie, number of children born and still alive, number of children born alive and now dead). Residential location was defined as major city, inner regional, outer regional, rural or remote, or very remote, and was based on the remoteness area index (RAI) produced by the Australian Bureau of Statistics (ABS).[20] The RAI assigned to each mother was based on the location of her household collection district (CD) at the time of the birth. CDs are currently the smallest area for which socioeconomic data can be obtained and contain approximately 250 households, although this may vary, particularly in more sparsely populated areas.[21]

Community-level socioeconomic status (SES) for each mother was determined using CD-level data available from the 2006 Socioeconomic Indexes for Areas (SEIFA).[21] SEIFA are area-level indices produced by the ABS, based on National Census data, collected every 5 years. The Index of Education and Occupation (IEO) was used in this study as it was found to be the best predictor of community-level SES. The IEO provides an indication of community level access to economic resources and the average educational qualifications and occupational status of the individuals residing in a CD.[22] Group one represents a CD where most of the people living within that area have higher educational qualifications or are in highly skilled occupations and there are few people who have no qualifications or are in low-skilled occupations. Conversely, group six is a CD where many people living within that area have few qualifications, are unemployed or are in low-skilled occupations and also have less people with higher educational qualifications or in highly skilled occupations.[23] As with the RAI, the community-level SES assigned to the mother was based on her CD at the time of the birth. Approximately 8% of births had missing CD information; this group was assigned 'unknown' and included as such in all analyses.

Analyses

The trend in the annual general fertility rate in WA from 1995–2006 was assessed based on the annual number of births divided by the total number of women of childbearing age (15 to 49 years) in the relevant census year. The total number of childbearing women was determined using population data obtained from the ABS. Although annual numbers of the female estimated residential population are available from the ABS, they are not available with a breakdown by various maternal socio-demographic characteristics at the time of birth. This detailed information is available from the Census data and was used to obtain the breakdown of childbearing women in WA, which enabled general fertility rates to be assessed by age group, SES, location and Aboriginality for each year. As Census data are only available every 5 years (ie, 1996, 2001, 2006) the population denominators were applied by these 5-year intervals. Additionally, median age at first birth by SES between 1995 and 2006 was examined and Mantel-Haenszel χ^2 tests[24] were used to examine trends in parity across years.

A segmented negative binomial regression model was used to examine changes in overall general fertility rates between 1995 and 2006.[25] This model fits separate trend lines to the pre and post Baby Bonus years and provides a direct estimate of the immediate effect of the Baby Bonus. The year 2005 was defined as the first post Baby Bonus year as the policy announcement occurred in May 2004 and so infants born after February 2005 could have been conceived with the intention of receiving the monetary incentive.

Negative binomial regression models[26 27] were used to investigate the associations between general fertility rate, birth year and maternal characteristics during the years 2004–2006. For these analyses, the 2006 Census population was applied to estimate the childbearing population in 2004, 2005 and 2006. Independent variables in the models were age group, location, year and community SES category with number of births in each combination of variable categories as the dependent variable. Because changes in general fertility rates for different groups of mothers between the pre and post Baby Bonus years were the main focus of interest in this study, we included interaction terms in the models as follows: birth year × age group, birth year × location, birth year × Aboriginal status and birth year × SES category. An overall p value for each interaction effect was obtained using the likelihood ratio from type 3 analyses and $p<0.05$ were considered statistically significant. In addition, annual fitted mean general fertility rates for each maternal characteristic group were calculated. All analyses were performed using SAS version 9.1.[28]

RESULTS

There was a steady decline in the general fertility rate between 1998 and 2004 (figure 1). This trend reversed in 2005 when the general fertility rate increased from 52.2 births per 1000 women, aged between 15 and 49 years, in 2004 to 55.2 births per 1000 women in 2005 and 58.6 births per 1000 women in 2006. The segmented regression model estimated that prior to the introduction of the Baby Bonus the general fertility rate was declining annually by around 1% (RR 0.991, 95% CI 0.988 to

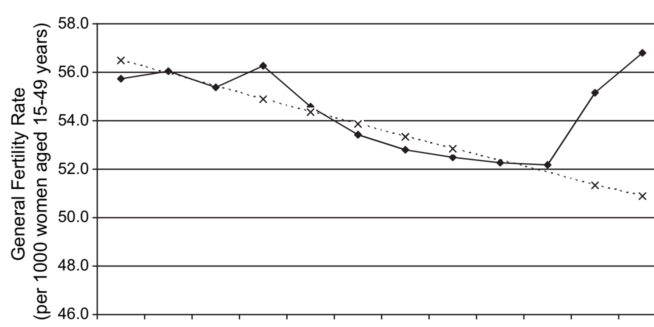

Figure 1 Actual birth rates and fitted trend. —◆—Actual general fertility rate. Fitted trend··×··.

0.993) (figure 1). However in 2005, following the introduction of the Baby Bonus, there was a significant increase in births (7.4%, $p<0.01$) compared to what could have been expected based on the trend between 1995 and 2004. The difference in births between the pre and post Baby Bonus trends was approximately 3.9% ($p<0.01$).

Between 2004 and 2006, general fertility rates increased across most maternal characteristics and all levels of community SES (table 1). Prior to adjusting for any maternal characteristics, women aged 30–34 years had the highest general fertility rate with 131.9 births per 1000 women in 2006, while women aged 35–39 years had the greatest increase in general fertility rate, with an absolute increase of 14.7 births per 1000 women from 2004–2006. Women aged 15–19 years were the only group to have a slight decline in their general fertility rate from 2005–2006, and they had the second lowest increase in the overall general fertility rate with an increase of 1.1 births per 1000 women between 2004 and 2006. Aboriginal women had a general fertility rate twice as high as non-Aboriginal women, and general fertility rates by maternal residential location were highest in the remote and very remote areas. Examining general fertility rates by community SES showed a gradual increase across socioeconomic groups with group one (highest SES) having the lowest general fertility rate and group six (lowest SES) having the highest.

There was an overall increase in median age at first birth across all socioeconomic groups, although there was no significant change following the introduction of the Baby Bonus. Examination of trends in parity between 1995 and 2006 revealed there was a steady increase in first births ($p<0.01$), but a declining trend in third births ($p<0.01$) and fourth or more births ($p<0.05$). Between 2004 and 2006, only second births ($p<0.05$) decreased markedly, although there was a small increase in the percentage of third (14.9% to 15.3%) and fourth or more births (9.4% to 9.7%).

After adjusting for various maternal socio-demographic characteristics, women aged 25–29 years had the highest average general fertility rate across all years, increasing from 125.1 births per 1000 women in 2004, to 145.4 births per 1000 women in 2006 (figure 2A). Between 2004 and 2005 women aged 25–29 years also had the greatest increase in general fertility rate (13.5 births per 1000 women), although they were surpassed by women aged 20–24 years in 2005 and 2006 (28.1 births per 1000 women) (figure 2A). Although there was an increase in general fertility rates across all years and among all age groups, there were no statistically significant differences in the general fertility rates among the maternal age groups ($p=0.98$).

Similarly, after adjusting for all factors, Aboriginal women continued to have a higher general fertility rate compared to non-Aboriginal women (figure 2B). There was not a significant difference in the increases in general fertility rates between Aboriginal and non-Aboriginal women ($p=0.80$). Women living in the major city area had the highest general fertility rate across all years, with 32.4 births per 1000 women in 2004, increasing to 38.8 births per 1000 women in 2006 (figure 2C). However, the greatest increase in general fertility rates occurred among women living in the outer regional area between 2004 and 2005 (5.9 births per 1000 women), and in the inner regional area in 2005 and 2006 (4.3 births per 1000 women). While general fertility rates increased among all maternal residential locations there were no differences between the groups ($p=0.98$).

The final model examined general fertility rates among community level socioeconomic groups (figure 2D). The greatest increase in general fertility rates were among women residing in

Table 1 Socioeconomic and demographic characteristics of mothers who gave birth in 2004–2006

	2004 births, N (general fertility rate*)	2005 births, N (general fertility rate*)	2006 births, N (general fertility rate*)
Total births	25528 (52.1)	26986 (55.1)	28665 (58.6)
Maternal age group (y)			
15–19	1119 (16.4)	1215 (17.8)	1193 (17.5)
20–24	3765 (56.9)	3933 (59.4)	4429 (66.9)
25–29	6586 (106.1)	6824 (109.9)	7158 (115.3)
30–34	8611 (124.3)	8913 (128.6)	9142 (131.9)
35–39	4486 (60.1)	5003 (67.0)	5582 (74.8)
40–44	919 (12.2)	1055 (14.0)	1105 (14.6)
45–49	42 (0.6)	43 (0.6)	56 (0.8)
Aboriginality			
Non-Aboriginal	23953 (50.5)	25265 (53.3)	26857 (56.6)
Aboriginal	1575 (104.1)	1721 (113.8)	1808 (119.5)
Location†			
Major city	17125 (48.5)	18221 (51.6)	19376 (54.9)
Inner regional	2828 (46.6)	3161 (52.1)	3510 (57.9)
Outer regional	2255 (54.2)	2454 (59.0)	2592 (62.3)
Remote and very remote	1901 (58.4)	2087 (64.1)	2285 (70.2)
Index of education and occupation†			
1=Highly educated, highly skilled occupations	1450 (37.6)	1536 (39.9)	1733 (45.0)
2	3367 (41.4)	3420 (42.1)	3739 (46.0)
3	6740 (47.0)	7226 (50.4)	7728 (53.9)
4	5937 (50.0)	6547 (55.1)	6861 (57.8)
5	3668 (53.5)	3929 (57.3)	4328 (63.2)
6=Few qualifications, low skilled occupations	2067 (59.8)	2229 (64.4)	2322 (67.1)

*Births per 1000 women aged 15–49 years.
†Numbers do not add up to totals due to missing data.

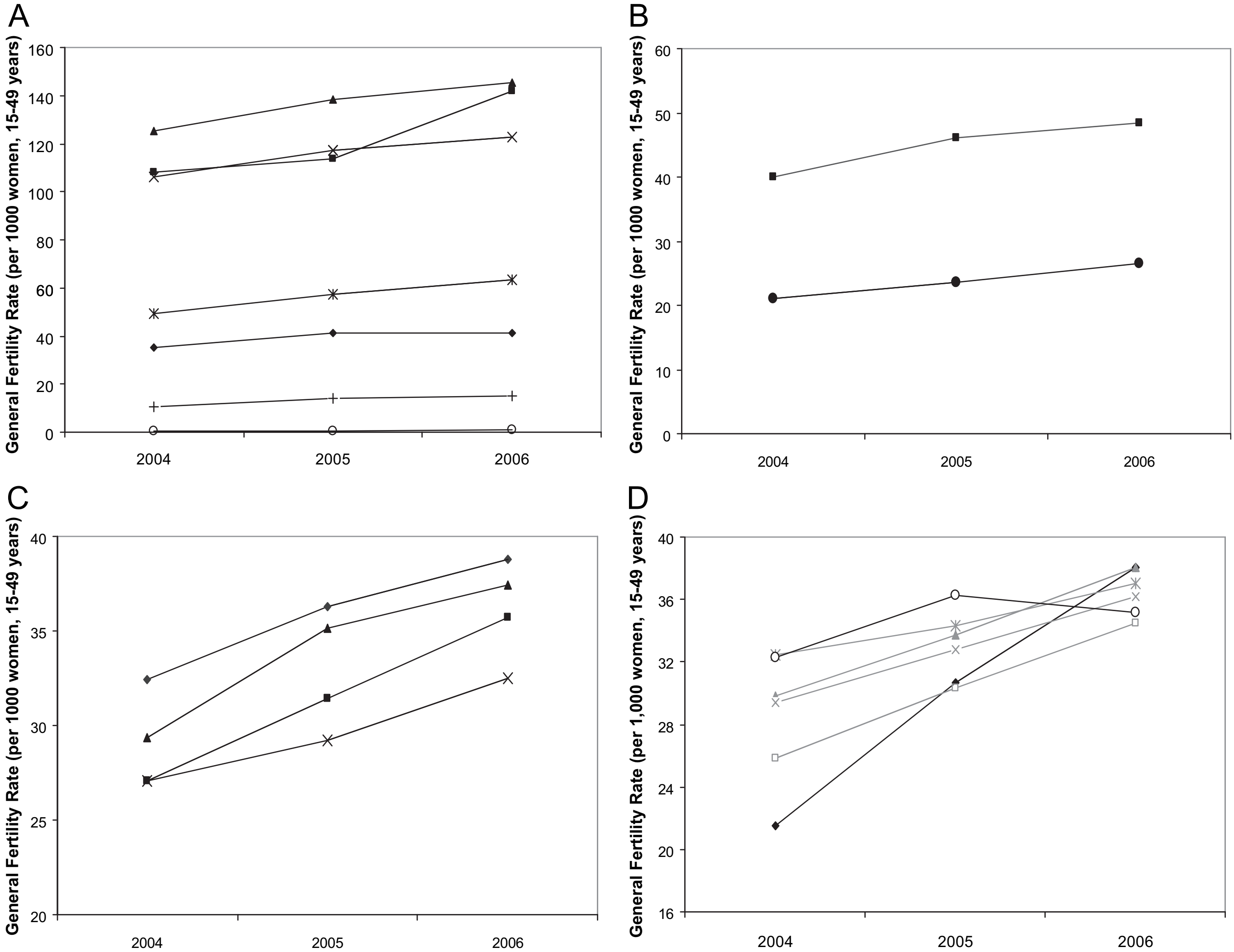

Figure 2 (A) Adjusted general fertility rate for maternal age group by year; (B) adjusted general fertility rate for Aboriginality by year; (C) adjusted general fertility rate for location by year; (D) adjusted general fertility rate for index of education and occupation by year. A: —◆— 15–19, —■— 20–24, —▲— 25–29, —×— 30–34, —✳— 35–39, —+— 40–44, —○— 45–49. B: —●— Non-Aboriginal, —■— Aboriginal, —◆— major city, —■— inner regional, —▲— outer regional, —×— remote or very remote. —◆— 1 highest, —□— 2, —▲— 3, —×— 4, —✳— 5, —○— 6 (lowest).

areas of the highest SES (group one) who had the lowest general fertility rate in 2004 with 21.5 births per 1000 women but the highest in 2006 with 38.1 births per 1000 women. In contrast, women living in areas of the lowest SES (group six) had the smallest increase in general fertility rate between 2004 and 2006 with an increase of only 2.9 births per 1000 women. Additionally, group six was the only group whose general fertility rate declined with the general fertility rate falling slightly from 36.3 births per 1000 women in 2005 to 35.2 births per 1000 women in 2006. However, while there was a general increase in general fertility rates across most socioeconomic groups, there was no significant overall difference between groups (p=0.68).

DISCUSSION

This is the first study to investigate the association between monetary incentives and general fertility rates at CD-level using population-level data and adjusting for various maternal characteristics. Compared to 2004 (prior to the Baby Bonus), the WA general fertility rate increased significantly in 2005 and again in 2006. Importantly, this increase was not exclusively among teenagers or socially disadvantaged groups. Rather, there was a general increase among most maternal age groups, in both Aboriginal and non-Aboriginal women, in all maternal residential locations and among all community level socioeconomic groups. Furthermore, there were no changes in median age at first birth by socioeconomic group and no significant change in parity after 2004 except for a slight decline in second births. The women contributing most to the increase were aged 20 to 29 years, and primarily living in areas of highest socioeconomic advantage characterised by a higher proportion of individuals with higher educational qualifications or in highly skilled occupations.

This study does not support claims that the Baby Bonus increased general fertility rates among teenagers and socially disadvantaged groups. Evidence from previous studies lend support to these findings, showing that teenagers and socially disadvantaged groups often have different motivations for having children, such as viewing teen motherhood as a meaningful life experience,[29,30] and having limited expectations in regards to continuing education and their future career.[29] Additionally, while the Baby Bonus may not appear to be an appealing incentive for women living in the highest socioeconomic groups, anecdotal evidence published on online forums indicates that, for some women and families, it contributed to their decision to have a child as it was used as a substitute for paid maternity leave, which is largely unavailable in Australia.[31 32]

A monetary incentive similar to the Baby Bonus, known as the Allowance for Newborn Children, was implemented in Quebec in the late 1980s in an attempt to boost birth rates. However, as the total number of births did not increase, the Allowance for Newborn Children was deemed ineffective and cancelled in 1997. Unfortunately, the true positive effect of the fertility policy was not revealed as birth rates were not adjusted for the number of childbearing women in the population.[12 33] Similar to the post hoc findings from Quebec, our analyses demonstrate an increase in birth rates following the introduction of the Baby Bonus.

Our finding is also similar to a recently published Australian study from New South Wales (NSW)[34] which showed an increase in the general fertility rate following the introduction of the Baby Bonus, although they also reported a small but significant increase in teenage births and third births. However, one of the principle limitations with the NSW analysis was the use of a larger statistical local area (SLA) to define geographical location and broader categories to assign SES. Compared to the smaller area-level measure used in our study (CD level), a single SLA can consist of up to 309 CDs. These larger aggregations mask considerable SES variation among CDs and the individuals living within them. There is also misclassification at higher aggregations with an Australian study finding almost 50% of residents are misclassified at postcode level compared to CD level.[35] Access to CD-level data allowed small area-level analysis to examine the influence of community SES on the Baby Bonus. Additionally, the NSW analysis differed with the use of only two locations (rural or metropolitan) compared to four used in this study, and they only examined three socioeconomic groups (top 20%, middle 60% and bottom 20%) compared to six in our study. Results may also have differed due to differences in the demographic characteristics of the populations and the timing of the Baby Bonus corresponding to a booming economic climate in WA[36] not experienced by NSW. Unfortunately, this study was unable to disentangle the effects of the resources boom from that of the Baby Bonus on general fertility rates in WA.

A limitation of the community level SES used in our analysis is that while the within-in group differences for groups one and six tend to be quite small, there is much more diversity within groups two to five.[37] Additionally, while data on all mothers who gave birth in WA were available, information regarding who applied for the Baby Bonus was not. Consequently, it was not possible to examine whether there were any differences between those who claimed the Baby Bonus and those who did not. However, given that information pertaining to the Baby Bonus was provided at the hospital following the birth, it is highly likely that all eligible families had access to relevant information and documentation. One other potential limitation of this study is the use of a constant denominator for 2004, 2005 and 2006 in the regression analyses. While annual estimated residential populations are available from the ABS, they are not available with a breakdown by age group, SES, location and Aboriginality as required for our stratified analyses and, as such, could not be used in our analysis. Thus, we applied the constant childbearing population obtained from the 2006 Census for 2004, 2005 and 2006.

The extent to which the increase in the general fertility rate between 2004 and 2006 can be attributed to the Baby Bonus is difficult to determine. While there has been an increase in the general fertility rate across Australia since the introduction of the Baby Bonus,[38] the Australian Productivity Commission has stated that it believes the contribution of the policy to the increased general fertility rate is only moderate and several other factors are likely to have contributed. These factors include the improved economic climate, increased flexibility in the labour market and births to women who previously delayed child bearing.[39] While births to women who previously delayed child bearing may partially explain higher general fertility rates among 25 to 34-year-old women, it does not explain the increase in the general fertility rate observed among women aged 20–24 years. Possible explanations include a change in women's attitudes about child bearing with more tertiary educated women now deciding to have children at an earlier age.[40] The Baby Bonus policy may have also encouraged women to have children at slightly younger ages where, although this would bring births forward and increase the general fertility rate in the short-term and among younger age groups, it would not actually increase the overall number of births in Australia in the long-term.

There may be both clinical and public health implications associated with an increase in the number of births. In the short-term, an increase in births may place greater strain on maternity care services, staff and resources and, in the longer-term, on health, education and social services. The full effects of the Baby Bonus on services, as well as the impact on the overall fertility rate in Australia, will require longer-term follow-up.

In conclusion, results showed that there was a significant increase in the general fertility rate between 2004 and 2006 that appears to be associated with the introduction of the Baby Bonus. More importantly, findings highlight that the increase in the general fertility rate among teenagers and socially disadvantaged groups was not different to that for other women in WA. Future studies with longer follow-up periods are required to investigate general fertility rates and to confirm if the trends observed in this study have continued post-2006. It would also be of interest for other Australian states to undertake similar

What is already known on this subject

Fertility rates are declining around the world and have been doing so for more than 25 years. There are many factors contributing to this decline, including delayed child bearing, higher educational attainment among women and increased costs associated with raising children. Governments have implemented a range of policies and strategies in attempts to boost fertility rates, although the success of these policies has varied across countries and by the type of strategy implemented.

What this paper adds

In July 2004, the Australian Government introduced a fertility policy in the form of a maternity payment known as the Baby Bonus. There was a significant increase in the general fertility rate between 2004 and 2006, which appears to be associated with the introduction of the Baby Bonus, with the greatest increase in births among women residing in the highest socioeconomic areas who had the lowest general fertility rate in 2004 but the highest in 2006.

analyses at the CD level to compare findings. As findings from our study are different to those from NSW, it suggests that the Baby Bonus did not have a uniform impact in all states. This suggests that the impact of the policy was affected by other factors, including the economic climate and demographic characteristics of the state's population, which may be important factors to consider for any future fertility policy. Finally, given the current global financial crisis and the Government's announcement to introduce means testing for the Baby Bonus from January 2009,[41] it would be of considerable interest to conduct a follow-up study to examine whether the means testing would alter the nature and magnitude of the association between the Baby Bonus and general fertility rates.

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Competing interests None.

Ethics approval This study was conducted with the approval of the Human Research Ethics Committee at the University of Western Australia, the Western Australian Aboriginal Health Information and Ethics Committee and the Human Research Ethics Committee at the Department of Health, Western Australia.

Contributors All authors participated in the design, analysis, interpretation and writing of this study and have seen and approved the final version.

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