

# women's health *a u s t r a l i a*



the australian longitudinal  
study on women's health

## Reproductive health: *Findings from the Australian Longitudinal Study on Women's Health*

### Authors:

Deborah Loxton and Jayne Lucke

on behalf of the Australian Longitudinal Study on Women's Health



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# Major Report D

## Reproductive Health: Findings from the Australian Longitudinal Study on Women's Health

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### Contributors to this Report:

	University of Queensland	University of Newcastle
<b>Team Leaders:</b>	Jayne Lucke	Deborah Loxton
<b>Contributors:</b>	Danielle Herbert Melissa Johnstone Liane McDermott Melanie Watson	Catherine Chojenta Xenia Dolja-Gore Stacey Hosking Jennifer Powers
<b>Reviewers:</b>	Annette Dobson Wendy Brown	
<b>Production:</b>	Megan Ferguson	

# Table of Contents

List of Tables.....	v
List of Figures.....	vii
<b>1. Executive Summary .....</b>	<b>1</b>
1.1. Childbearing among the cohorts.....	1
1.2. Use of contraception.....	2
1.3. Aspirations.....	2
1.4. Fertility and infertility.....	3
1.5. Prenatal and maternal health behaviour .....	3
1.6. Maternal health.....	4
1.7. Motherhood and paid work .....	5
<b>2. Introduction .....</b>	<b>6</b>
2.1. Key Findings.....	6
2.2. The Australian Longitudinal Study on Women’s Health.....	6
2.3. Aims.....	8
2.4. Report structure .....	8
2.5. Fertility rates .....	9
2.6. Characteristics of women having children during the last decade .....	12
2.7. Conclusion .....	13
2.8. References.....	14
<b>3. Use of contraception .....</b>	<b>15</b>
3.1. Key findings .....	15
3.2. Introduction.....	15
3.3. Contraception use at each survey.....	17
3.4. Factors associated with contraception use.....	20
3.5. Change in contraception use over time .....	20
3.6. Change over time in method of contraception used .....	23
3.6.1. <i>Patterns of oral contraceptive pill use .....</i>	<i>23</i>
3.6.2. <i>Patterns of condom use.....</i>	<i>23</i>
3.6.3. <i>Patterns of implant use.....</i>	<i>26</i>
3.7. Changes in the use of contraception after a reproductive event .....	26
3.8. Discussion .....	31
3.9. References.....	31
<b>4. Aspirations for children .....</b>	<b>33</b>
4.1. Key Findings.....	33
4.2. Introduction.....	33
4.3. Motherhood aspirations.....	35
4.3.1. <i>Motherhood aspirations of the 1973-1978 cohort .....</i>	<i>35</i>
4.3.2. <i>Motherhood aspirations of childless women and mothers .....</i>	<i>36</i>
4.3.3. <i>Motherhood aspirations of women with one child or two children.....</i>	<i>37</i>

4.3.4. <i>Motherhood and relationship aspirations</i> .....	38
4.3.5. <i>Motherhood, relationship and employment aspirations</i> .....	38
4.4. Consistency/inconsistency of aspirations across surveys .....	40
4.4.1. <i>Motherhood aspirations over time</i> .....	41
4.4.2. <i>Motherhood aspirations after first birth</i> .....	41
4.4.3. <i>Motherhood aspirations after first birth and other life events</i> .....	43
4.5. Do aspirations match behaviour? .....	48
4.5.1. <i>Motherhood aspirations and number of children</i> .....	49
4.6. Discussion .....	49
4.7. References .....	50
<b>5. Fertility and infertility</b> .....	<b>52</b>
5.1. Key findings .....	52
5.2. Introduction.....	52
5.3. Pregnancy losses for the 1973-1978 cohort.....	53
5.4. Self-reported infertility, medical advice and use of treatment.....	59
5.5. Factors associated with self-reported infertility, medical advice and use of treatment .....	63
5.6. Discussion .....	67
5.6.1. <i>Pregnancy losses</i> .....	67
5.6.2. <i>Self-reported infertility, seeking advice and use of treatment</i> .....	68
5.7. References .....	70
<b>6. Prenatal and maternal health behaviours</b> .....	<b>71</b>
6.1. Key findings .....	71
6.2. Diet and physical activity.....	71
6.2.1. <i>Diet</i> .....	72
6.2.2. <i>Physical Activity</i> .....	74
6.3. Prescription medication, prenatal and maternal health behaviours .....	75
6.4. Participant characteristics .....	77
6.4.1. <i>Prescribed medication use by women before, during and after pregnancy</i> .....	78
6.4.2. <i>Differences in medication prescriptions by area of residence</i> .....	81
6.4.3. <i>Conclusion</i> .....	83
6.5. Use of tobacco and alcohol during pregnancy .....	83
6.5.1. <i>Summary</i> .....	89
6.6. References .....	89
<b>7. Maternal health</b> .....	<b>93</b>
7.1. Key findings .....	93
7.2. Introduction.....	93
7.3. The health of mothers.....	94
7.3.1. <i>Participant characteristics</i> .....	94
7.3.2. <i>General health, symptoms and mental health of mothers</i> .....	95
7.4. Postnatal depression .....	99
7.4.1. <i>Participants</i> .....	100
7.4.2. <i>Predictors of postnatal depression</i> .....	100
7.4.3. <i>Demographics</i> .....	100
7.4.4. <i>Previous depression</i> .....	102

7.4.5. Previous anxiety.....	102
7.4.6. Life Events.....	103
7.4.7. Social support .....	105
7.4.8. Participants – first births only.....	107
7.4.9. Previous depression – first births only.....	107
7.4.10. Previous anxiety – first births only.....	109
7.5. Conclusion .....	110
7.6. References.....	110
<b>8. Motherhood and paid work.....</b>	<b>112</b>
8.1. Key findings .....	112
8.2. Employment patterns.....	113
8.2.1. Employment after first birth.....	114
8.2.2. Employment status transitions and motherhood.....	116
8.3. Maternity leave and health .....	120
8.4. Discussion .....	128
8.5. References.....	128
<b>Appendices .....</b>	<b>130</b>
Appendix A: ALSWH design, attrition and retention.....	130
Appendix B: Supplementary information for Section 3 - Use of contraception .....	134
Appendix C: Supplementary table for Section 5 - Fertility and infertility .....	139
Appendix D: Comparison of consenters and non-consenters to Medicare and PBS linkage.....	141

## List of Tables

Table 1-1	Survey schedule and response rates for the ALSWH 1973-1978 cohort .....	1
Table 2-1	Schedule of surveys for the Australian Longitudinal Study on Women's Health, age in years and number of participants in each cohort .....	7
Table 2-2	Number of children of women in the 1973-1978 cohort at Survey 4 .....	11
Table 2-3	Demographic characteristics of women in the 1973-1978 cohort according to whether they have children or not, Surveys 1 to 4 .....	14
Table 3-1	Reasons for not using contraception (N=6708) .....	20
Table 3-2	Characteristics of contraception users, by Survey .....	21
Table 3-3	Categories of reproductive events and their descriptions .....	26
Table 3-4	Proportion of reproductive events between surveys .....	27
Table 3-5	Categories of transitions in contraception use and their descriptions .....	27
Table 4-1	Motherhood status of 1973-1978 cohort from Survey 2 to Survey 3, and Survey 3 to Survey 4 .....	42
Table 4-2	Motherhood aspirations of the 1973-1978 cohort across Survey 2 and Survey 3 and Survey 3 to Survey 4 .....	43
Table 4-3	Percentages of women according to life transitions between Survey 2 and Survey 3, and Survey 3 and Survey 4 .....	45
Table 4-4	Crosstabulation of motherhood aspirations at Survey 4 and number of live births (full-term and premature) at Survey 4 .....	48
Table 4-5	Crosstabulation of motherhood aspirations at Survey 4 and number of live births (full-term and premature) at Survey 4 .....	49
Table 5-1	Total recognised pregnancy outcomes of the 1973-1978 cohort .....	54
Table 5-2	Reproductive histories of the 1973-1978 cohort .....	55
Table 5-3	Associations between reproductive histories and having infertility and sought advice for women aged up to 25-30 years in the 1973-1978 cohort .....	62
Table 5-4	Associations between reproductive histories and having infertility, sought advice and used treatment for women aged 28-33 years in the 1973-1978 cohort .....	63
Table 5-5	Factors associated with having infertility, sought advice and used treatment in the 1973-1978 cohort .....	64
Table 5-6	Effect of selected significant factors on having infertility, sought advice and used treatment for women aged 28-33 years in the 1973-1978 cohort .....	66
Table 6-1	Categories of risk of drug use in pregnancy .....	76
Table 6-2	Demographics and medications at Survey 4 of women from the 1973-1978 cohort who consented to data linkage by pregnancy status .....	77
Table 6-3	Medications claimed during 2005 by women from the 1973-1978 cohort by pregnancy status .....	78
Table 6-4	PBS medications claimed by women who were pregnant in 2005 by pre-pregnancy, pregnancy and post-pregnancy periods .....	79
Table 6-5	Top ten medications claimed by women in the 1973-1978 cohort who gave birth in 2005 .....	80
Table 6-6	Definition of levels of risk for alcohol consumption among pregnant and non-pregnant women (2001) .....	84

Table 6-7	Australian Guidelines to Reduce Health Risks from Drinking Alcohol- Recommended low risk alcohol consumption for women and their developing babies (2009) .....	85
Table 7-1	Demographic characteristics of women with and without children at Survey 4 .....	95
Table 8-1	Employment of women having first birth between Survey 2 and Survey 3, and Survey 3 and Survey 4 .....	114
Table 8-2	Employment status of the 1973-1978 cohort between Survey 2 and Survey 3 and Survey 3 to Survey 4 .....	116
Table 8-3	Motherhood status of 1973-1978 cohort from Survey 2 to Survey 3, .....	117
Table 8-4	Percentages of women according to life transitions of sole parent status and education between Survey 2 and Survey 3, and Survey 3 and Survey 4 .....	119
Table 8-5	Paid and unpaid maternity leave at the time of birth of the last child .....	121
Table 8-6	Mental health, vitality and stress levels after the birth of the last child by paid and unpaid maternity leave .....	125

## List of Figures

Figure 2-1	Age at which women in the 1973-1978 and 1946-1951 cohorts first gave birth .....	10
Figure 2-2	Number of children of women in the 1946-1951 and 1921-1926 cohorts .....	11
Figure 2-3	Percentage of women in the 1973-1978 cohort aspiring to have none, one, two, or three or more children at Surveys 2, 3 and 4 .....	12
Figure 3-1	Contraceptive use at each survey .....	19
Figure 3-2	Patterns of change in use of contraception (n=6708).....	22
Figure 3-3	Patterns of use of the oral contraceptive pill as sole method among contraception users at all surveys (n=2377) .....	24
Figure 3-4	Patterns of condom use as sole method of contraception among contraception users at all surveys (n=2377) .....	25
Figure 3-5	Patterns of implant use as sole method of contraception among women at Survey 3 and Survey 4 (n=6708).....	26
Figure 3-6	Contraception use transitions and reproductive events between Surveys 1 .....	28
Figure 3-7	Contraception use transitions and reproductive events between Surveys 2 and 3 .....	29
Figure 3-8	Contraception use transitions and reproductive events between Surveys 3 and 4 .....	30
Figure 4-1	Number of children aspired to by women in the 1973-1978 cohort at Survey 1, Survey 2, Survey 3 and Survey 4.....	35
Figure 4-2	Number of children aspired to by women in the 1973-1978 cohort at Survey 1, Survey 2, Survey 3 and Survey 4, according to motherhood status.....	36
Figure 4-3	Number of children aspired to by women in the 1973-1978 cohort at Survey 1, Survey 2, Survey 3 and Survey 4, according to number of children.....	37
Figure 4-4	Number of children aspired to by women in the 1973-1978 cohort at Survey 1, Survey 2, Survey 3 and Survey 4, according to relationship aspirations.....	38
Figure 4-5	Six most popular relationship x motherhood x employment aspiration combinations at Surveys 1, 2, 3 and 4 of the 1973-1978 cohort .....	40
Figure 4-6	Consistency of motherhood aspirations from Survey 1 to Survey 4.....	41
Figure 4-7	Number of children aspired to pre- and post-birth of 1973-1978 cohort having first birth from Survey 2 to Survey 3 .....	42
Figure 4-8	Number of children aspired to pre- and post-birth of 1973-1978 cohort having first birth from Survey 3 to Survey 4 .....	43
Figure 4-9	Motherhood aspirations according to motherhood status from Survey 2 to Survey 3 .....	46
Figure 4-10	Motherhood aspirations according to motherhood status from Survey 3 to Survey 4 .....	46
Figure 4-11	Motherhood aspirations according to marital transitions from Survey 2 to Survey 3.....	47
Figure 4-12	Motherhood aspirations according to marital transitions from Survey 3 to Survey 4.....	48
Figure 5-1	Reproductive patterns of first birth and first miscarriage or first miscarriage only (no birth) in the 1973-1978 cohort .....	57
Figure 5-2	Trends in first miscarriage as a proportion of first miscarriages and first births in the 1973-1978 cohort.....	59



Figure 5-3	Infertility in the 1973-1978 cohort .....	60
Figure 5-4	Seeking advice for infertility in the 1973-1978 cohort.....	61
Figure 6-1	Estimated iodine intake from consumption of key foods containing iodine by pregnant and post-partum women from the 1973-1978 cohort.....	73
Figure 6-2	Medications claimed in the pre-pregnancy period by area for women in the 1973-1978 cohort who gave birth in 2005 .....	81
Figure 6-3	Medications claimed in the pregnancy period by area for women in the 1973-1978 cohort who gave birth in 2005 .....	82
Figure 6-4	Medications claimed in the post-pregnancy period by area for women in the 1973-1978 cohort who gave birth in 2005 .....	82
Figure 6-5	Prevalence of smoking for women who were not pregnant at any survey or were pregnant at only one survey.....	86
Figure 6-6	Prevalence of risky drinking among women who were not pregnant at any survey or were pregnant at only one survey .....	87
Figure 6-7	Prevalence of smoking or risky drinking among women who were not pregnant at any survey or were pregnant at only one survey.....	88
Figure 6-8	Prevalence of smoking and risky drinking among women who were not pregnant at any survey or were pregnant at only one survey.....	89
Figure 7-1	Mean SF-36 General Health Perceptions score by motherhood status at Survey 4 of the 1973-1978 cohort .....	96
Figure 7-2	Percentages of symptoms experienced 'sometimes' or 'often' in 1973-1978 cohort at Survey 4 for mothers versus non-mothers .....	97
Figure 7-3	Mean SF-36 Mental Health Index score by motherhood status at Survey 4 (2006) of the 1973-1978 cohort .....	98
Figure 7-4	Demographic characteristics at Survey 4 (2006) of women who gave birth between 2002-2006 by PND status.....	101
Figure 7-5	The relationship between history of depression at Survey 2 (2000) or 3 (2003) and PND at Survey 4 (2006) among women who gave birth to a child 2002-2006 .....	102
Figure 7-6	The relationship between anxiety at Survey 2 (2000) and Survey 3 (2003) and PND at Survey 4 (2006) among women who gave birth to a child 2002-2006 .....	103
Figure 7-7	Number of stressful life events experienced for Surveys 1-4 for women who gave birth between 2002-2006 by PND status at Survey 4 .....	104
Figure 7-8	The relationship between emotional/informational support and PND at Survey 4 (2006) among women who gave birth to a child 2002-2006 .....	105
Figure 7-9	The relationship between tangible support and PND at Survey 4 (2006) among women who gave birth to a child 2002-2006 .....	106
Figure 7-10	The relationship between affectionate support/positive social interaction and PND at Survey 4 (2006) among women who have gave birth to a child 2002-2006.....	107
Figure 7-11	The relationship between history of depression at Survey 2 (2000) or 3 (2003) and PND at Survey 4 (2006) among women who have gave birth to their first child 2002-2006.....	108
Figure 7-12	The relationship between history of anxiety at Survey 2 (2000) or 3 (2003) and PND at Survey 4 (2006) among women who have gave birth to their first child 2002-2006.....	109
Figure 8-1	Employment patterns of the 1973-1978 cohort for Surveys 1, 2, 3 and 4.....	113

Figure 8-2	Pre-birth and post-birth employment status between Survey 2 and Survey 3, of women who had had their first birth between surveys.....	115
Figure 8-3	Pre-birth and post-birth employment status between Survey 3 and Survey 4, of women who had had their first birth between surveys.....	115
Figure 8-4	Employment according to motherhood status from Survey 2 to Survey 3.....	117
Figure 8-5	Employment according to motherhood status from Survey 3 to Survey 4.....	118
Figure 8-6	Employment according to sole parent status from Survey 2 to Survey 3.....	119
Figure 8-7	Employment according to sole parent status from Survey 3 to Survey 4.....	120
Figure 8-8	Type of maternity leave by length of maternity leave after birth of last child .....	121
Figure 8-9	Type of maternity leave by area of residence .....	122
Figure 8-10	Type of maternity leave by marital status.....	122
Figure 8-11	Type of maternity leave by highest educational qualifications achieved .....	123
Figure 8-12	Type of maternity leave by stress about money .....	123
Figure 8-13	Type of maternity leave by number of other children .....	124
Figure 8-14	Type of maternity leave by general practitioner visits.....	124
Figure 8-15	Mental health score for women with and without paid and unpaid maternity leave adjusted for year since the birth of their last child, number of GP visits prior to that birth and number of children .....	126
Figure 8-16	Mental health of women by length of maternity leave adjusted for time since birth of the last child, number of GP visits and number of children .....	126
Figure 8-17	Vitality of women by length of maternity leave adjusted for time since birth of the last child and number of GP visits.....	127
Figure 8-18	Stress score of women by length of maternity leave adjusted for time since birth of the last child, number of GP visits and number of children.....	127

\*Due to rounding, percentage totals in this Report may not equal 100%.

# 1. Executive Summary

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This report focuses on the reproductive health of women from the Australian Longitudinal Study on Women's Health (ALSWH). The report was developed on the basis of discussions between the ALSWH research team and the staff of the Australian Government Department of Health and Ageing and has the broad aim of examining reproductive health among Australian women of child bearing ages.

The ALSWH is a longitudinal cohort study funded by the Department of Health and Ageing and conducted by a team of researchers and staff based at the Universities of Newcastle and Queensland. The ALSWH first collected data in 1996, from three cohorts of women then aged 18-23, 45-50 and 70-75. While some descriptive information concerning birthing patterns of the latter two cohorts is included in the current report, the focus of analyses is on data collected from the youngest cohort, who were born 1973-1978 (See Table 1-1). The ALSWH collects data by mailed surveys at regular intervals. The 1973-1978 cohort completed surveys in 1996, 2000, 2003, and 2006. Over 14 000 women completed Survey 1 of the 1973-1978 cohort, and 9145 of these women completed Survey 4 in 2006, which reflects an acceptable level of participant retention. More details about the ALSWH cohorts, attrition and retention can be found in Appendix A and on the ALSWH website ([www.alswh.org.au](http://www.alswh.org.au)).

**Table 1-1 Survey schedule and response rates for the ALSWH 1973-1978 cohort**

Survey	Year	Ages and responses
1	1996	18-23 N=14 247
2	2000	22-27 N=9688
3	2003	25-30 N=9081
4	2006	28-33 N=9145
5	2009	31-36 (in progress)

## 1.1. Childbearing among the cohorts

Data collected from all three cohorts clearly demonstrated generational differences in childbearing. A trend in decreasing family sizes was noted, with women from the 1921-1926 cohort being more likely to have four or more children compared with the 1946-1951 cohort, who were more likely to have two or three children. Most women in the 1973-1978 cohort aspired to have two children but over time an increasing proportion of women aspired to have only one child.

Decisions to have fewer children could reflect the ages at which women are having their first children. About half of the 1946-1951 cohort had their first child before 24 years of age, compared with less than 20% of the 1973-1978 cohort. In 2006, when they were aged between 28 and 33 years, almost 60% of women in the 1973-1978 cohort had not had children.

## 1.2. Use of contraception

Obviously the availability of a wide range of contraceptive choices has played a key role in the current patterns of childbearing. Among the 1973-1978 ALSWH cohort, contraceptive use increased as women moved from their late teens to early twenties and became sexually active. Contraceptive use then decreased as women reached their mid to late twenties and started having children. The main reasons for not using contraception at Surveys 3 and 4, when women were aged 25 to 33, were pregnancy, trying to conceive, or having no male sexual partners. Women who used contraception were more likely to be in de facto relationships or single, be up to date with Pap tests and have had two or more births.

The oral contraceptive pill was the most commonly used method of contraception at each survey of the 1973-1978 cohort. Of women who consistently used contraception, 40% used the oral contraceptive pill as their only method of contraception in at least three out of four surveys. However, use of the oral contraceptive pill decreased over time. Condoms were the next most common single method used; 15-18% of women used condoms only, although only 3% used condoms consistently across time. The proportion of women using both condoms and the oral contraceptive pill remained steady at 13-14% of all women from Survey 1 to 3 (ages 18-30) but decreased to 8% of all women at Survey 4 (ages 28-33), when the use of methods other than the oral contraceptive pill and/or condoms increased. Contraception changed in expected ways according to reproductive events: women who reported only miscarriages between surveys also stopped using contraception in the same period; most women who did not report reproductive events continued to use the same method of contraception; and women who had a termination tended to switch methods.

The advent of long-acting reversible methods of contraception is likely to have an impact on the ways in which women manage their fertility as they complete their families. For example, 3% of the ALSWH 1973-1978 cohort was using an implant (e.g. Implanon) at Survey 3, and one third of these women continued using an implant three years later. It will be important to assess the uptake of newer forms of contraception and to assess the reproductive and sexual health needs of women in this age group as they move into their late thirties in order to develop policy that supports best practice in women's reproductive health.

## 1.3. Aspirations

Another informative factor in women's health policy planning is the aspirations women hold for having children. The majority of the 1973-1978 cohort want to have children, with the most popular aspiration being for two children, followed by three or more children, at all four surveys. Few women aspired to no children, and less than 2% of women consistently aspired to no children across all four surveys. However, the popularity of the single-child family increased across surveys as the women became older, while the popularity of larger families of two or more children started to decline.

Changes in aspirations were found to be dependent on circumstances. Approximately two-thirds of the 1973-1978 cohort changed their motherhood aspirations at some time since the first survey, and changes were associated with having already started childbearing and being in a stable relationship. Differences were observed in aspirations between women who had started childbearing and those who hadn't; with childless women more dramatically reducing their aspirations for larger families of three or more children across surveys. Women who had experienced a first birth were more likely to revise their aspirations for children upwards compared with women who had no children.

The most common combination of aspirations was to be in a stable relationship, have some form of paid work, and to have at least one child. However, the details about the type of paid work and number of desired children changed over time. From Surveys 1 to 3, women most commonly aspired

to marriage, one or two children and full time paid work but by Survey 4, more women aspired to marriage, one or two children and part time rather than full time paid work.

Although the majority of the 1973-1978 cohort consistently aspire to having children, half had not had children by Survey 4, when they were aged 28-33 years, and 70% had not yet had their desired number of children. While the women in this cohort are still having children, there is some indication that despite their aspirations, they will have smaller families than previous generations. Furthermore, as they approach their mid to late thirties, issues to do with fertility and infertility will increase. By Survey 4, one in six of the 1973-1974 cohort had already had a problem with infertility.

## **1.4. Fertility and infertility**

As women age they are more likely to experience infertility and, with little other data available, the ALSWH provides an important opportunity to examine this problem and the related use of health services. Reproductive history is an important factor in understanding fertility issues. Pregnancy losses are common, with half of the women in the 1973-1978 cohort who reported a pregnancy outcome at Survey 4 having experienced a pregnancy loss. More than one third (39%) of women who had experienced a live birth by Survey 4 also experienced a pregnancy loss. For every ten women aged 28-33 years in 2006: four women had not been pregnant; five women had a live birth (with or without a recognised pregnancy loss); and one woman had a recognised pregnancy loss only. Recognised pregnancy losses are an important measure of fecundity, the findings of this study point to the value of a research approach that includes a complete reproductive history.

The inclusion of pregnancy losses also sheds light on the fertility rate of the 1973-1978 cohort. While four in ten women reported never being pregnant, one in two women aged 28-33 were yet to report a live birth by 2006. Among women who had tried to conceive or had been pregnant, one-in-six had experienced infertility (i.e. tried unsuccessfully to get pregnant for 12 months or more). The most significant factors associated with having infertility, seeking advice and using treatment were: polycystic ovary syndrome, endometriosis and miscarriage. In all, of the women who reported infertility, two-thirds sought advice but only half used treatment and most of the women who used fertility treatment had used low cost and non-invasive methods. However, not all women with infertility sought treatment, with smokers and those who were overweight or obese being the least likely to seek help.

## **1.5. Prenatal and maternal health behaviour**

In addition to investigating the health behaviour of women trying to become pregnant, this report examined three key areas of prenatal and maternal health behaviour, including: a summary of past ALSWH work that examined diet and physical activity in women of childbearing age; new analyses of linked ALSWH and Pharmaceutical Benefits Scheme (PBS) data that investigated medications prescribed during the pre-pregnancy, pregnancy and post pregnancy periods; and the use of alcohol and tobacco during pregnancy.

Past ALSWH research has demonstrated that while women appear to make alterations to their diets while pregnant, many fail to meet nutrient recommendations that are important during this period (e.g. folate, iron). In addition, pregnant and post-partum women from the 1973-1978 cohort were found to consume less than the recommended level of iodine. The findings support the importance of continuing to stress the recommended levels of nutrients during pregnancy and the post-partum period.

It is possible that the factors that prevent women from following dietary guidelines are similar to those barriers that impede women from undertaking the recommended levels of physical activity. Life events such as getting married (or moving into a de facto relationship) and having children are associated

with decreases in physical activity among the 1973-1978 cohort. ALSWH results reveal varied patterns of physical activity with similar percentages moving into and out of regular exercise. Overall, the findings suggest that there is a need for targeted interventions and public health messages that encourage women to adopt or maintain healthy diets and levels of physical activity throughout life transitions, particularly as they move into new personal relationships, during pregnancy and into motherhood, when the health benefits are great.

Dietary supplements might be recommended for pregnant women but there are other classes of drugs and medications that are contraindicated for women who are trying to become pregnant or who are pregnant. In Australia, the patterns of prescribing medication for pregnant women have not been examined in detail. Analyses of linked ALSWH and PBS data revealed that women who gave birth in 2005 were more likely to be prescribed medications in the pre- or post-pregnancy period than during the pregnancy period. Nevertheless, 17% of the 1973-1978 cohort who had children in 2005 (and consented for their survey data to be linked with PBS data) had claims for prescription medication during the pregnancy period. The most commonly claimed medications during the pregnancy period were anti-depressants, with 4% of women pregnant in 2005 continuing the use of antidepressants during pregnancy. Results also indicated that claims made during the pregnancy period for medications that are known or suspected of harming fetal development were very rare.

Two other factors that are known to harm fetal development when used in sufficient quantities comprise the third health behaviour area examined by this report: tobacco and alcohol use. Of women who were smokers and not pregnant at any survey, 30% quit smoking over the ten years from 1996 to 2006. At least half the women who were smokers before pregnancy quit smoking during pregnancy, but 30% or more did not. There was a similar pattern for alcohol use: 40% of women who were drinking at risky levels (for pregnant women) but were not pregnant at any survey stopped risky drinking over the ten years from 1996 to 2006, and while more than half the women who were drinking at risky levels (for pregnant women) before pregnancy stopped drinking at those levels during pregnancy, 35% or more did not.

In summary, health behaviour during pregnancy was generally found to include an increase in healthy behaviours and a decrease in behaviours that potentially damage the health of the mother and/or fetus. However, while diets improved, physical activity increased and tobacco and alcohol use decreased during pregnancy, the overall results indicated that for a substantial number of women, pregnancy health behaviour was not optimal. These findings indicate an ongoing need for effective public health interventions that promote healthy behaviours and enable the discontinuation of unhealthy behaviours in the pre-pregnancy and pregnancy periods.

## **1.6. Maternal health**

Women's health after birth is as important as their health during pregnancy. This report examines the data collected from the 1973-1978 cohort in 2006, when the women were aged 28-33, to determine the general health, symptoms and mental health of mothers. While much policy and research has focused attention on the post-partum period, the current research found that women whose children were under 12 months had higher self rated physical and mental health than women whose children were older than 12 months, and higher than women without children. These findings indicate a need for more research into the health and wellbeing of mothers of older children who are potentially the least healthy of all women in this age group.

While women with children under 12 months had higher self rated health than other women, they were more likely to experience some symptoms (e.g. incontinence, severe tiredness). Furthermore, around 10% of the women who had given birth in a three year period reported a diagnosis of postnatal depression. Mothers with a history of depression and anxiety and those who had experienced more stressful life events were more likely to experience postnatal depression than other

mothers. Those mothers who reported limited social support were also more likely to report experiencing postnatal depression, especially those who had limited affectionate support and positive social interactions.

## **1.7. Motherhood and paid work**

Another factor that might influence the health and wellbeing of mothers is their attachment to the paid work force. The 1973-1978 cohort have demonstrated interesting and varied patterns of paid employment over the ten year study period. Across the four surveys, 23% of women alternated between full-time paid and part-time paid employment while 63% of women were not in the paid labour force at least once across the four surveys. Having children is a pivotal factor in women's attachment to paid work. Compared with women with no children, women having a first birth were likely to change from full-time to part-time paid employment, or to change from full-time or part-time employment to not being in the labour force. Paid employment status prior to birth of the first child appears to influence women's paid employment after first birth. For instance, more women who worked full-time prior to their first birth remained in the paid labour force after having their first birth compared with women who worked part-time or who were not in the labour force before their first birth.

It is also likely that the availability of maternity leave plays an important role in patterns of mothers' paid employment. For employed 22-33 year old women who had their last child between 2000 and 2006, two thirds took paid or unpaid maternity leave and more than 70% of women with maternity leave took 12 weeks or more off work. Paid maternity leave was more common among women with university qualifications, while taking no maternity leave was more common among women who had other children.

While the benefits of available maternity leave have been the subject of much debate in the media, the potential impact of paid work and maternity leave on mothers' mental health warrants further research. Analysis of 1973-1978 cohort data demonstrated the importance of viewing maternity leave in the more complete context of women's lives. Women with both paid and unpaid leave had the best mental health but this difference disappeared after adjusting for number of general practitioner visits prior to pregnancy, time since birth of the last child and number of other children. Women who took less than 6 weeks maternity leave had worse mental health and more stress than women who took 12 or more weeks maternity leave, but these differences disappeared after adjusting for number of general practitioner visits prior to pregnancy, time since birth of the last child and number of other children. Women who took less than 6 weeks maternity leave had less vitality than women who took 12 or more weeks maternity leave, even after adjusting for number of general practitioner visits prior to pregnancy and time since birth of the last child.

## 2. Introduction

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### 2.1. Key Findings

This report focuses on the reproductive health of women from the Australian Longitudinal Study on Women's Health (ALSWH). This section introduces the Study, describes the aims of the report, and provides information about patterns of motherhood in the three ALSWH cohorts.

- Women from the 1921-1926 cohort were more likely to have four or more children compared with the 1946-1951 cohort, who were more likely to have two or three children.
- Most women in the 1973-1978 cohort aspired to have two children but over time an increasing proportion of women aspired to have only one child.
- 50% of women in the 1946-1951 cohort had their first child before 24 years of age, compared with less than 20% of the 1973-1978 cohort. In 2006, when they were aged between 28 and 33 years, almost 60% of women in the 1973-1978 cohort had not had children.
- Women in the 1973-1978 cohort who had not had children by 2006 tended to have higher socio-economic status than women who had children. Women without children were less likely to be stressed about money, more likely to be in the labour force and less likely to have consulted a hospital doctor than women with children.

### 2.2. The Australian Longitudinal Study on Women's Health

The ALSWH is a longitudinal population-based survey funded by the Australian Government Department of Health and Ageing. The project began in 1996 and involves three large, nationally representative, cohorts of Australian women representing three generations:

- the 1973-1978 cohort, aged 18 to 23 years when first recruited in 1996 (N=14 247) and now aged 31 to 36 years in 2009
- the 1946-1951 cohort, aged 45 to 50 years in 1996 (N=13 716), now aged 58 to 63 years in 2009
- the 1921-1926 cohort, aged 70 to 75 years in 1996 (N=12 432), now aged 83 to 88 years in 2009.

The women have now been surveyed at least four times over the past 13 years, providing a large amount of data on the women's lifestyles, use of health services and health outcomes. Details about the ALSWH design, attrition and retention are available in Appendix A. The schedule of surveys is shown in Table 2-1 as well as the age in years and number of participants in each cohort.



**Table 2-1 Schedule of surveys for the Australian Longitudinal Study on Women's Health, age in years and number of participants in each cohort**

Survey	Year	1973-1978 cohort	1946-1951 cohort	1921-1926 cohort
<b>S1</b>	1996	18-23 N=14 247	45-50 N=13 716	70-75 N=12 432
	1998		47-52 N=12 338	
<b>S2</b>	1999			73-78 N=10 434
	2000	22-27 N=9688		
<b>S3</b>	2001		50-55 N=11 200	
	2002			76-81 N=8646
<b>S4</b>	2003	25-30 N=9081		
	2004		53-58 N=10 905	
<b>S5</b>	2005			79-84 N=7158
	2006	28-33 N=9145		
<b>S6</b>	2007		56-61 N=10 638	
	2008			82-87 N=5561*
	2009	31-36 N=4041**		
	2010		59-64	
	2011			85-90
	2012	34-39		
	2015	↓	↓	↓

\*Survey intake will be finalised in August 2009.

\*\*Survey intake will be finalised in August 2010.

## 2.3. Aims

This report has been prepared on the basis of discussions between the ALSWH research team and staff of the Australian Government Department of Health and Ageing and focuses on key research questions about reproductive health. The report examines both cross-sectional and longitudinal data, and reports general trends across all cohorts; however, the report focuses mainly on Surveys 1 to 4 from the 1973-1978 cohort of women (aged 18-23 at Survey 1 in 1996).

There are many options for women regarding their reproductive health and motherhood. Advances in technology provide an increasing range of contraceptive choices, options for infertile couples, and ways to combine paid work and motherhood. Women's transitions to motherhood, age of first birth, contraception use, fertility issues, postnatal depression, and health related behaviour were identified as areas requiring further research, and in particular longitudinal research. In addition, workforce participation and the factors that might influence the workforce participation of mothers have emerged as important areas that will be addressed by this report.

The broad aim of this report is to examine reproductive health among women using eleven years of data from the 1973-1978 cohort of women, from when they were aged 18-23 years at Survey 1 in 1996 to 28-33 years at Survey 4 in 2006. Specifically, this report examines:

- patterns of contraception over time
- women's aspirations for motherhood and the factors associated with fulfilling or modifying aspirations
- reproductive histories, problems with fertility and related treatment and advice-seeking behaviour
- factors associated with maternal health and wellbeing, particularly postnatal depression
- factors associated with maternal health behaviours, including diet and physical activity, medication use, alcohol and tobacco use
- motherhood and participation in the paid workforce.

## 2.4. Report structure

This report consists of eight sections, the first being the Executive Summary. Section 2 describes differences between patterns of motherhood in all three of the ALSWH cohorts. The purpose of this section is to highlight the striking differences between the cohorts in the number of children and the age at which women gave birth. It also examines the characteristics of the women aged 28-33 in 2006 who have children compared with those who do not have children.

Section 3 examines patterns of contraception use over time. The 1973-1978 cohort is in a particularly active phase of reproductive life with many women trying to conceive and others completing their families, both changes with important implications for contraceptive behaviour. Contraception use over time has not been thoroughly examined in the Australian context, with much of the current research focusing on unplanned pregnancies among adolescents. The current report fills this gap by determining the patterns of contraception over time and the factors that are associated with different patterns of use.

Section 4 examines women's aspirations for children. As the 1973-1978 cohort enter their thirties it is possible to track whether women's aspirations for children are realised and the factors that are associated with fulfilling or modifying aspirations for children. Section 4 also investigates the

co-occurrence of motherhood and work aspirations to develop an accurate representation of what Australian women want to do, and how they anticipate balancing motherhood and paid work.

Section 5 describes patterns of fertility, including pregnancy outcomes. As the 1973-1978 cohort approach their mid-thirties those who wish to have children are more likely to have fertility problems, and with little other data available the ALSWH provides an important opportunity to examine the prevalence of these problems and the related use of health services.

Section 6 describes prenatal and maternal health behaviours and focuses on diet, physical activity, and the use of prescription medications, tobacco, and alcohol.

Section 7 examines the physical and mental health of women having children. In addition to comparing the health of women with and without children, this section focuses on postnatal depression (PND) among recent mothers, and in particular describes predictors of PND. The demographics, social support, prior life events and mental health of women experiencing PND are described.

Section 8 examines the relationship between motherhood and paid work. It describes the working patterns of mothers and investigates associations between maternity leave and mental health and wellbeing.

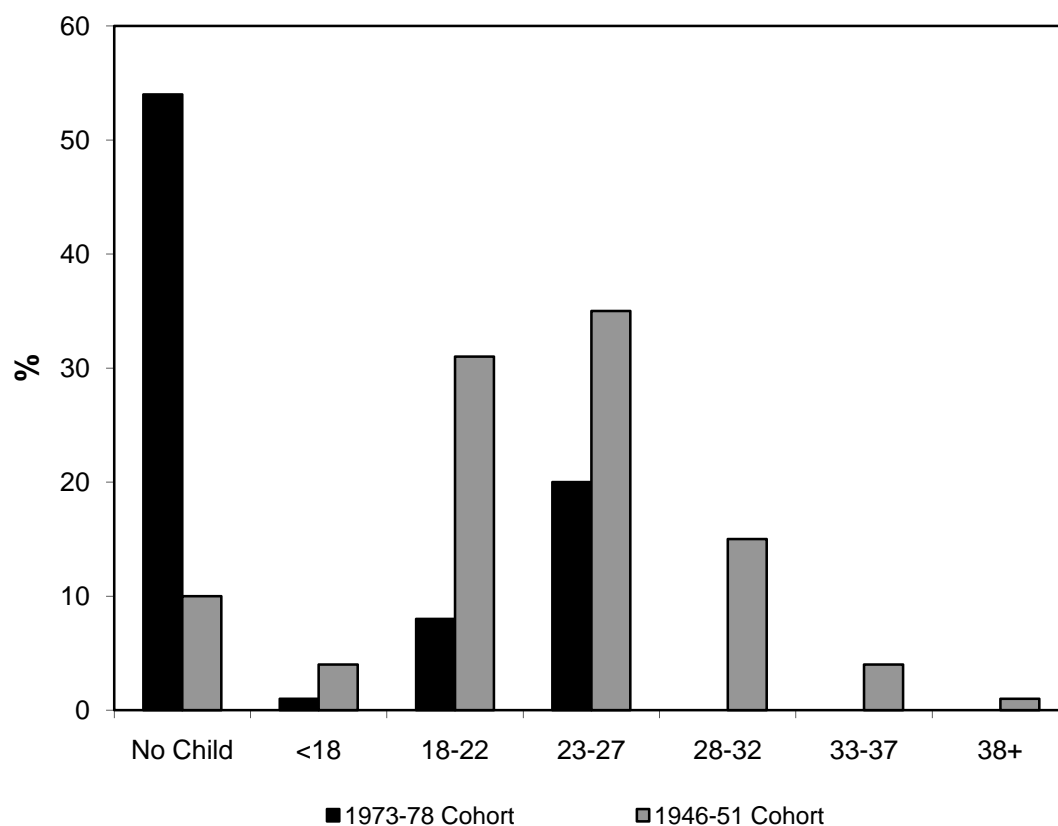
## 2.5. Fertility rates

Fertility rates across developed countries have declined dramatically since the 1970s. The world average total fertility rate (TFR) has fallen from 2.7 babies per woman in the 1970s to 1.6 babies per woman in 2002 (d'Addio & d'Ercole, 2005). Australia's TFR followed a similar trend with a sustained fertility decline that continued to 2001. Since then there has been an upturn in fertility level and by 2007 Australia's TFR was 1.9 babies per woman (ABS, 2008). The population replacement level of 2.1 babies per woman and prolonged periods of fertility at the current level will result in decreased population growth and is likely to exacerbate the problems associated with an ageing population.

Statistics show a shift in peak fertility as a consequence of many Australian women postponing motherhood. For instance, in 2007, women aged 30-34 years experienced the highest fertility of all Australian women, with 126.6 babies per 1000 women (ABS, 2008). This was apparent in all states and territories except Tasmania and the Northern Territory, where women aged 25-29 years recorded the highest fertility rates (ABS, 2008).

ALSWH data clearly illustrate the differences in age at first birth between the 1973-1978 and 1946-1951 cohorts (see Figure 2-1)<sup>1</sup>. Whilst the two cohorts are not directly comparable, as the women from the 1946-51 cohort have completed their reproduction and the 1973-78 cohort have some years of reproduction remaining, it is noticeable that women from the 1973-78 cohort are having their first birth later in life. About half of the women in the 1946-1951 cohort had their first child by the time they were aged 24 years compared with only 20% of the 1973-1978 cohort. Less than 30% of the 1973-1978 cohort had given birth by the time they were 27, and the majority of women in this cohort had not had a child by Survey 4 in 2006 (when they were aged 28-33 years). Reproductive histories, problems with fertility and related treatment and advice-seeking behaviour are discussed in detail in Section 5 of this report.

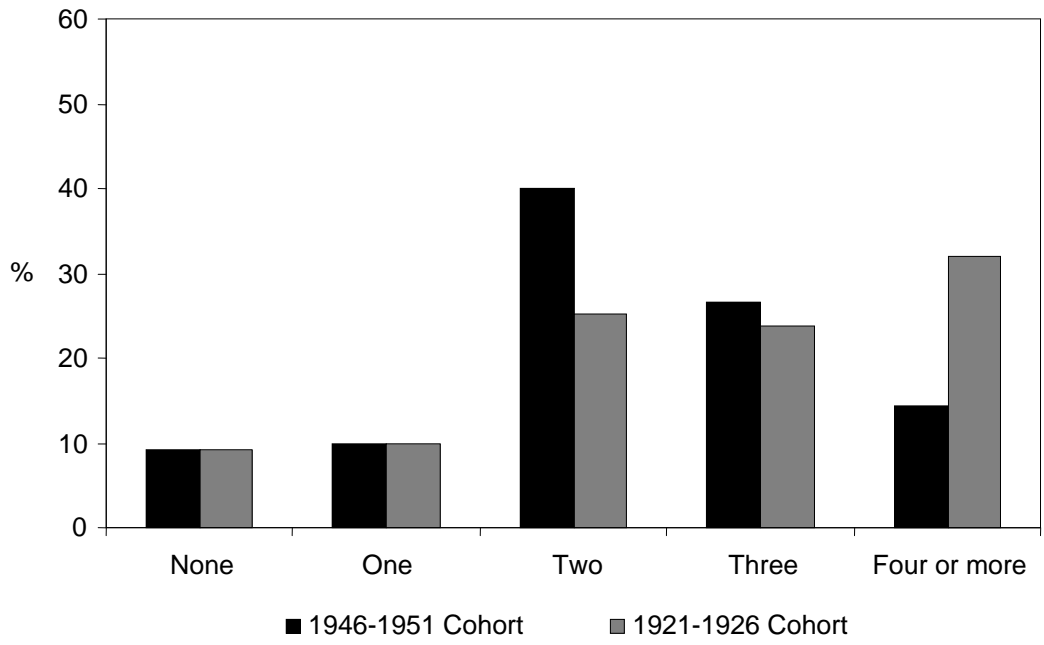
<sup>1</sup>Data for age at first birth were not collected from the 1921-1926 cohort.



**Figure 2-1 Age at which women in the 1973-1978 and 1946-1951 cohorts first gave birth**  
*(Note: data is not yet complete for the 1973-1978 cohort from age 28 onwards).*

ALSWH data also show differences between the 1946-1951 and 1921-1926 cohorts in the number of children that women have had (Figure 2-2). Women from the oldest cohort were the most likely to have had four or more children, while women from the 1946-1951 cohort were most likely to have had two children. The majority of the 1973-1978 cohort had not had children by Survey 4 (Table 2-2); since they were aged 28-33 years at that time it is to be expected that many, if not most, of this cohort have not yet completed their families. At Survey 4, the mean number of children for women in the cohort was 0.8.

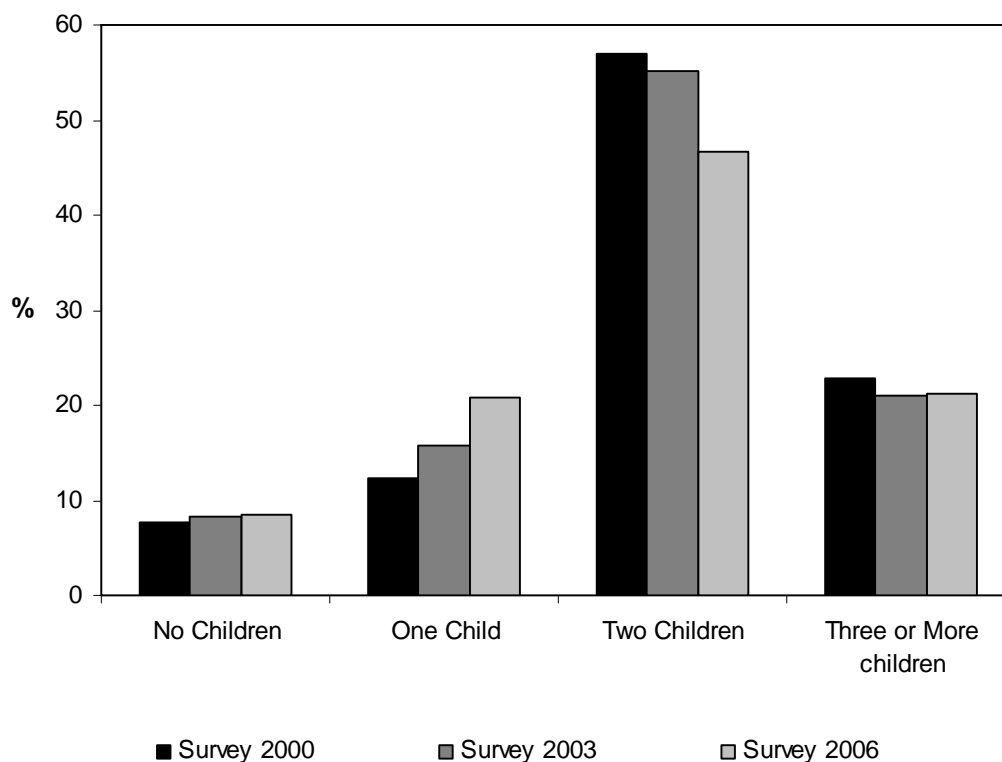
Some indication of the number of children women in the 1973-1978 cohort might eventually have, can be gained by examining their aspirations for having children, reported in Figure 2-3. Over the six year period from Survey 2 to Survey 4 there is a trend for aspirations for a large family to decrease and aspirations for one child to increase. Women's aspirations for motherhood are discussed in more detail in Section 4 of this report.



**Figure 2-2 Number of children of women in the 1946-1951 and 1921-1926 cohorts**

**Table 2-2 Number of children of women in the 1973-1978 cohort at Survey 4**

No. of children	(N= 9145)
	%
No Children	54
One Child	21
Two Children	17
Three Children	6
Four or more Children	2



**Figure 2-3 Percentage of women in the 1973-1978 cohort aspiring to have none, one, two, or three or more children at Surveys 2, 3 and 4**

## 2.6. Characteristics of women having children during the last decade

Australian women with paid jobs, higher education and income, and who are not married have lower fertility rates than other women (d'Addio & d'Ercole, 2005). For example, in 2005, Australian women from areas of high socio-economic status (high income, high education, skilled occupations) had fewer births than women from areas of lower socio-economic status (ABS, 2007). Age-specific patterns were also evident between socio-economic groups. For instance, 62% of births from lower socio-economic areas were by women under 30 years, while women over 30 had increased fertility rates in high socio-economic areas (ABS, 2007). This demonstrates that postponement of motherhood is likely to be a consequence of many factors, including participation in higher education and the paid work force.

Women from rural areas have higher fertility rates than women from major cities. As the level of remoteness of an area increases so does the fertility rate (AIHW, 2008). There are age-specific patterns between urban and rural areas. For example, fertility rates for women aged 15-19 years in very remote areas were seven times that in major cities, whereas fertility rates for women 30 years and older, in all regional and remote areas were lower than in major cities in 2002-04 (AIHW, 2008). Higher fertility at younger ages in rural and remote communities has been attributed to the relatively high fertility of young Indigenous women.

Another important maternal factor includes the proportion of ex-nuptial births, which has been increasing since the 1950s. In 2007, only 66% of births were to women who were married (ABS, 2008), however, many mothers may have been in a de facto relationship. Additionally, 23% of women who gave birth in 2005 were born in another country (Laws, Abeywardana, Walker, & Sullivan, 2007). It is important to examine the demographic characteristics of Australian women having children in order to assist in the monitoring of population ageing and its potential economic burden.

The ALSWH data can be used to compare the characteristics of women who have had children with those who have not. Table 2-3 compares the characteristics of women in the 1973-1978 cohort who have not had children with those who have had one or more children. Data were included for those women who responded to all four surveys (N = 6840). By Survey 4 (2006), 47% of women had at least one child and 31% of women had more than one child, an increase of 14% from Survey 3 (2003).

The socio-economic position of women with children improved, with 66% of women with children participating in the labour force at Survey 4 compared with 27% at Survey 1, and women with children reporting less stress about money at Survey 4 (24%) than women with children at Survey 1 (35%). At Survey 4, 78% of mothers were married, compared to 35% at Survey 1.

Demographic comparisons show that 65% of women without children at Survey 4 had university qualifications, compared with 40% of women with children. Women without children were also more likely to live in urban areas than women with children (70% vs. 49%) and to have private health insurance (61% vs. 52%) than women with children. More women without children were current smokers at Survey 4 (16%) than women with children (16%).

While women with children at Survey 4 were less likely to be stressed about money or have a Health Care card in 2006 than in 1996, they were more likely to be stressed about money (24% vs. 18%) or to have a Health Care Card (18% vs. 8%) compared with women without children.

While nearly all women had consulted a GP in the previous 12 months, mothers were more likely than women without children to have consulted a hospital doctor. The older a woman was at the time she had her first child, the more likely she was to be married. At Survey 1, 34% of first time mothers were married, compared with 84% of first time mothers at Survey 4.

## **2.7. Conclusion**

The ALSWH data clearly reflect other national data demonstrating that women giving birth in the twenty-first century are having their first child later in life than previous generations. While the 1973-1978 cohort have not yet finished having children, current survey results suggest that these women aspire to smaller families than their parents and grandparents. The data also showed differences between those women who had children by the time they were aged 28-33 and those who did not, with mothers tending to have a lower socio-economic status and fewer qualifications when compared with women without children.

Future ALSWH surveys will be able to demonstrate whether these findings reflect later motherhood or choices to not have children. At this stage the study is unable to examine motherhood among women who are currently aged in their late teens and early twenties. Therefore, a comparison of the 1973-1978 cohort with young women approaching ages at which they will become mothers is not currently possible. Given the changing nature of motherhood and the wide range of choices available to women, the addition of a younger cohort to the ALSWH would be of great benefit to understanding women's reproductive health.

**Table 2-3 Demographic characteristics of women in the 1973-1978 cohort according to whether they have children or not, Surveys 1 to 4**

	Survey 1 Aged 18-23 %	Survey 2 Aged 22-27 %	Survey 3 Aged 25-30 %	Survey 4 Aged 28-33 %
% Women without children	95	85	73	53
% Women with children	5	15	27	47
<b>Demographic characteristics</b>				
	%	%	%	%
University Qualifications				
Women without children	15	53	61	65
Women with children	5	17	28	40
Stressed about Money				
Women without children	22	21	20	18
Women with children	35	34	28	24
Married				
Women without children	7	18	30	33
Women with children	38	58	72	78
Current Smokers				
Women without children	26	25	21	18
Women with children	42	28	22	16
Urban Area of Residence				
Women without children	56	58	64	70
Women with children	35	39	44	49
In the Labour Force				
Women without children	54	93	94	96
Women with children	27	55	60	66
Private Insurance				
Women without children	39	36	49	61
Women with children	12	21	41	52
Health Care card				
Women without children	-	15	10	8
Women with children	-	37	26	18
Seen a Hospital Doctor				
Women without children	21	19	18	18
Women with children	43	34	31	30

Only women who participated in all surveys were included, N = 6840.

## 2.8. References

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## 3. Use of contraception

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### 3.1. Key findings

This section examines trends in the use of contraception between 1996 and 2006 by women who participated in the surveys for the 1973-1978 cohort of the Australian Longitudinal Study on Women's Health.

- The oral contraceptive pill was the most commonly used method of contraception at each survey, but its use decreased over time.
- Of women who consistently used contraception, 40% used the oral contraceptive pill as their only method of contraception in at least three out of four surveys.
- The proportion of women using condoms as their only method of contraception remained steady over time (15-18%) but only 3% of all women used condoms only at every survey.
- The proportion of women using both condoms and the oral contraceptive pill remained steady at 13-14% of all women from Survey 1 to 3, but decreased to 8% of all women at Survey 4.
- The use of methods other than the oral contraceptive pill and/or condoms increased at Survey 4.
- The proportion of women using an implant (e.g. Implanon) remained steady between Surveys 3 and 4, with 3% of women using an implant only. Around one third of implant users at Survey 3 continued to use this method at Survey 4.
- The main reasons for not using contraception at Surveys 3 and 4 were pregnancy, trying to conceive, or no male sexual partners.
- Women who used contraception were more likely to be in de facto relationships or single, be up to date with Pap tests and have had two or more births.
- Women who did not use contraception were more likely to be non-drinkers and/or do low levels of exercise, have had one birth and have experienced miscarriage.
- Contraception changed in expected ways according to reproductive events: women who reported only miscarriages between surveys also stopped using contraception in the same period; most women who did not report reproductive events continued to use the same method of contraception; and women who had a termination tended to switch methods.

### 3.2. Introduction

Contraception is one of the keystones of reproductive health (European Society of Human Reproduction and Embryology Capri Workshop Group, 2005) enabling women to control their fertility according to their desires and circumstances. A range of new products such as vaginal rings, skin patches, hormonal IUDs, implants, injectables and new types of oral contraceptive pills now allow women more choice than ever. Technological advances promise even further developments in contraceptive methods (Sitruk-Ware, 2006). Despite the options available in developed countries, it has been shown that around half of all pregnancies in the United States of America are unintended and half of unintended pregnancies occur despite contraceptive use (Finer & Henshaw, 2006).

In Australia, there is little information about unintended pregnancy among women aged over 25 years. However, a recent survey by Marie Stopes International showed that contraceptive use was common before unintended pregnancy in Australia. The study found that 60% of women aged 18 or more who had experienced an unplanned pregnancy had been using at least one form of contraception before the pregnancy, with 21% using more than one method of contraception at the time (Marie Stopes International, 2008). Further, women who had an unplanned pregnancy and were not using contraception reported that they were not expecting to have sex or did not believe they were at the fertile period of their menstrual cycle at the time of intercourse. The majority (81%) of women confronted with an unplanned pregnancy believed that it was important for pregnancy counsellors to discuss all three options: abortion, adoption and parenting. Three-quarters (75%) of women with an unplanned pregnancy, however, made their decisions to resolve an unplanned pregnancy without speaking with a pregnancy counsellor. More than half (56%) of the women chose to continue their pregnancy (Marie Stopes International, 2006).

A substudy of the ALSWH cohort of women born in 1946-1951 explored the extent of planned and wanted pregnancies among women who had completed their reproductive careers (Weisberg, Bateson, Read, Estoesta, & Lee, 2008). One-third (32%) of first pregnancies were unplanned and 29% of first pregnancies were unwanted but termination of pregnancy was uncommon. Contraceptive failure was stated as the reason for 11% of unplanned first pregnancies. An important finding was that unplanned pregnancies were not necessarily recalled as being unwanted several decades after the pregnancy had occurred. The ALSWH does not currently collect information about unplanned pregnancy but this would be an important issue to examine for a new cohort of 18-23 year old women.

Among the 1946-1951 cohort, 29% reported a tubal ligation (Bryson, Strazzari, & Brown, 1999). In future surveys of the 1973-1978 cohort it will be possible to compare this figure with the proportion of these younger women who have a tubal ligation after completion of their families. With the trend to later childbearing, and the availability of new long-acting reversible contraceptives, it is probable that younger women may pursue a different variety of contraceptive options once they complete childbearing. This question will be able to be examined when the 1973-1978 cohort reach their mid-40s. This report focuses on the contraceptive use of the 1973-1978 cohort from 1996 (when they were aged 18-23 years) to 2006 (when they were aged 28-33 years) and examines how these women changed their contraception use over a decade.

At Survey 1 around a third of women aged 18-23 were not yet sexually active and therefore did not require contraception. At Survey 2 at ages 22-27 more young women had become sexually active and were therefore potential contraception users. Socio-demographic factors and a range of health behaviours were explored to identify which factors were associated with the use or non-use of contraception over time. Further analyses included the type of contraceptive method used and patterns of use over time for the common methods of the oral contraceptive pill and condoms, and the newly available implant. The impact of reproductive events, such as births, terminations and miscarriages, on the use and type of contraception was also explored.

It is important that women have access to safe, effective and affordable contraception to meet the different contraceptive requirements they have throughout their reproductive careers; and that they are able to choose the contraception that best suits their needs (Sexual Health & Family Planning Association of Australia, 2006). The availability of many effective methods of contraception on the Pharmaceutical Benefits Scheme (for example many oral contraceptive pills, implants, injectables and hormonal IUDs) enhances access and there are a number of different health providers (for example, GPs, Family Planning Clinics, pharmacists) that provide contraception services.

Other aspects of sexual health, such as the risk of sexually transmitted infections (STI), are also closely related to access to effective contraception and prevention of unplanned pregnancy. It is recommended that women who want effective protection from both unplanned pregnancy and STIs use condoms in conjunction with an effective form of contraception such as the oral contraceptive pill

(Jordan, Bayly, & Sawyer, 2004). There are a number of national government policies that focus on issues relating to sexual health. These include:

- prevention of STIs such as Chlamydia in priority populations (Department of Health and Ageing, 2005d)
- National Hepatitis C Strategy 2005–2008 (Department of Health and Ageing, 2005b)
- National Aboriginal and Torres Strait Islander Sexual Health and Blood Borne Virus Strategy 2005–2008 (Department of Health and Ageing, 2005a)
- National HIV/AIDS Strategy (Department of Health and Ageing, 2005c).

However, an integrated strategy for sexual and reproductive health has not been developed, as has occurred in other countries such as the UK and New Zealand (Department of Health, 2001, 2008; Ministry of Health, 2001).

Key organisations have called for a national sexual and reproductive health strategy (Public Health Association of Australia (PHAA), Sexual Health & Family Planning Association of Australia (SH&FPA), & Australian Reproductive Health Alliance (ARHA), 2008). The first National Men's Health Policy, currently under development, takes a lifecourse approach to the changing needs of men as they age; including sexual and reproductive health (Department of Health and Ageing, 2008). Similar principles will be applied to the new National Women's Health Policy which is also the subject of current development (Department of Health and Ageing, 2009).

### **3.3. Contraception use at each survey**

This section describes the patterns of contraception use from 1996 to 2006 in the 1973-1978 cohort (Lucke, Watson & Herbert, in press). The 6840 women who responded to all four surveys formed the sample for the following analyses unless otherwise specified. Further information about the measurement of contraception is shown in Appendix B.

Figure 3-1 displays the categories of contraception use and non-use at each survey. The proportion of women not using contraception decreased from Survey 1 to Survey 2 and then steadily increased from Survey 2 to Survey 4. Women were more likely to report that they were trying to conceive at later surveys, and this pattern was evident in the increasing proportion of women who were pregnant or trying to conceive at the time of these surveys.

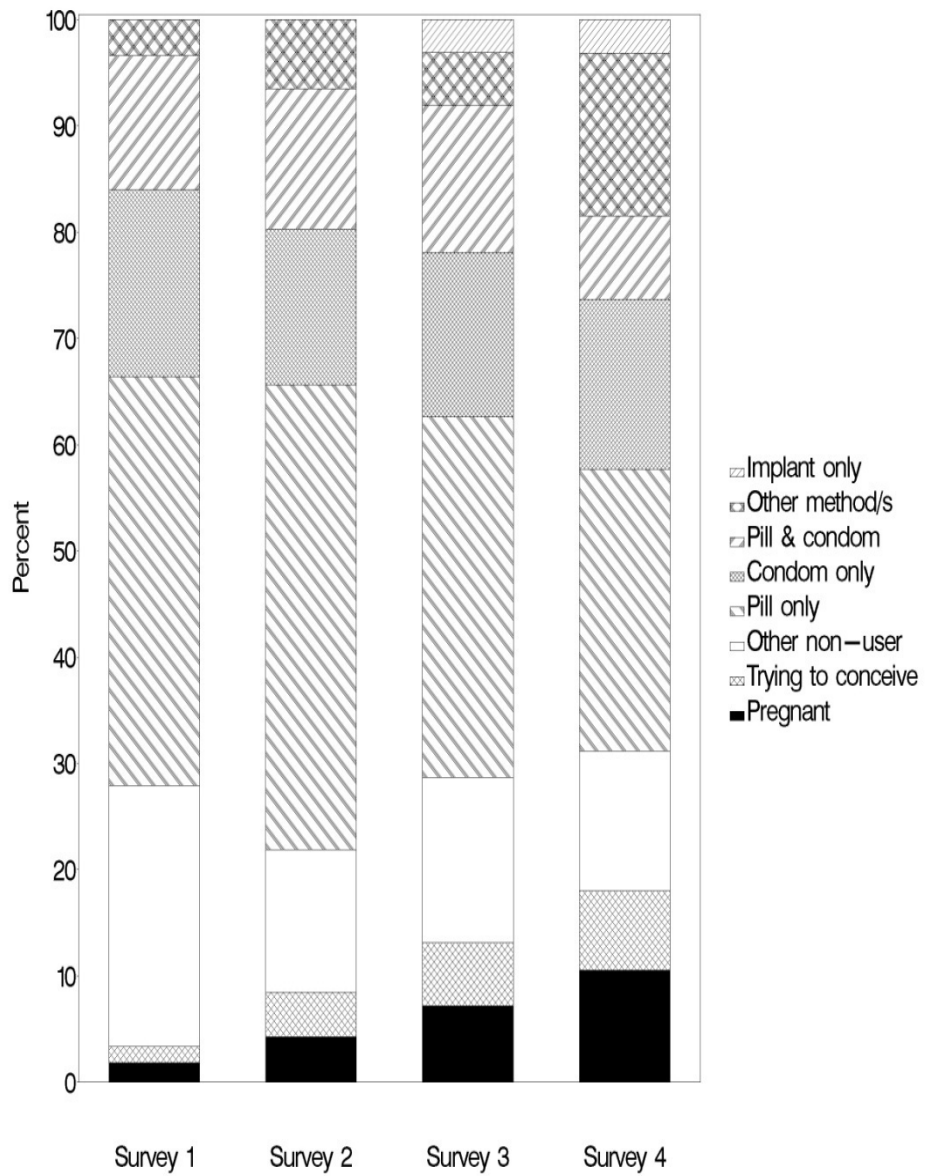
The oral contraceptive pill was the most commonly used method at each survey, but its use decreased over time as women stopped using contraception or changed to other methods. The proportion of women using condoms as their only method of contraception remained steady over time, while the proportion using both condoms and the oral contraceptive pill declined between Surveys 3 and 4. This may partly reflect the fact that at Survey 4 women were not asked about use of the oral contraceptive pill and condoms for reasons other than contraception. This question was included in the first three surveys which allowed an additional opportunity to identify women using both of these methods.

There was an increase in the proportion of women listed in the 'other method/s' category at Survey 4, which may also partly reflect a question change – the withdrawal method was listed as a response option in Survey 4 only. Of the women in the 'other method/s' category at Survey 4, 59% indicated that they were using the withdrawal method, either as their sole method of contraception or in combination with other methods. Overall, 14% of women who used contraception reported the use of the withdrawal method at Survey 4 and around half of these also reported using another method. It is important to note that the women may only have identified the withdrawal method as a method of

contraception when it was suggested to them at Survey 4. Use of the withdrawal method by women at Surveys 1-3 is not known.

At Surveys 3 and 4, approximately 3% of women used an implant (such as Implanon) as their sole method of contraception. Of those women who first reported using an implant at Survey 3, 73% switched from another method of contraception at Survey 2, and the remaining 27% were not using contraception at Survey 2. At Survey 4, 31% of those using an implant as their only method of contraception had also used an implant at Survey 3, while 44% switched from using another method at the previous survey.

Table 3-1 shows further detail about the women who did not use contraception. This information is available only for Surveys 3 and 4. The main identifiable reasons for not using contraception were being pregnant or trying to conceive, the absence of male sexual partners, and being unable to conceive (sterile) including having had a hysterectomy, tubal ligation or partner having had a vasectomy. The proportion of unexplained non-use of contraception was low (6% at Survey 3 and 4% at Survey 4).



**Figure 3-1 Contraceptive use at each survey**

**Table 3-1 Reasons for not using contraception (N=6708)**

	<b>Survey 3</b>	<b>Survey 4</b>
	<b>%</b>	<b>%</b>
Pregnant	7	11
Trying to conceive	6	7
Cannot conceive	0.3	0.5
Sterile (self or partner)	2	3
No male sexual partners	7	5
Other non-user	6	5
Contraception user	71	69

### **3.4. Factors associated with contraception use**

This section examines the factors associated with contraception use at the four surveys. There were 6708 of the 6840 women who answered all four surveys whose contraception use could be determined. The characteristics of contraception users at each survey are shown in Table 3-2. The characteristics were selected by statistical modelling, from a more extensive set of factors that were hypothesised to be related to contraception use. Table 3-2 summarises the patterns of association from the best model for each survey, after adjusting for area of residence to account for the oversampling of women in rural and remote areas.

The factors associated with contraception use were similar in all four surveys. Women who used contraception were more likely to be in a de facto relationship than married at all surveys. At Surveys 2-4, they were also more likely to be single than married. Contraception users were more likely to have had a recent Pap test (within the last two years). Women who used contraception were more likely to have had two or more births and less likely to have had one birth. This suggests the women using contraception are those women who have completed their families, or who have not yet begun to have children. The relationship between number of miscarriages and contraception showed the opposite pattern to births, as women who used contraception were less likely to have experienced miscarriage at each time.

### **3.5. Change in contraception use over time**

This section examines patterns of change of contraception use and non-use from Survey 1 to Survey 4. There were 6708 women who responded to all four surveys and whose contraceptive use could be determined. Figure 3-2 shows the patterns of contraception use over the four surveys. Most women reported using some method of contraception at each survey, with only 3% identified as non-users at all four surveys. Of the 6708 women, 35% were identified as users at all four surveys while 70% reported using contraception at three or more surveys.

Of those women who reported using contraception at two surveys, the most common pattern was contraception use at the first two surveys, followed by non-use at Surveys 3 and 4 (32%). Women who reported using contraception at three surveys most commonly discontinued contraception use at Survey 4 (33% of the 2306) or were not using contraception at Survey 1 (28%).

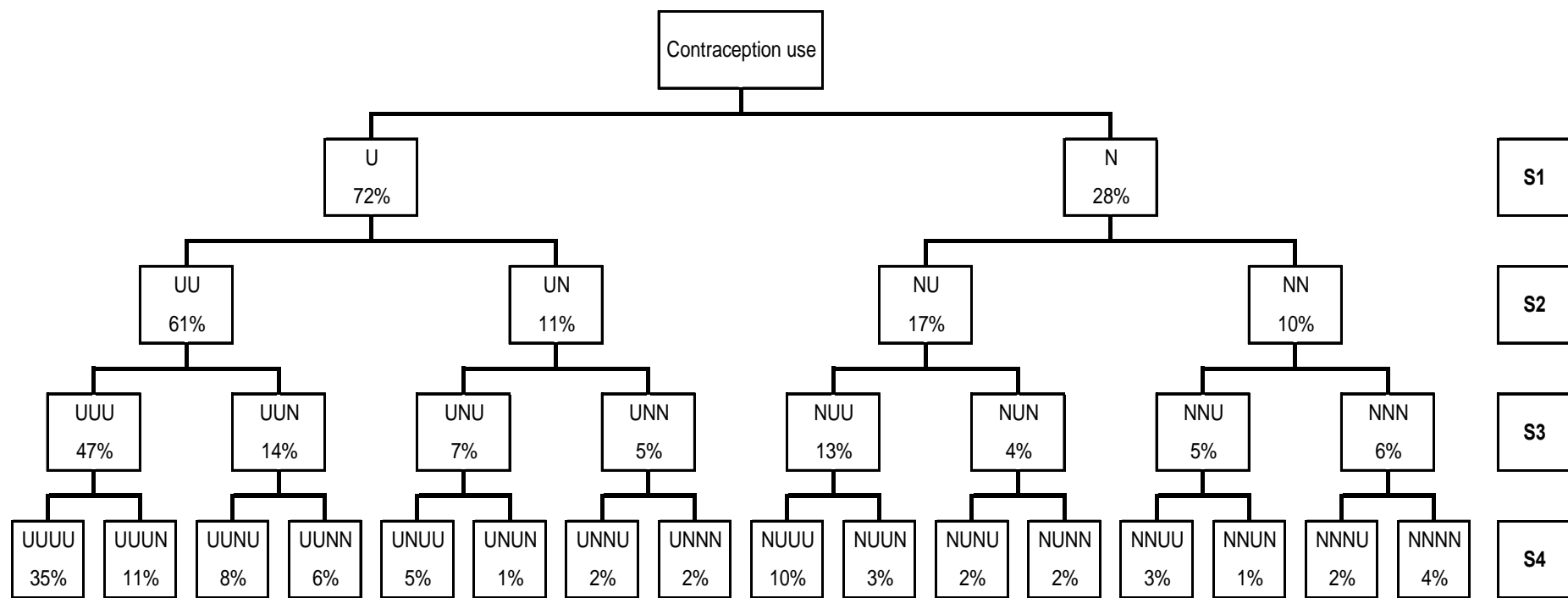
**Table 3-2 Characteristics of contraception users, by Survey**

	Survey 1	Survey 2	Survey 3	Survey 4
<b>Socio-demographics</b>				
Age (ref = younger*)	n.s.	More likely to be aged <25	More likely to be aged <28	n.s.
Marital status (ref = married)	More likely to be in a de facto relationship	More likely to be single or in a de facto relationship	More likely to be single or in a de facto relationship	More likely to be single or in a de facto relationship
Area of residence ** (ref = city/metropolitan)	n.s.	n.s.	n.s.	n.s.
Education (ref = year 12 or below)	n.s.	n.s.	More likely to have university education	n.s.
Employment (ref = full-time)	n.s.	Less likely to be in part-time employment or unemployed	Less likely to be in part-time employment or unemployed	Less likely to be in part-time employment or unemployed
<b>Health behaviour</b>				
Alcohol consumption (ref = low)	Less likely to be a non-drinker; more likely to be a high/risky drinker	Less likely to be a non-drinker	Less likely to be a non-drinker	Less likely to be a non-drinker
Smoking status (ref = never)	n.s.	More likely to be a current smoker	n.s.	Less likely to be an ex-smoker
Exercise status (ref = moderate)	n.s.	Less likely to do nil/low exercise	Less likely to do nil/low exercise	Less likely to do nil/low exercise
<b>Sexual and reproductive</b>				
Recent Pap test (ref = no)	More likely to have had a recent Pap test	More likely to have had a recent Pap test	More likely to have had a recent Pap test	More likely to have had a recent Pap test
Number of live births (ref = none)	Less likely to have had 1 birth	Less likely to have had 1 birth; more likely to have had 2 or more births	Less likely to have had 1 birth; more likely to have had 2 or more births	More likely to have had 2 or more births
Number of miscarriages (ref = none)	Less likely to have experienced miscarriage(s)	Less likely to have experienced miscarriage(s)	Less likely to have experienced miscarriage(s)	Less likely to have experienced miscarriage(s)

\* younger refers to less than 21, 25, 28, 31 at Surveys 1, 2, 3, and 4 respectively

\*\* ARIA+ from Survey 2 was used for Survey 1, as ARIA+ was not available at Survey 1

n.s. = not statistically significant ( $p > 0.005$ )



*U = use of any method of contraception; N = non-use of contraception; e.g. UUUN denotes contraception use at the first three surveys, followed by non-use at Survey 4.*

**Figure 3-2 Patterns of change in use of contraception (n=6708)**



## **3.6. Change over time in method of contraception used**

Three patterns of change over time in women's choice of method were examined.

1. Change between use of the oral contraceptive pill as the only method of contraception and use of other methods alone or in combination (n=2377 who used contraception at all four surveys).
2. Change between use of condoms as the only method of contraception and use of other methods alone or in combination (n=2377 who used contraception at all four surveys).
3. Change between use of an implant as the only method of contraception (at Surveys 3 and/or 4) and use of other methods or non-use of contraception at Surveys 2, 3 and 4. (n=6708).

These patterns were chosen because the methods were common (as in the case of the oral contraceptive pill and condoms) or relatively newly available (as in the case of the implant).

### **3.6.1. Patterns of oral contraceptive pill use**

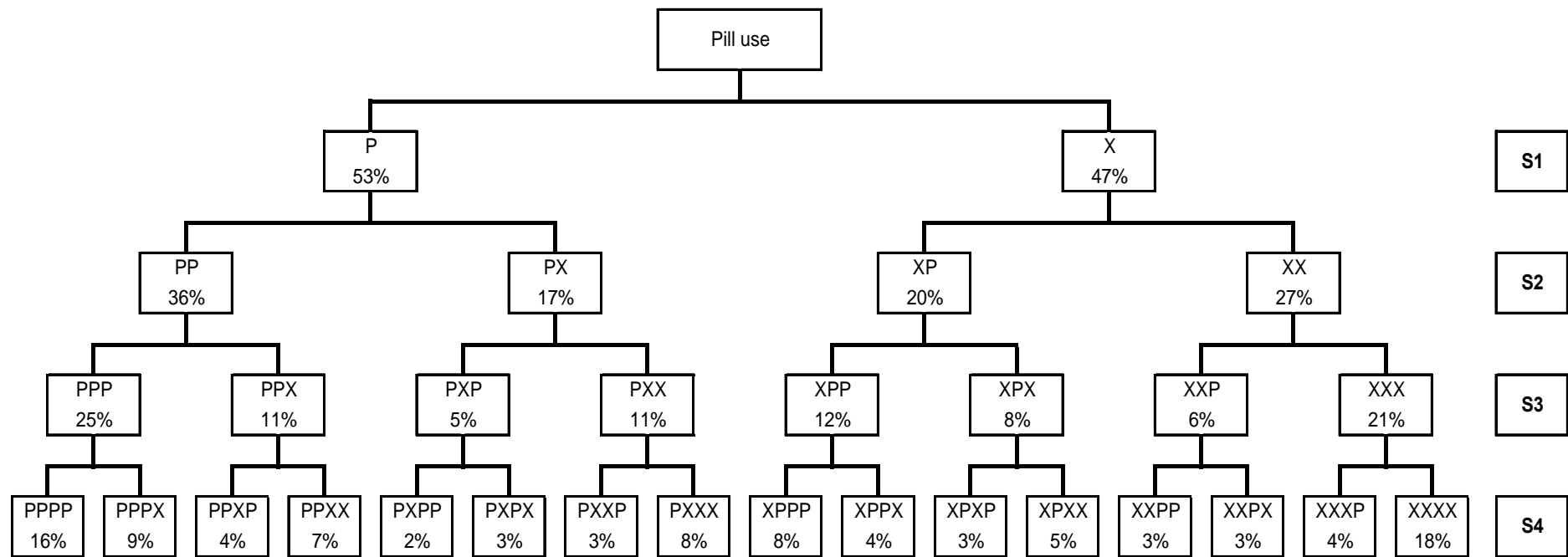
There were 2377 women (35%) who used contraception at all four surveys. Patterns of use of the oral contraceptive pill only (P) compared with use of all other methods (X) are presented in Figure 3-3.

Of the women who consistently reported using contraception, 40% reported using the oral contraceptive pill as their only method of contraception in at least three of the four surveys. Of the women who reported using the oral contraceptive pill as their only method of contraception at three surveys, the most frequent pattern of change involved changing from the oral contraceptive pill to some other method (which may or may not include oral contraceptive pill use) at Survey 4. Another common pattern was use of the oral contraceptive pill as the only method of contraception at Surveys 2 to 4 after using a different method of contraception at Survey 1 (34%). Of the women who reported the oral contraceptive pill as their only method of contraception at one survey only, 44% reported this at the first survey (and then use some other method or combination at future surveys). Among the women who used contraception at all four surveys, there was a decline in the use of the oral contraceptive pill as the only method of contraception, from a peak of 57% in Survey 2 to 43% in Survey 4.

### **3.6.2. Patterns of condom use**

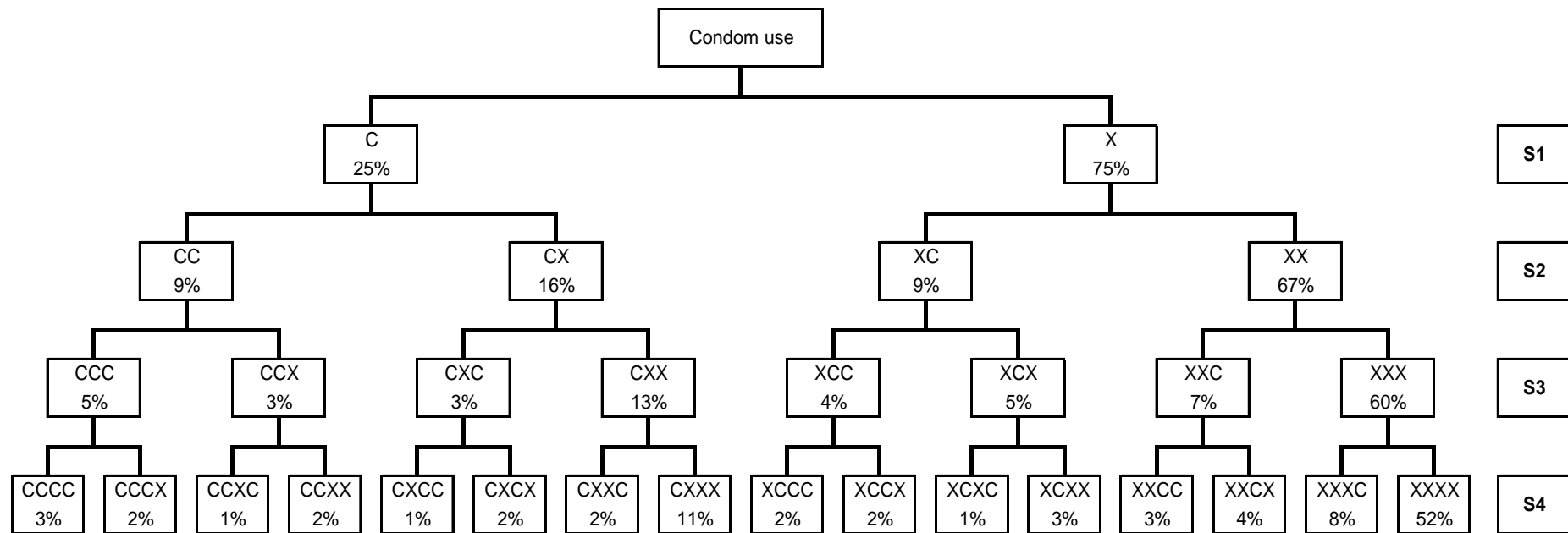
Patterns of use of condoms (C) as the only method of contraception compared with all other methods (X) were examined among the 2377 women who were identified as using contraception at all four surveys. The results are presented in Figure 3-4.

Of these 2377 women, slightly more than half never reported using condoms as the only method of contraception and only 3% used condoms as their only method of contraception at all four surveys. The women who reported using condoms as their only method of contraception were more likely to report this once only (26%), and most likely at Survey 1 (42% of those who reported using condoms as their only method of contraception at one survey only). The level of use of condoms as the only method of contraception ranged from 23% at Survey 1 to 16% at Survey 2, with 18% and 20% use at Surveys 3 and 4 respectively. While the level of use was similar over time, the same women did not consistently use condoms as their only method of contraception.



*P = use of oral contraceptive pill only; X = use of other methods of contraception; e.g. PPPX denotes use of the oral contraceptive pill only at the first three surveys, followed by use of another method of contraception at Survey 4*

**Figure 3-3 Patterns of use of the oral contraceptive pill as sole method among contraception users at all surveys (n=2377)**

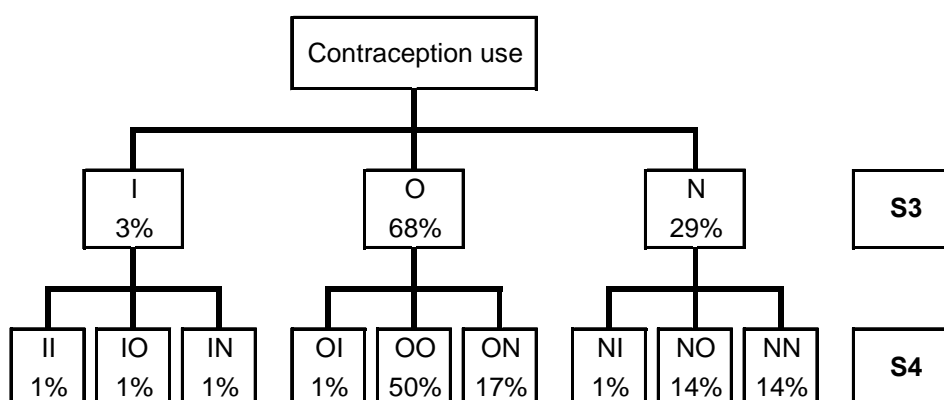


*C = use of condoms only; X = use of other methods of contraception; e.g. CCCX denotes use of condoms only at the first three surveys, followed by use of another method of contraception at Survey 4*

**Figure 3-4 Patterns of condom use as sole method of contraception among contraception users at all surveys (n=2377)**

### 3.6.3. Patterns of implant use

Patterns of implant use were examined to compare the use of implants (I) as the sole method of contraception with the use of other contraceptives (O) and non-use (N) across Surveys 3 and 4, for the 6708 women previously described. The nine possible patterns are presented in Figure 3-5. There is a relatively low level of use of implants; approximately 3% of women reported use of an implant as the only method of contraception at each survey. There was some change in use of implants with only one third of women who reported using an implant at Survey 3 also reporting use of an implant at Survey 4.



*I = use of an implant; O = use of another method of contraception; N = non-use of contraception*

**Figure 3-5 Patterns of implant use as sole method of contraception among women at Survey 3 and Survey 4 (n=6708)**

## 3.7. Changes in the use of contraception after a reproductive event

Each survey included questions about reproductive events including live births, still births, miscarriages, terminations and ectopic pregnancies. Six categories of reproductive events were constructed as shown in Table 3-3. Further information about the measurement of reproductive events is provided in Appendix B. Table 3-4 shows the proportion of women who reported each reproductive event category between surveys.

**Table 3-3 Categories of reproductive events and their descriptions**

No.	Category	Description of category
1	No events	Women who had not experienced a reproductive event
2	Birth only	Women who had experienced at least one birth of a child and no other reproductive events
3	Miscarriage only	Women who had experienced at least one spontaneous loss of pregnancy including miscarriage and stillbirth, and no other reproductive events
4	Both birth and miscarriage	Women who had experienced at least one birth and one miscarriage or stillbirth
5	Termination only	Women who had experienced induced pregnancy loss including termination of pregnancy or ectopic pregnancy
6	Multiple events	Women who had experienced multiple types of reproductive events

**Table 3-4 Proportion of reproductive events between surveys**

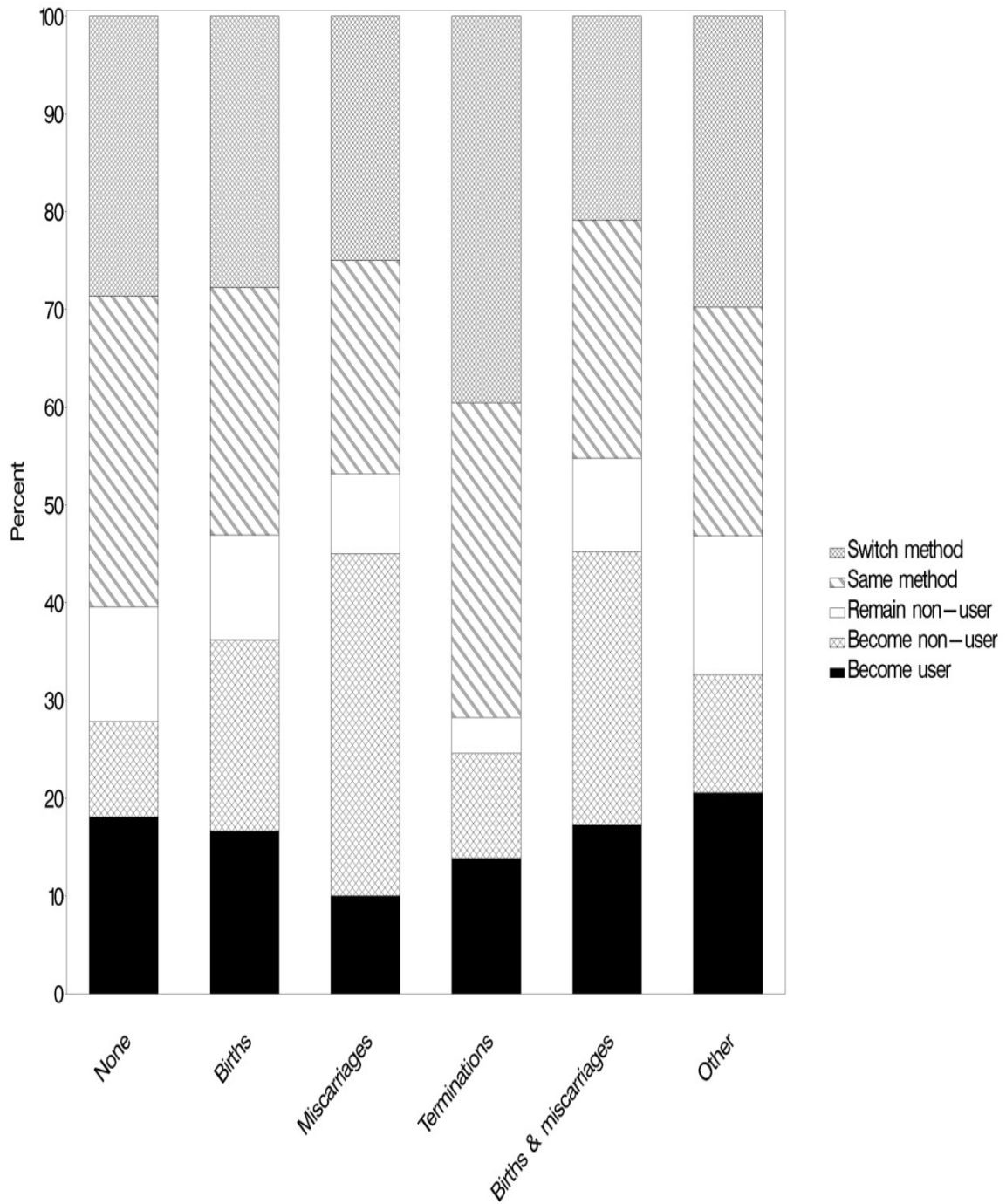
<b>Event between surveys</b>	<b>S1-S2 N=9678</b>	<b>S2-S3 N=7790</b>	<b>S3-S4 N=7746</b>
No events	79	73	61
Birth/s only	10	17	28
Miscarriage/s only	2	3	3
Birth/s and miscarriage/s	2	3	4
Termination/s only	6	3	2
Multiple events	1	1	2

Five categories of contraception use were examined: non-user, pill only, condom only, pill and condom, and all other methods (single or combination). There were five transitions in contraception use that were possible between successive surveys: remained a non-user, remained a user (same method), remained a user (switch methods), began using contraception, or stopped using contraception (see Table 3-5). The 'other' group encompassed a range of effective and less effective methods, and combinations of various methods. There may have been method switching within this group, but this was not easily distinguishable from the data available.

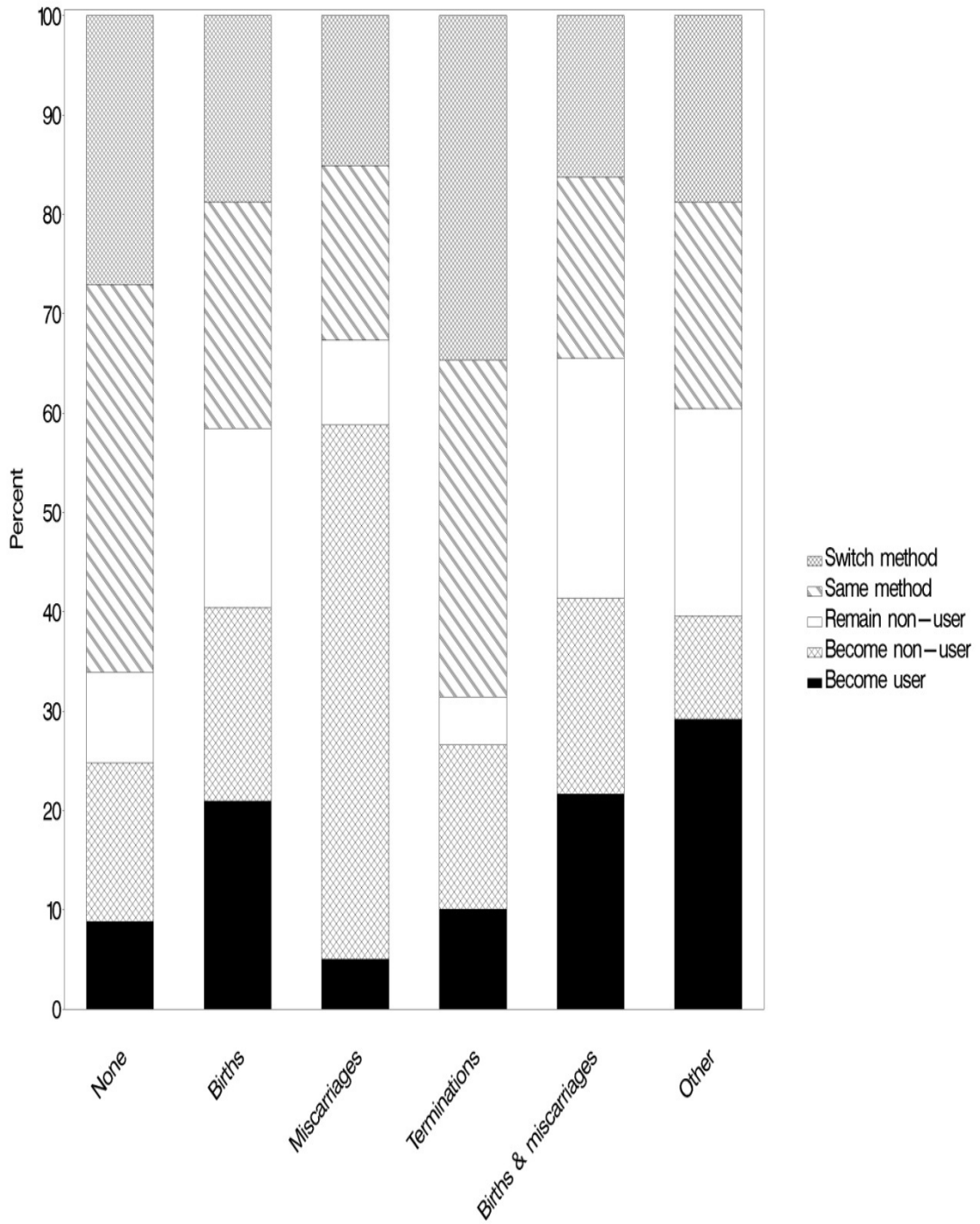
**Table 3-5 Categories of transitions in contraception use and their descriptions**

<b>No</b>	<b>Category</b>	<b>Description of category</b>
1	Remained non-user	Women who did not use contraception at either survey
2	Same method	Women who used the same method of contraception at both surveys
3	Switched methods	Women who used contraception at both surveys but changed the method they used
4	Became user	Women who did not use contraception at the first survey but used contraception at the second survey
5	Became non-user	Women who used contraception at the first survey but did not use contraception at the second survey

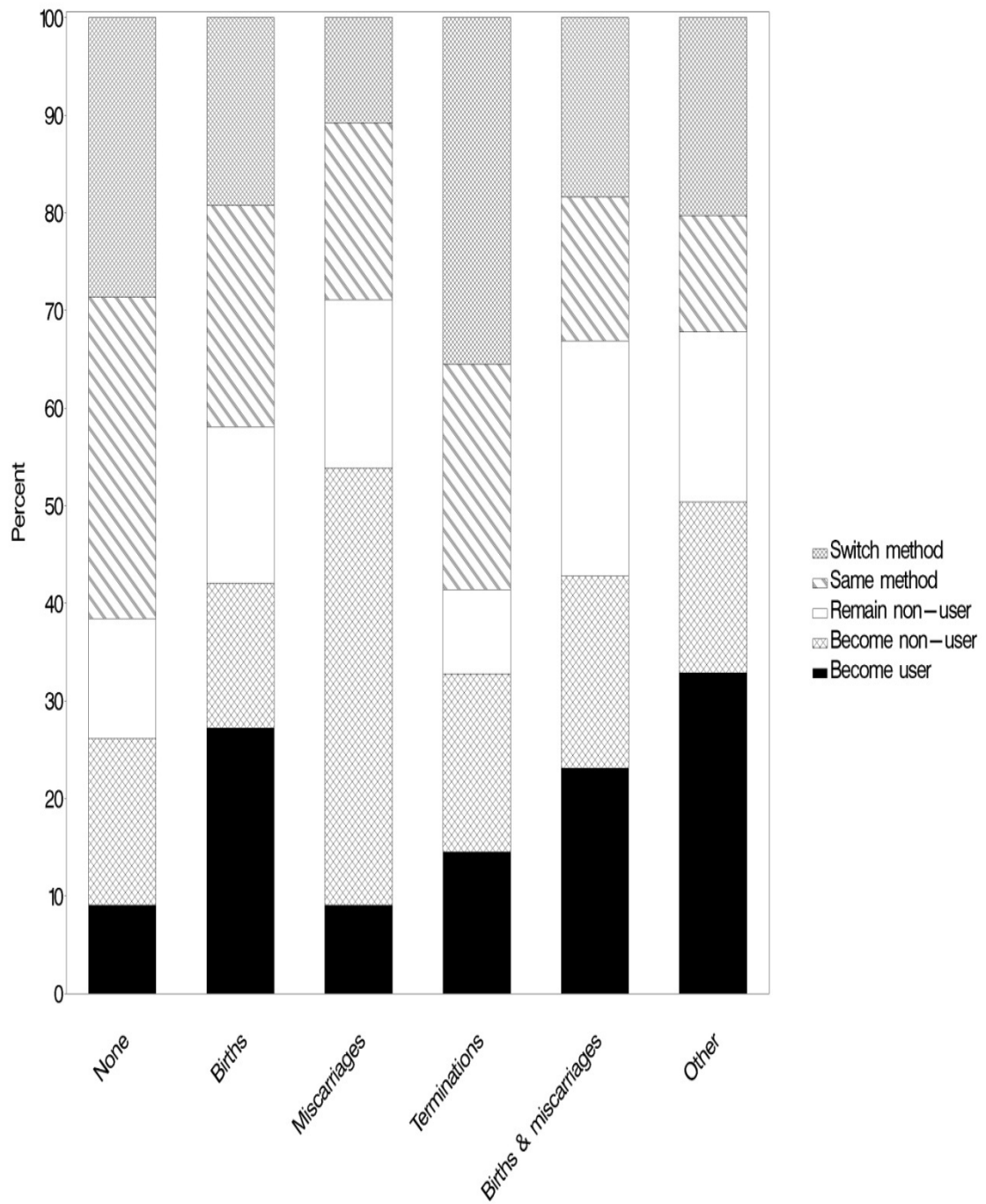
Figure 3-6, Figure 3-7 and Figure 3-8 show the reproductive events and transitions in contraception use between surveys. The results show that women who had a miscarriage, but no other type of reproductive event, between surveys were likely to stop using contraception in the same period. Most women who reported no reproductive event continued using the same method of contraception between surveys. Women who reported terminations only tended to switch methods, although to a lesser degree between Surveys 2 and 3.



**Figure 3-6 Contraception use transitions and reproductive events between Surveys 1 and 2**



**Figure 3-7 Contraception use transitions and reproductive events between Surveys 2 and 3**



**Figure 3-8 Contraception use transitions and reproductive events between Surveys 3 and 4**



## 3.8. Discussion

Patterns of contraceptive use change as women age. At Survey 1 many young women were not yet sexually active and therefore did not use contraception. At later surveys many women were pregnant or trying to conceive and thus did not use contraception. Of women using contraception, the most common contraceptive methods used at all surveys, were the oral contraceptive pill and condoms. Oral contraceptive pill use declined, use of condoms only and implant only remained steady, and the use of other methods increased. An examination of the patterns of change for individual women showed that oral contraceptive pill users were generally consistent in their use of this method. However, condom users were less likely to use condoms at more than one or two surveys with only 3% of all women using condoms at all four surveys. Around a third of implant users continued to use this method at both Survey 3 and 4. Women who used contraception were likely to be in de facto relationships or single, be up to date with Pap tests or to have had two or more births. Women who did not use contraception were likely to be non-drinkers and those who did low levels of exercise, had had one birth or had experienced miscarriage. Contraception changed in expected ways according to reproductive events. Women who had miscarriages only also stopped using contraception in the same period. Most women with no reproductive event continued to use the same method, and women who had a termination tended to switch methods.

These findings are important because they demonstrate that contraceptive use is dynamic and changes according to the circumstances of a woman's life, particularly her intention to conceive, but also in response to the availability of new methods. From previous work we know that many of the women in the 1946-1951 cohort had tubal ligations as they completed their families (Bryson, Strazzari & Brown, 1999). However, these women had children at younger ages than the 1973-1978 cohort (see Section 2) and they did not have access to long-acting reversible methods of contraception such as the implant or hormonal IUD. It is likely that women completing their families today may take up these long-acting reversible methods in preference to permanent methods of sterilisation (vasectomy or tubal ligation), but this is not yet known. Future surveys of the 1973-1978 cohort as they move through their 30s into their 40s and complete their families will provide useful information about these changing patterns. It is also likely that the next generation of young women will have different options and preferences. The addition of a new cohort of 18-23 year olds to ALSWH will be an ideal way of examining changing patterns of contraception use.

Most Australian research about contraception effectiveness focuses on preventing unintended pregnancy in adolescents. A substudy of the ALSWH 1973-1978 cohort could provide useful information about the effectiveness of contraception use among women in their 30s. There is also very little information about contraceptive knowledge and access among women in their 30s. It is important to know whether women received the information and advice that they required, particularly after reproductive events such as birth, miscarriage or termination. A substudy of women experiencing reproductive events could examine qualitative aspects of women's contraceptive use, particularly how they access information and services. This is particularly relevant for the many women who change their method of contraception at this time. Effective policy needs to consider how sexual and reproductive health needs change over time in order to ensure that services are available to meet women's needs throughout their reproductive lives.

## 3.9. References

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## 4. Aspirations for children

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### 4.1. Key Findings

This section examines the motherhood aspirations of the 1973-1978 cohort from Survey 1 to Survey 4. It examines how motherhood aspirations relate to aspirations for employment and relationships, whether aspirations change over time and as a result of having a first birth. Analyses included a comparison of women's aspirations with their actual number of children to examine whether women achieve their aspirations for motherhood.

- At all four surveys most of the 1973-1978 cohort of women reported that they aspired to have children. Very few women (less than 9%) aspired to having no children.
- The most common aspiration was for two children. Aspirations for two or more children declined across surveys as aspirations for one child increased.
- The majority of women aspired to being married at all four surveys and women aspiring to marriage were more likely to aspire to having two or more children, compared with other women.
- Of women who had their first birth between surveys, the majority held consistent aspirations for two children from pre- to post-birth.
- Compared with women having no births, women who had had a first birth were more likely to change their motherhood aspirations to greater number of children.
- By Survey 4, when they were aged 28-33 years, half of the women had not had any children and approximately 70% of the women had not yet met their aspirations for the desired number of children. The majority of childless women aspired to having two or more children.
- Only 13% of women with one child at Survey 4 aspired to their current number of children. Most aspired to two children (63%) and a quarter aspired to three or more children.
- Women with two children at Survey 4 mostly aspired to their current number of children (63%) with just over a third aspiring to three or more children.

### 4.2. Introduction

Australia has experienced a significant downward trend in fertility over the past few decades and the total fertility rate (1.8 babies per woman) is now below replacement level (2.1) (ABS, 2008a). This decline has been attributed to delays in couple formation and childbearing, followed by low levels of subsequent childbearing (McDonald, 2001). Consequently, Australia, like most OECD countries (d'Addio & d'Ercole, 2005; Commonwealth of Australia, 2002; Grant et al., 2004; Sleetbos, 2003), is faced with the prospect of an ageing population and the associated social and economic consequences. This has resulted in public interest in the childbearing patterns of Australian people and underscored the need for policies that encourage people to have more children and support families in looking after the children they have (Weston, Qu, Parker & Alexander, 2004).

The Baby Bonus, a one-off payment of \$5000, is a recent example of a government initiative to encourage families to have more children (Family Assistance Office, 2008a). The Baby Bonus was initially introduced in 2004 at a rate of \$3000 and has increased over time. It is paid as a lump sum except for claimants aged 17 years or under who receive it in 13 equal fortnightly instalments. From 1 January 2009 a family income test will apply to the Baby Bonus which will limit eligibility to families with a combined Adjusted Taxable Income (ATI) of \$75 000 (indexed) or less in the six months following the birth or entry into care of the child.

Another family-friendly initiative, the Family Tax Benefit (Family Assistance Office, 2008b) is comprised of Part A and Part B. The Family Tax Benefit Part A is a two-tiered means tested payment linked to the number and age of children that helps families with the cost of raising children. Families receiving Family Tax Benefit Part A may also be eligible for extra payments such as Rent Assistance (if renting privately), Large Family Supplement (for third and each subsequent child); and Multiple Birth Allowance (for three or more children born during the same birth). The Family Tax Benefit Part B gives extra assistance to sole parent families and to families with one main income where the income is \$150 000 or less.

Both the Baby Bonus and the Family Tax Benefit have been said to have contributed to a small increase in the fertility rate over recent years (Lattimore & Pobke, 2008). The effect on the total fertility rate is not entirely clear – some have debated that this small increase is a blip in a long downtrend in fertility - and other factors are also recognised as being important in the decision to have children. As the total fertility rate continues to remain below replacement level, there is a need to identify factors that act as barriers or facilitators to having children in order to inform policy development.

Being able to afford a child has been identified as the most important factor by men and women when considering having children. Thus, policies that assist people with the costs of having children, such as those mentioned above, continue to be recommended (Gray, Qu & Weston, 2008). Australian demographers have further argued that rather than encouraging childless people to have children, it would be more beneficial to target policies that encourage people who have children, to have additional children to help lift the fertility rate (McDonald, 2006). Further, Gray et al. have recommended that policies need to help women more easily combine paid employment with parenthood, in addition to assisting people with the costs of having children. The Productivity Commission draft inquiry report (2008) presented a detailed description of a draft model of paid parental leave which proposed 18 weeks postnatal leave that can be shared by parents at the adult minimum wage per week. The final report was provided to the Government in early 2009.

To continue to develop policy that can help lift the fertility rate, a strong evidence base is needed (Weston et al., 2004). Understanding people's fertility aspirations – who wants to have children and what impacts upon their fertility aspirations – as well as whether people achieve their desired number of children is of increasing importance for policy makers and researchers. Further, while contributing to this evidence base by looking at motherhood aspirations, there is a need to investigate the co-occurrence of motherhood and work aspirations to get an accurate representation of what young Australian women want to do, and how they anticipate managing motherhood and employment. Therefore, the ALSWH survey questions which focus on aspirations for motherhood, as well as for relationships, employment and occupation, are of interest.

## 4.3. Motherhood aspirations

This section presents the motherhood aspirations of the 1973-1978 cohort at Surveys 1, 2, 3 and 4. It compares the motherhood aspirations of childless women with those of women who have children, and of women with one or two children. This section examines the relationship between motherhood aspirations and aspirations for relationships and employment.

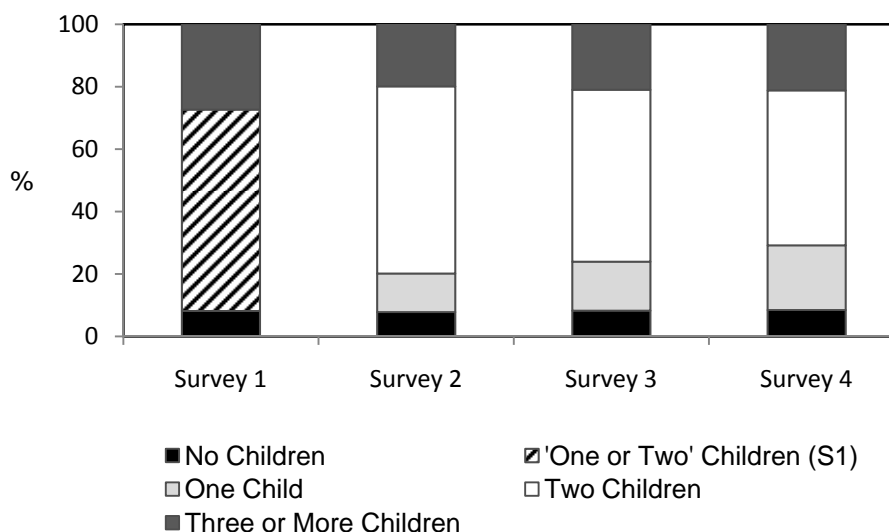
### 4.3.1. Motherhood aspirations of the 1973-1978 cohort

At each of the four surveys, the majority of women aspired to having children (see Figure 4-1). The most common response category was to aspire to two children by the age of 35, although the proportion of women aspiring to this response option declined across surveys. At Surveys 2, 3 and 4, 57%, 55% and 50% of the 1973-1978 cohort aspired to two children, respectively. At Survey 1, 65% of women aspired to the response option of '1 or 2 children'.<sup>1</sup>

The next most common response after two children was to aspire to '3 or more children' (or 'more than 2 children' at Survey 1), although the proportion of women aspiring to three or more children declined from 27% at Survey 1, to 21% at Survey 4.

Very few women aspired to having no children at any of the four surveys. Between 7% and 9% of women aspired to having no children at any of the four surveys while at Survey 2 and Survey 3, 13% and 16% of women aspired to one child, respectively. At Survey 4, the number of women aspiring to one child increased to 21%.

Thus, aspirations for two or more children appeared to decline across surveys and aspirations for one child increased.

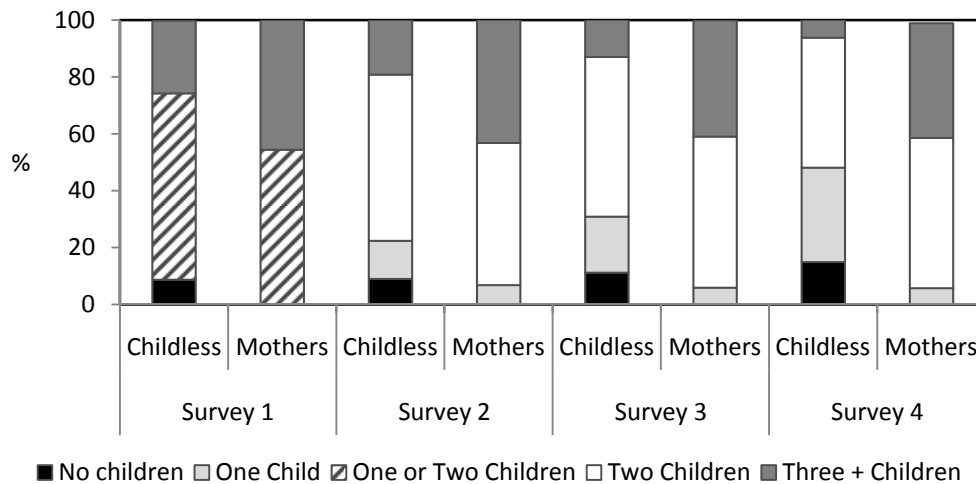


**Figure 4-1 Number of children aspired to by women in the 1973-1978 cohort at Survey 1, Survey 2, Survey 3 and Survey 4**

<sup>1</sup> At Survey 1, women were offered the response option '1 or 2 children'; in subsequent surveys this item was separated into 2 items: '1 child'; '2 children'.

### 4.3.2. Motherhood aspirations of childless women and mothers

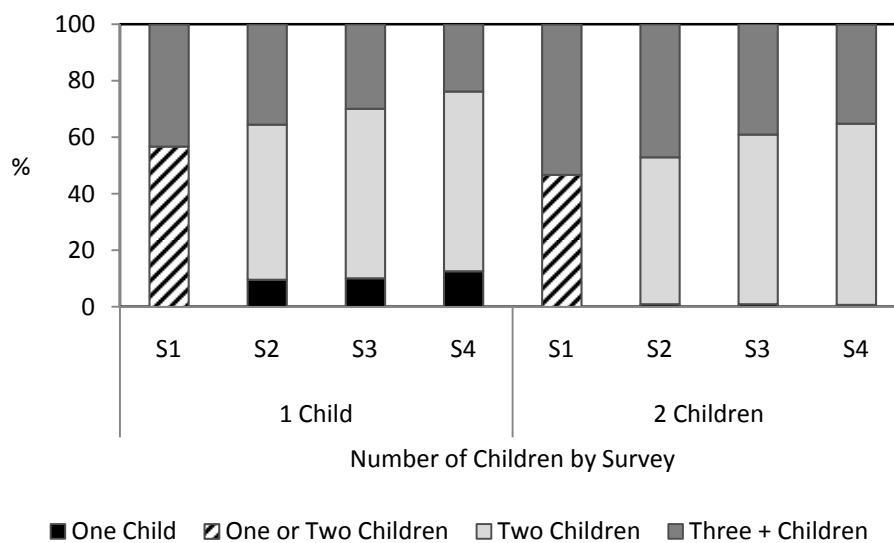
At each of the surveys, women who had children showed different patterns of motherhood aspirations from those of women without children (see Figure 4-2). While the majority of women still aspired to two children, those who already had children aspired to larger families of three or more children. Aspirations for larger families of three or more children declined among childless women, from 25% at Survey 1 to 6% at Survey 4. Childless women increasingly aspired to one or no children with successive surveys; from 22% of women at Survey 2 to 48% at Survey 4.



**Figure 4-2 Number of children aspired to by women in the 1973-1978 cohort at Survey 1, Survey 2, Survey 3 and Survey 4, according to motherhood status**

### 4.3.3. Motherhood aspirations of women with one child or two children

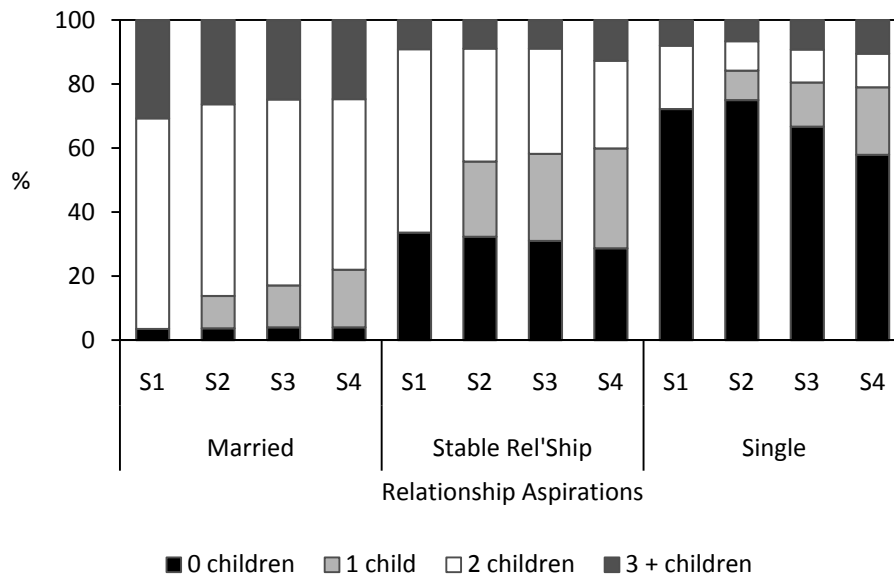
Figure 4-3 presents the breakdown of motherhood aspirations for women of the 1973-1978 cohort who had one child or two children at each survey. Women with three or more children were not included as they were not able to aspire to fewer children than they had. For women with one or two children, aspirations for two children increased with age, while aspirations for three or more children decreased.



**Figure 4-3 Number of children aspired to by women in the 1973-1978 cohort at Survey 1, Survey 2, Survey 3 and Survey 4, according to number of children**

### 4.3.4. Motherhood and relationship aspirations

This section presents the motherhood aspirations held by the 1973-1978 cohort at Surveys 1, 2, 3, and 4 according to relationship aspirations (see Figure 4-4). The majority of women aspired to marriage; over 85% at all four surveys. Women aspiring to marriage were more likely to aspire to having two or more children, compared with women aspiring to a stable relationship that did not include marriage, or to single status. Between 10-15% of women aspired to a stable relationship that did not include marriage. More of these women aspired to one-child families compared with women aspiring to marriage or to single status. Few women (approximately 1%) aspired to single status at any of the four surveys, and these women were more likely to aspire to no children. Thus, the findings suggest that aspirations for motherhood and marriage continue to co-occur.



**Figure 4-4 Number of children aspired to by women in the 1973-1978 cohort at Survey 1, Survey 2, Survey 3 and Survey 4, according to relationship aspirations**

### 4.3.5. Motherhood, relationship and employment aspirations

To obtain a better understanding of how women anticipate managing both work and family, the combinations of relationship, motherhood and employment aspirations were examined across the four surveys. To allow comparability with Survey 1, the response options of aspiring to '1 child' or '2 children' at Surveys 2, 3 and 4, were combined into one response option of '1 or 2 children'.

The majority of women aspired to a stable relationship (marriage or de facto), at least one child, and some form of paid work: 87% at Survey 1; 87% at Survey 2; and 88% at Survey 3 and 84% at Survey 4. Figure 4-5 presents the six most popular responses for each survey.



Across Surveys 1, 2 and 3 the most common aspiration was for marriage, one or two children and full-time paid work, although the proportion of women with these aspirations declined across surveys. Aspiring to marriage, one or two children and part-time paid employment was the second most common response set and increased across surveys. However, at Survey 4, the popularity of these two combinations was reversed. More women aspired to marriage, one or two children and part-time paid employment than marriage, one or two children and full-time paid work.

The option of self-employment/own business impacted on results. Aspiring to marriage, one or two children and self-employment/own business was the third most common response set at Surveys 2, 3 and 4.

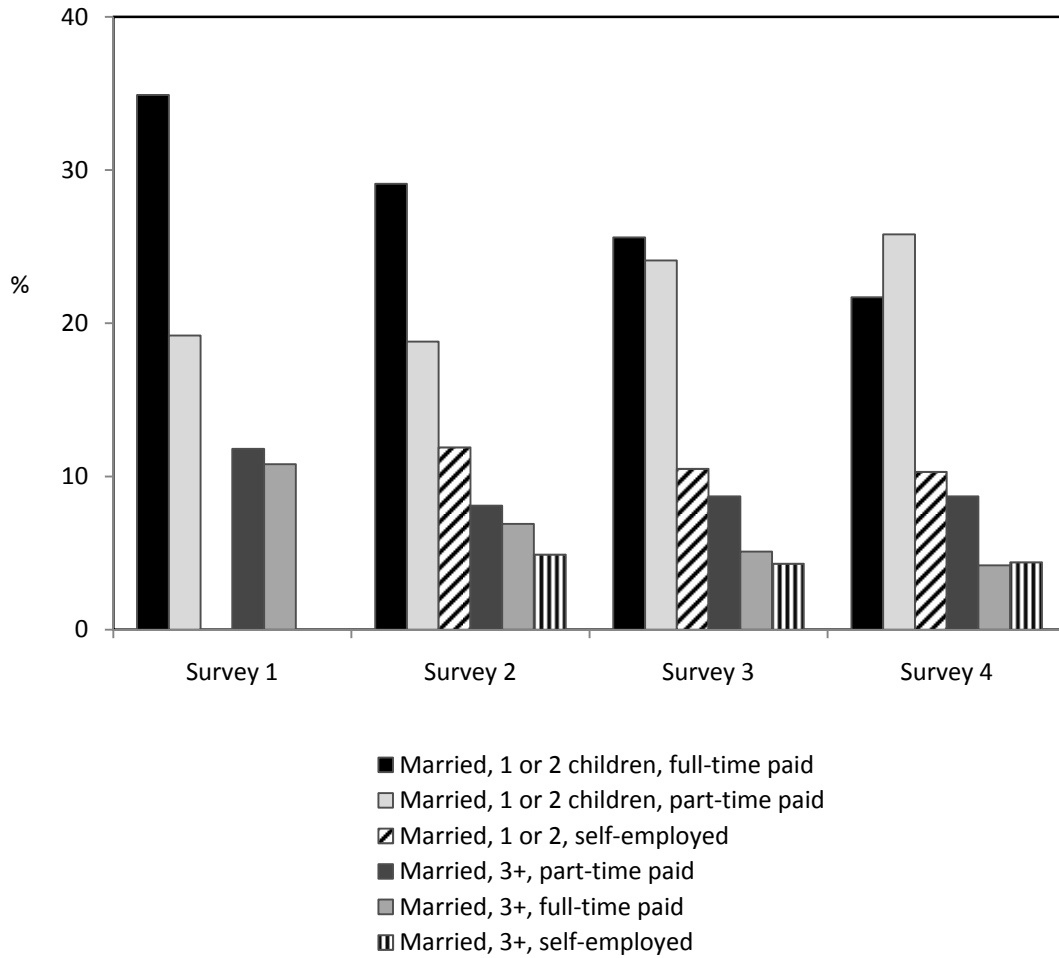
Categories including aspirations for a larger family of three or more children were the fourth and fifth most common categories at Survey 2 and 3 (third and fourth at Survey 1). However, among women aspiring to marriage and three or more children, aspirations for part-time paid employment were more common than aspirations for full-time paid employment.

The fourth most common response set at Survey 4 was for marriage, three or more children and part-time paid employment. The same pattern, but with self-employment as the employment aspiration was the fifth most common category.

The findings suggest that as women get older and have children, they experience some difficulty balancing their work and family commitments and are more likely to aim for reduced hours or self-employment. As childless women get older and start to think about having children, they may anticipate potential difficulties. Some of the comments written by women in the 1973-1978 cohort suggested that even before they had children, women were wondering how they would cope with employment and family commitments. Previously published ALSWH work found that women who held aspirations for no children, or only one or two children at Survey 1, held more ambitious aspirations for occupation compared with women who aspired to more than two children (Wicks & Mishra, 1998).

*'I regularly wonder how I will achieve my goals of further education and continue work and yet start a family before I am too old (>35), I guess something will have to be sacrificed (likely career).'* (Survey 3)

*'I feel that I am working harder than ever. Each year is getting harder and I'm working longer hours. At this time I guess I can afford to let my job take over an unequalled and undeserved amount of time. But what happens when my life changes e.g. Move out? Boyfriend? Children? How am I going to balance it? I'm struggling now to balance work / social / exercise / family /me time. I see my mother trying to be super hero and I don't think I could sustain everything and still be happy, still be me, still attain what I want out of life. How do other people feel?'* (Survey 3)



*N.B. No option of self-employment/own business at Survey 1*

**Figure 4-5 Six most popular relationship x motherhood x employment aspiration combinations at Surveys 1, 2, 3 and 4 of the 1973-1978 cohort**

#### **4.4. Consistency/inconsistency of aspirations across surveys**

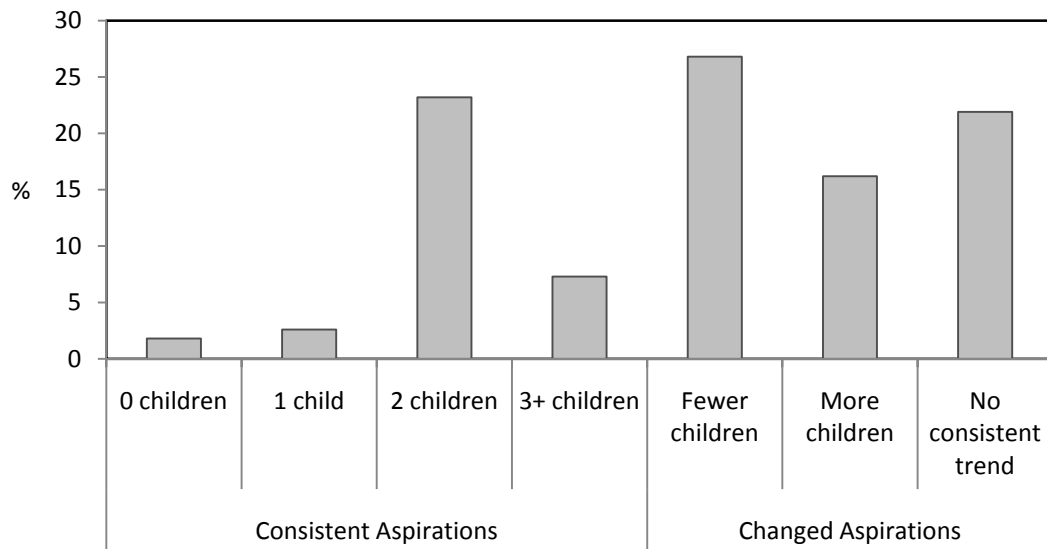
This section investigates the consistency of women's aspirations over time by linking individual responses across surveys. This section also investigates the impact of first birth and other life events on motherhood aspirations.

#### 4.4.1. Motherhood aspirations over time

Approximately 35% of women held consistent motherhood aspirations across the four surveys (see Figure 4-6), meaning that they aspired to the same number of children at all four surveys.<sup>2</sup>

Of the women who held consistent motherhood aspirations, the most common consistent response across the three surveys was for two children. Approximately 23% of women consistently aspired to this category at all four surveys; 7% of women consistently aspired to three or more children; 3% of women consistently aspired to one child and 2% aspired to no children.

A remaining 65% of women changed their motherhood aspirations at some point over the four surveys. Approximately 27% of women aspired to fewer children at Survey 4 than they had at Survey 1. A further 16% revised their aspirations to more children; so that by Survey 4 they aspired to more children than they had at Survey 1. An additional 8% increased their aspirations but then decreased them again by Survey 4; while another 8% revised their aspirations downwards then upwards. The remaining 6% of women fluctuated in their motherhood aspirations.



**Figure 4-6 Consistency of motherhood aspirations from Survey 1 to Survey 4**

#### 4.4.2. Motherhood aspirations after first birth

There have been recommendations that to increase the total fertility rate, policies should target women who have already had children, to have more children, rather than encouraging childless people to have children (McDonald, 2001). Thus, it is important to understand the impact of having a child on aspirations for further children. This section assesses the motherhood aspirations of the 1973-1978 cohort who had a first birth between surveys, by examining changes between Survey 2 and Survey 3 and between Survey 3 and Survey 4.

<sup>2</sup> It should be noted that the response options for motherhood aspirations changed from Survey 1 to Survey 2, and to assess the consistency of aspirations, respondents who aspired to the category of '1 or 2 children' at Survey 1, and then '1 child' or '2 children' at Survey 2, were treated as having a consistent aspiration across Surveys 1 and 2.

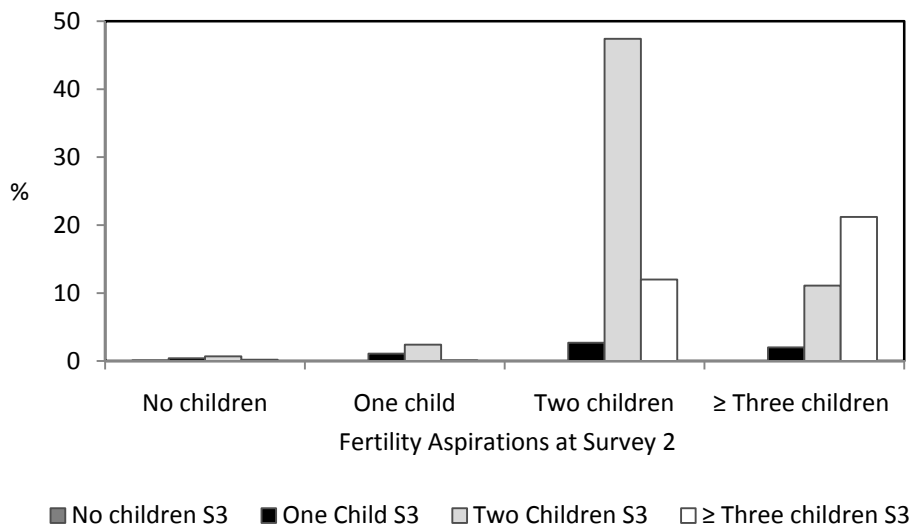
Table 4-1 presents the motherhood distribution of the 1973-1978 cohort, including women who had their first birth between surveys; women who already had children, and women who did not have any children from Survey 2 to Survey 3 and from Survey 3 to Survey 4. As can be seen from Table 4-1, 13% of women had their first birth between Survey 2 and Survey 3, and 19% of women had their first birth between Survey 3 and Survey 4.

**Table 4-1 Motherhood status of 1973-1978 cohort from Survey 2 to Survey 3, and Survey 3 to Survey 4**

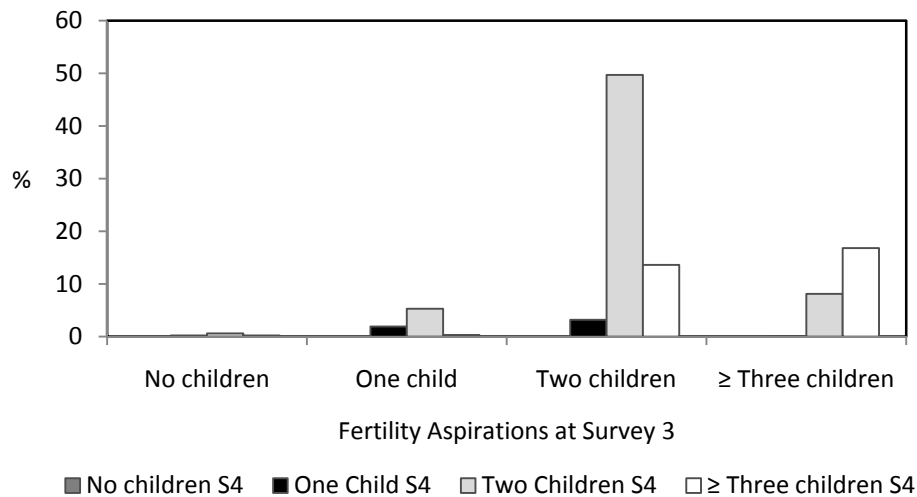
Births across surveys	Survey 2 to Survey 3	Survey 3 to Survey 4
	%	%
No births	72	53
First birth	13	19
Already had children	15	28

Figure 4-7 presents the pre- and post-birth motherhood aspirations for the 13% of women from the 1973-1978 cohort who had their first birth between Survey 2 and Survey 3. Figure 4-8 presents the pre- and post-birth motherhood aspirations for the 19% of women from the 1973-1978 cohort who had their first birth between Surveys 3 and 4.

The majority of women who had a first birth between surveys held consistent aspirations for two children from pre- to post-birth. A small proportion decreased their aspirations to one child after having a first birth while slightly more decreased their aspirations from three children to two children after the first birth. However, after having first birth, there were also some increases in aspirations; from one child to two children, and from two children to three children.



**Figure 4-7 Number of children aspired to pre- and post-birth of 1973-1978 cohort having first birth from Survey 2 to Survey 3**



**Figure 4-8 Number of children aspired to pre- and post-birth of 1973-1978 cohort having first birth from Survey 3 to Survey 4**

#### 4.4.3. Motherhood aspirations after first birth and other life events

There is some variation in motherhood aspirations following first birth. However, to understand why women change their motherhood aspirations, it would be useful to compare changes in motherhood aspirations among women who have children compared with women who have no children while also investigating other events that could be associated with changes in motherhood aspirations. This section presents a detailed analysis of the association between changing motherhood aspirations, life events, including first births and marital transitions, and changes in relationship and employment aspirations.

Table 4-2 presents the changes in motherhood aspirations of the 1973-1978 cohort from Survey 2 to Survey 3 and from Survey 3 to Survey 4. Across both periods, the majority of women did not change their motherhood aspirations, approximately 20% revised their aspirations to fewer children by the latter survey, and another 15% revised their aspirations upwards to aspire to more children by the latter survey.

**Table 4-2 Motherhood aspirations of the 1973-1978 cohort across Survey 2 and Survey 3 and Survey 3 to Survey 4**

Motherhood aspirations across surveys	Survey 2 to Survey 3	Survey 3 to Survey 4
	(n = 7515)	(n = 7538)
	%	%
Consistent/no change	65	65
Revised downwards (to fewer children)	20	19
Revised upwards (to more children)	15	15

*Motherhood status.* As detailed in the preceding section, women's motherhood status was assessed longitudinally across two time periods: from Survey 2 to Survey 3, and from Survey 3 to Survey 4. Women were categorised into one of three groups: having first birth between surveys, already having children prior to the first survey or not having any children by the second survey (see Table 4-1 for figures).

*Change in marital status.* Marital status was assessed at each survey and responses were assessed longitudinally to assess transitions from Survey 2 to Survey 3, and from Survey 3 to Survey 4. This section presents the changes in employment for women who were: married at both surveys; changed from never married to married; never married at both surveys; in a de facto status at both surveys; changed from de facto to married; changed from never married to de facto status, or who made some other marital transition.

*Changes in relationship aspirations.* Responses to the relationship aspiration items were assessed longitudinally across Surveys 2 and 3, and Surveys 3 and 4. Changes in relationship aspirations were categorised as: no change in relationship aspirations across surveys; aspirations revised to become less traditional between surveys (where marriage is treated as the most traditional and single status as least traditional and women move away from aspiring to marriage towards aspiring to single status); and aspirations revised to become more traditional between surveys.

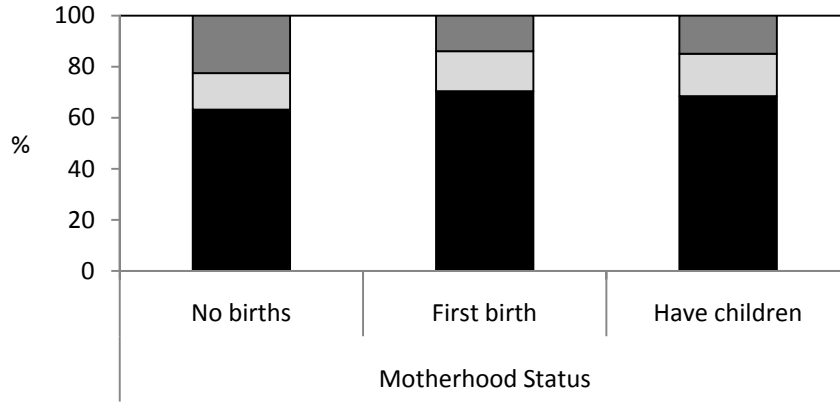
*Changes in employment aspirations.* Responses to the employment aspiration items were assessed longitudinally between Surveys 2 and 3, and between Surveys 3 and 4. Changes in employment aspirations were categorised as: no change; aspirations revised from full-time paid to part-time paid employment between surveys; aspirations revised from part-time paid to full-time paid employment between surveys; or some other change in employment aspirations.

Table 4-3 presents percentages of women at each of the life transitions of marital transitions, changes in relationship and employment aspirations between Survey 2 and Survey 3, and Survey 3 and Survey 4.

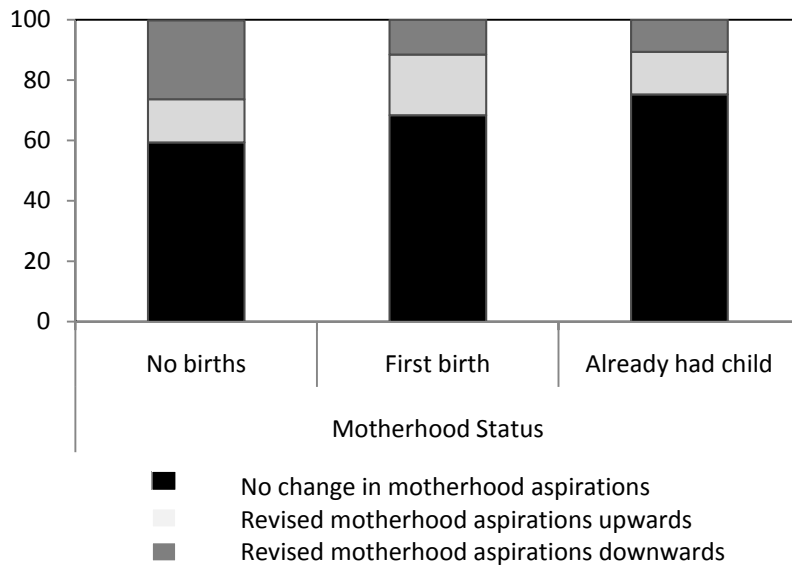
**Table 4-3 Percentages of women according to life transitions between Survey 2 and Survey 3, and Survey 3 and Survey 4**

	Survey 2 to Survey 3 %	Survey 3 to Survey 4 %
<b>Marital transitions</b>		
Married -> married	22	38
Never married -> married	10	6
Never married -> never married	34	21
De facto -> de facto	8	9
De facto -> married	8	8
Never married -> de facto	11	8
Other	8	9
<b>Relationship aspirations</b>		
No change	89	88
More traditional	5	5
Less traditional	6	7
<b>Employment aspirations</b>		
No change	58	59
Full-time to part-time	11	10
Part-time to full-time	6	6
Other change	24	25

Changing motherhood status was associated with changes in motherhood aspirations (Figure 4-9, Figure 4-10). The women who had a first birth between surveys were more likely than women with no children, to revise their motherhood aspirations to more children. Also not having any children was associated with revising motherhood aspirations downwards. Women who had no children were more likely to revise their motherhood aspirations to aspire to fewer children compared with women who had their first birth, and women who already had children.



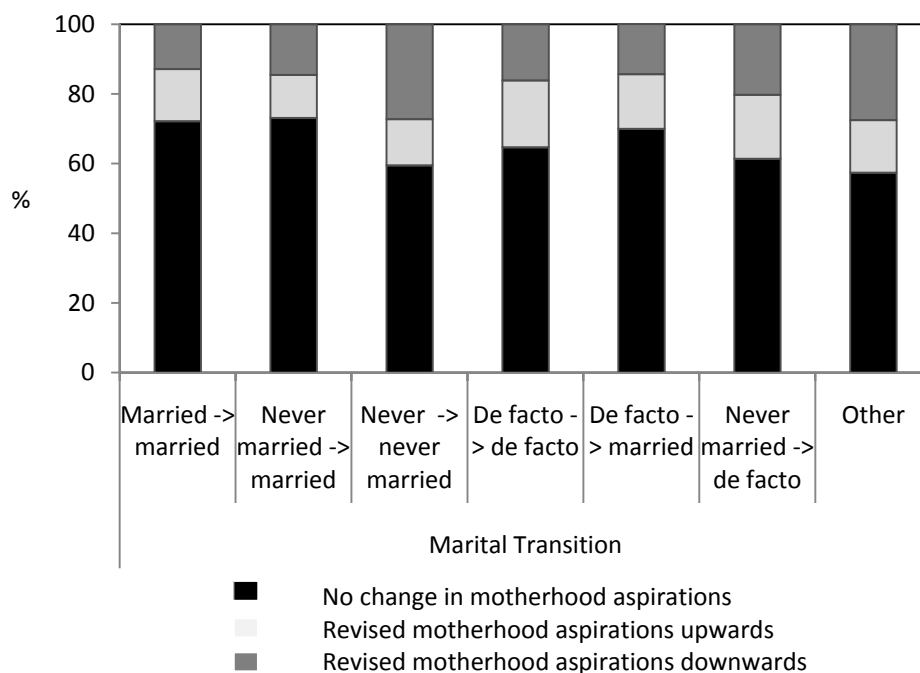
**Figure 4-9 Motherhood aspirations according to motherhood status from Survey 2 to Survey 3**



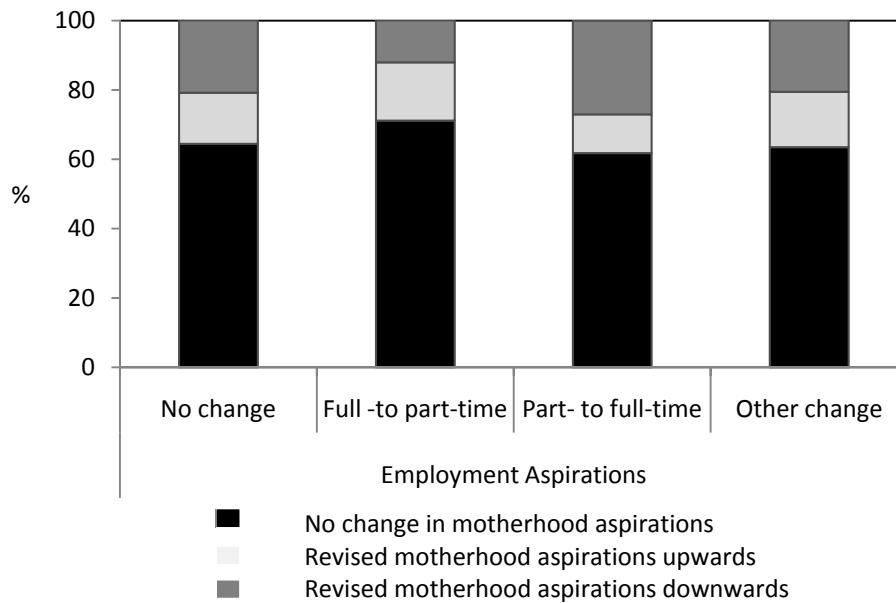
**Figure 4-10 Motherhood aspirations according to motherhood status from Survey 3 to Survey 4**



Marital transitions were also associated with changes in motherhood aspirations (Figure 4-11; Figure 4-12). Compared with women who were married at both surveys, women who married between Survey 3 and Survey 4 were more likely to revise their motherhood aspirations upwards by Survey 4. This was not apparent between Survey 2 to Survey 3. Women who were already married or who married between surveys were equally likely to hold consistent motherhood aspirations. A possible explanation is that in the earlier surveys, the women were younger, and were still idealistic about the number of children they would have. However, as the women become older, and their reproductive years start to reduce, their aspirations for having children become more dependent on being in a stable relationship. To further suggest that being in a stable relationship is important for these women to aspire to have children, women who remained unmarried across both surveys were more likely than women who were married at some point, to decrease their aspirations to fewer children.



**Figure 4-11 Motherhood aspirations according to marital transitions from Survey 2 to Survey 3**



**Figure 4-12 Motherhood aspirations according to marital transitions from Survey 3 to Survey 4**

## 4.5. Do aspirations match behaviour?

Are young women’s aspirations reflected in their reproductive choices at Survey 4? This section examines women’s aspirations for children according to the number of children they had by Survey 4. Table 4-4 presents a cross-tabulation of motherhood aspirations and number of live births.

Half of the women had not had any children and approximately 70% of them had not met their aspirations for their desired number of children. Of childless women, the majority aspired to having two children.

**Table 4-4 Crosstabulation of motherhood aspirations at Survey 4 and number of live births (full-term and premature) at Survey 4**

No. of Live Births at Survey 4	Motherhood Aspirations at Survey 4								Total	
	No Children		One Child		Two Children		≥ 3 Children			
	N	%	N	%	N	%	N	%		
<b>No Children</b>	687	8	1529	17	2101	24	283	3	4600	52
<b>One Child</b>	-	-	234	3	1181	13	442	5	1857	21
<b>Two Children</b>	-	-	-	-	1078	12	591	7	1669	19
<b>≥ Three Children</b>	-	-	-	-	-	-	732	8	732	8
	687	8	1763	20	4360	49	2048	23	8858	100

Missing = 159

### 4.5.1. Motherhood aspirations and number of children

Table 4-5 presents the motherhood aspirations of the 1973-1978 cohort, according to whether they had no children, one child, two children or three or more children at Survey 4. Those with no children at Survey 4 most commonly aspired to have two children (46%); a third aspired to one child and 6% aspired to three or more children. Those with one child at Survey 4 most commonly aspired to two children (63%) and a quarter aspired to three or more children. Only 13% aspired to their current number of children. Those with two children at Survey 4 mostly aspired to their current number of children (63%) with just over a third aspiring to three or more children.

**Table 4-5 Crosstabulation of motherhood aspirations at Survey 4 and number of live births (full-term and premature) at Survey 4**

No. of Live Births at Survey 4	Motherhood Aspirations at Survey 4								Total	
	No Children		One Child		Two Children		≥ 3 Children			
	N	%	N	%	N	%	N	%		
<b>No Children</b>	687	15	1529	33	2101	46	283	6	4600	100
<b>One Child</b>	-	-	234	13	1181	64	442	24	1870	100
<b>Two Children</b>	-	-	-	-	1078	65	591	35	1699	100
<b>≥ Three Children</b>	-	-	-	-	-	-	732	100	800	100

*Missing = 159*

## 4.6. Discussion

This section shows that the majority of the 1973-1978 cohort want to have children. The most popular aspiration was for two children, followed by three or more children, at all four surveys. Few women aspired to no children, and less than 2% of women consistently aspired to no children across all four surveys. However, the popularity of the single-child family increased across surveys as the women become older, while the popularity of larger families of two or more children started to decline.

The findings showed that changes in aspirations are dependent on circumstances. Approximately two-thirds of women changed their motherhood aspirations at some time since the first survey, and changes were associated with having already started childbearing and being in a stable relationship. Differences were observed in aspirations between women who had started childbearing and those who hadn't, with childless women more dramatically reducing their aspirations for larger families of three or more children across surveys.

While it is clear that the women did want to have children, half the women at Survey 4 (when they were aged 28-33 years) had not had any children, and the majority had not achieved their desired number of children. However, these women are not yet at the end of their reproductive years, and there is a trend in Australia for later childbearing. The median age of first birth for Australian women in 2005 was 30.7 years (ABS, 2008b) and so the 1973-1978 cohort are likely to start having children, or to have additional children. Future ALSWH surveys of the 1973-1978 cohort will show how many women go on to have their desired number of children.

However, our findings have shown that aspirations change due to circumstances and life constraints and that the number of children women aspire to is declining as the surveys progress and the women become older. Other research has suggested that delaying childbearing is not fully compensated by later childbearing, and that desired fertility is below actual fertility levels (Weston, Parker & Alexander, 2004). It is therefore possible that the aspirations of the 1973-1978 cohort will fall short of actual number of children they have, but these trends will need to be examined. If it is true that policy initiatives are effective in improving the fertility rate, then these patterns will be reflected in future surveys of the 1973-1978 cohort, and surveys of a younger cohort of women. If aspirations are not achieved, further research on the factors that impact upon childbearing, needs to be undertaken. Data from Surveys 5 and 6 could be used to examine who does and does not achieve their desired number of children and the associated factors and barriers to having children.

Further research with the women in the 1973-1978 cohort could provide useful information about why women do not have the number of children they desire, and how policy could support women in achieving their aspirations for children. A future qualitative substudy could be conducted to identify the barriers and events that prevented women from achieving their aspirations; what they felt could have helped them to achieve their aspirations; and the impact that policy initiatives such as the Baby Bonus had on their decision to have children. These findings would contribute to the evidence base for policy development.

The findings showed that aspirations for motherhood were considered with respect to other aspects of life, as changes were associated with changes in relationship and employment aspirations. The fact that more women aspired to part-time employment when increasing their motherhood aspirations, highlights the importance of work-family policies that help women manage paid work with childbearing. The most common motherhood x relationship x employment aspiration category involved full-time paid work in the earlier surveys, but the popularity of full-time paid work declined across surveys, as part-time and self-employment became more popular. Potentially, more women experienced or anticipated difficulty in managing full-time work with raising children. Developing and implementing work-family policies that meet the needs of Australian women and that assist in lifting the fertility rate continue to be important.

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## 5. Fertility and infertility

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### 5.1. Key findings

This section describes patterns of fertility across Surveys 1 to 4 among the cohort of women who were born in 1973-1978. This section includes the examination of pregnancy outcomes including both live births and pregnancy losses (stillbirths, miscarriages, terminations and ectopic pregnancies). This section also examines the prevalence of self-reported problems with fertility and whether these women sought advice and/or treatment. As women age they are more likely to experience infertility and, with little other data available, the ALSWH provides an important opportunity to examine this problem and the related use of health services.

- Pregnancy losses are common. Half of the women who report a pregnancy outcome at Survey 4 have experienced a pregnancy loss.
- More than one third (39%) of women who have experienced a live birth by Survey 4 have also experienced a pregnancy loss.
- For every ten women aged 28-33 years in 2006: four women had not had been pregnant, five women had a live birth (with or without a recognised pregnancy loss), and one woman had a recognised pregnancy loss only.
- Among women who had tried to conceive or had been pregnant, one-in-six had experienced infertility. (i.e. tried unsuccessfully to get pregnant for 12 months or more)
- The most significant factors associated with having infertility, seeking advice and using treatment were: polycystic ovary syndrome, endometriosis and miscarriage.
- Of the women who reported infertility, two-thirds sought advice but only half used treatment.
- Most of the women who used fertility treatment had used low cost and non-invasive methods.

### 5.2. Introduction

As has been noted in Sections 2, 3 and 4, increasing numbers of women are delaying childbearing until later in life and this trend is well recognised (Weston, Qu, Parker, & Alexander, 2004). However, many women have had pregnancies not resulting in a live birth which therefore do not appear in fertility statistics. In Australia, as in other countries, there are national fertility statistics on live birth rates but limited data on patterns of recognised pregnancy loss. Recognised pregnancy losses include spontaneous loss: miscarriages (<20 weeks gestation) and stillbirths (20+ weeks gestation); and induced losses, terminations and ectopic pregnancies. Comprehensive reproductive histories are an important measurement of both fecundity (reproductive ability) and fertility (live births). Pregnancy losses may reflect population level trends in changing fecundity (e.g. miscarriage due to genetic abnormalities or environmental influences), or changing social values (e.g. termination rates).

The increasing trend in delayed childbearing highlights the need for women to be reminded about declining fertility related to increasing age. The Sexual Health and Family Planning Association (SHFPA) supports the availability of accurate information on the management of

fertility including achieving pregnancy (SHFPA website [www.shfpa.org.au](http://www.shfpa.org.au)). SHFPA warns of an over-reliance on assisted reproductive technologies (ART) to counteract the effect of increased age on fertility and to achieve pregnancy.

Women and couples who are infertile need access to accurate medical assessment and advice, followed by safe and appropriate treatment. A range of legislation, guidelines, reviews and organisations contribute to the extent of Medicare-funded access to treatment. Fertility clinics operate under a range of national guidelines required for continuing accreditation with the Reproductive Technology Accreditation Committee including the National Health and Medical Research Council's Ethical guidelines on assisted reproductive technology (National Health and Medical Research Council, 2007). Access to ART should not be restricted by discriminatory or inequitable policies. In reality, many restrictions exist and vary between states and territories.

Many couples with a history of infertility neither seek advice nor use treatment with ART. The improved success rates in ART may encourage more couples to use treatment. Seeking medical advice and access to ART, however, may be limited by social, lifestyle and financial factors. In Australia, women with infertility who have used ART are recorded in the treatment registry: Australian and New Zealand Assisted Reproduction Database (ANZARD) (Wang, Dean, Badgery-Parker, & Sullivan, 2008). This treatment registry, however, does not include women with infertility who neither sought advice nor used treatment.

There have been two non-government national campaigns to raise an awareness of the detrimental impact of increasing age on fertility. The organisation of Business and Professional Women Australia initiated the Think Fertility Project to raise awareness of fertility issues within the community ([www.thinkfertility.com.au](http://www.thinkfertility.com.au)). The Fertility Society of Australia initiated the Fertility Preservation Project and commissioned The National Fertility Study which showed the limited knowledge and broad misconceptions about fertility and infertility within the general population (Clark & Mackenzie, 2007; Fertility Society of Australia, 2006a). For women who had sought advice from medical professionals, the majority had not used treatment. The NFS included an additional survey of general (medical) practitioners (GPs) and found the majority underestimated the prevalence of infertility (Fertility Society of Australia, 2006b).

### **5.3. Pregnancy losses for the 1973-1978 cohort**

The objective of this section is to describe patterns of fertility across Surveys 1 to 4 among the cohort of women born in 1973-1978. This includes an examination of pregnancy outcomes including both live births and pregnancy losses (stillbirths, miscarriages, terminations and ectopic pregnancies) (Herbert, Lucke & Dobson, 2009).

The women who participated in ALSWH were aged: 18-23 years at Survey 1; 22-27 years at Survey 2; 25-30 years at Survey 3; and 28-33 years at Survey 4. The pregnancy outcomes of the women were used to categorise them by their reproductive histories as detailed in Appendix B (Table B-4).

As the women became older there were more reported births and pregnancy losses (Table 5-1). At Survey 1 and Survey 2, more pregnancy losses (11%, 17% respectively) were reported than births (8%, 16%). The most common types of pregnancy loss were miscarriage and termination. The frequency of termination at Survey 1 (7%) was almost double that of miscarriage (4%), however by Survey 4 miscarriage was reported as commonly as termination (15%, 16% respectively). At Survey 3 and Survey 4, more births (29%, 46%) were reported than pregnancy losses (25%, 33%). Stillbirths were consistently reported as less than 1% of pregnancy losses across three surveys (Surveys 2 to 4). Similarly, ectopic pregnancies (reported for the first time at Survey 4), were rare (1%). For every four births reported by Survey 4, there were three pregnancy losses.

Women who participated in Survey 1 only reported higher frequencies of pregnancy at Survey 1 (resulting in birth for 14%; miscarriage for 5%; and termination for 9%) compared with women who participated beyond Survey 1 (birth for 7%; miscarriage for 3%; and termination for 6%). Further, Survey 4 participants reported the lowest frequencies of pregnancy at Survey 1, resulting in birth for 6%, miscarriage for 3%, and termination for 6%. These findings are consistent with analyses of patterns of participant retention which show that women who completed all surveys were less likely to have children than those who did not complete all surveys (Appendix A).

Table 5-2 describes the women categorised by their recognised pregnancy outcomes over ten years. Women were categorised into mutually exclusive pregnancy outcome groups and counted once only at each survey. These categories provide individual reproductive histories for each woman who reported pregnancy outcomes.

**Table 5-1 Total recognised pregnancy outcomes of the 1973-1978 cohort**

Pregnancy outcomes	Aged 18-23 in 1996 N=14 247		Aged 22-27 in 2000 N=9688		Aged 25-30 in 2003 N=9081		Aged 28-33 in 2006 N=9145	
	n	%	n	%	n	%	n	%
Births	1356	8	1816	16	2919	29	4458	46
Losses	1553	11	1820	17	2336	25	3072	33
- Miscarriage	561	4	683	6	998	10	1422	15
- Stillbirth	na		41	(<1)	64	1	75	1
- Termination	992	7	1096	11	1274	14	1460	16
- Ectopic	na		na		na		115	1

na = not available i.e., not a survey question.



**Table 5-2 Reproductive histories of the 1973-1978 cohort**

Reproductive histories	Aged 18-23 in 1996 N=14 247	Aged 22-27 in 2000 N=9688	Aged 25-30 in 2003 N=9081	Aged 28-33 in 2006 N=9145
	%	%	%	%
No pregnancy	85	74	60	44
Pregnancy outcomes	15	26	40	56
Women who reported pregnancy outcomes:	n=2379	n=2822	n=3917	n=5343
	%	%	%	%
<b>Birth only (subtotal)</b>	<b>37</b>	<b>39</b>	<b>45</b>	<b>50</b>
Miscarriage only	10	9	7	4
Termination only	33	29	20	12
Miscarriage + termination	3	2	2	2
<b>Loss only (subtotal)</b>	<b>46</b>	<b>40</b>	<b>29</b>	<b>18</b>
Birth + miscarriage	8	9	13	16
Birth + termination	7	9	9	11
Birth + miscarriage + termination	2	3	4	5
<b>Birth + loss (subtotal)</b>	<b>17</b>	<b>21</b>	<b>26</b>	<b>32</b>
<b>Total %</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

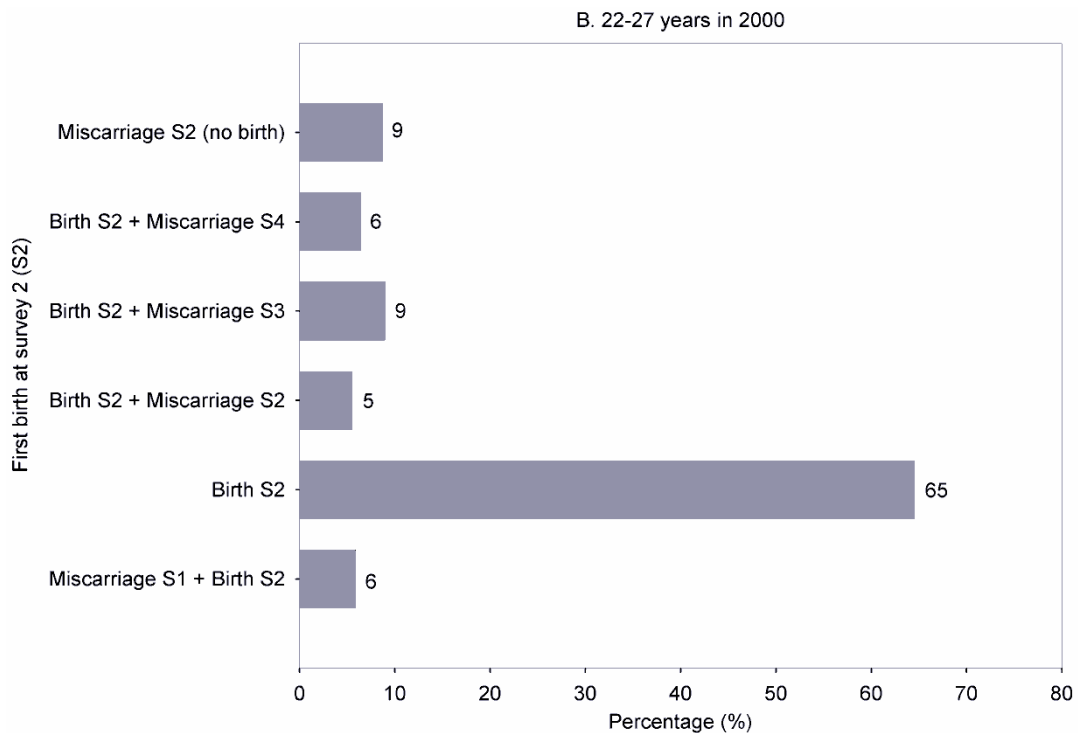
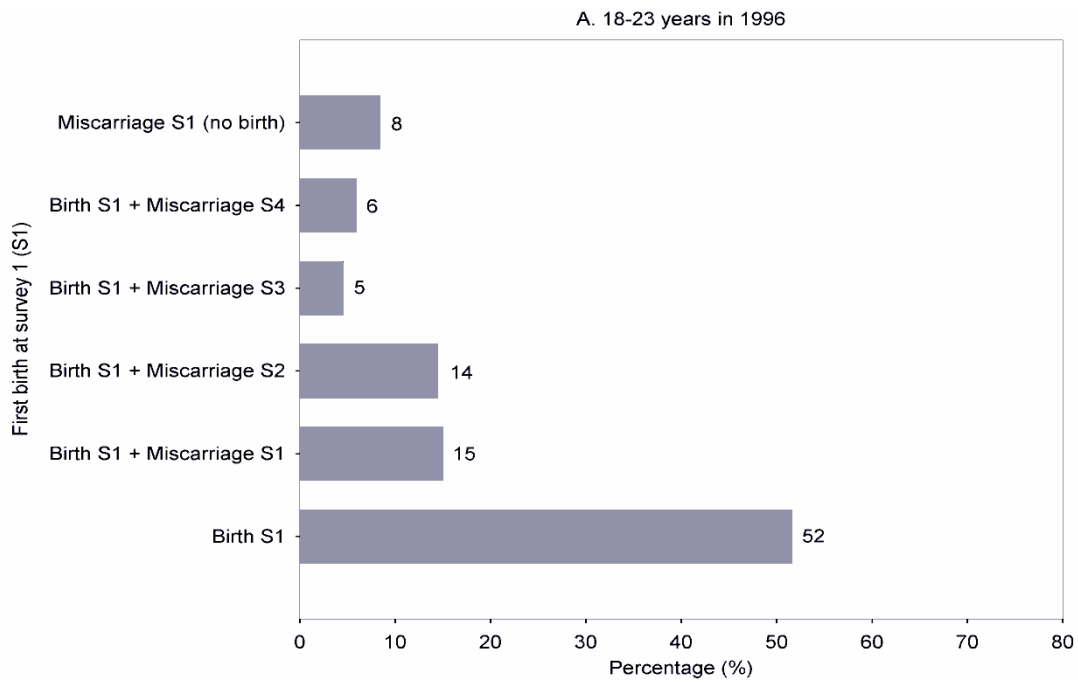
*Miscarriage includes stillbirth; less than 1% of women aged 28-33 years reported a stillbirth. Termination includes ectopic pregnancies; 1% of women aged 28-33 years reported an ectopic pregnancy.*

Pregnancy loss only, (i.e. miscarriage/stillbirth and termination), was the most common pregnancy outcome at Survey 1 (46%) and Survey 2 (40%). Birth only was the most common pregnancy outcome at Survey 3 (45%) and Survey 4 (50%). One-third (33%) of women at Survey 1 reported their pregnancy outcomes as terminations only; the frequency of this outcome dropped to 12% by Survey 4. The cumulative frequency of birth and at least one loss nearly doubled over ten years, from 17% (Survey 1) to 32% (Survey 4). Specifically, the category of birth and miscarriage doubled (Survey 1: 8%; Survey 4: 16%), whereas birth and termination had a 60% increase (Survey 1: 7%; Survey 4: 11%). At Survey 1, when they were aged 18-23 years the majority of women (85%) reported no pregnancy outcome but by Survey 4 (aged 28-33 years) fewer (44%) women had not reported a pregnancy outcome.

At Survey 1 and Survey 2, the women who reported their first miscarriage only (no birth) were younger than the women who reported first birth only (no miscarriage). Women who reported their first miscarriage at Survey 1 and did not have a first birth until Survey 3 were also likely to be younger than those who reported a first birth at Survey 1. No difference was found between the ages of women who reported their first miscarriage or first birth at Survey 3. Three years later, women who had reported their first birth at Surveys 1 or 2 and reported a first miscarriage at Survey 4 were older than those who reported their first birth at Survey 4.

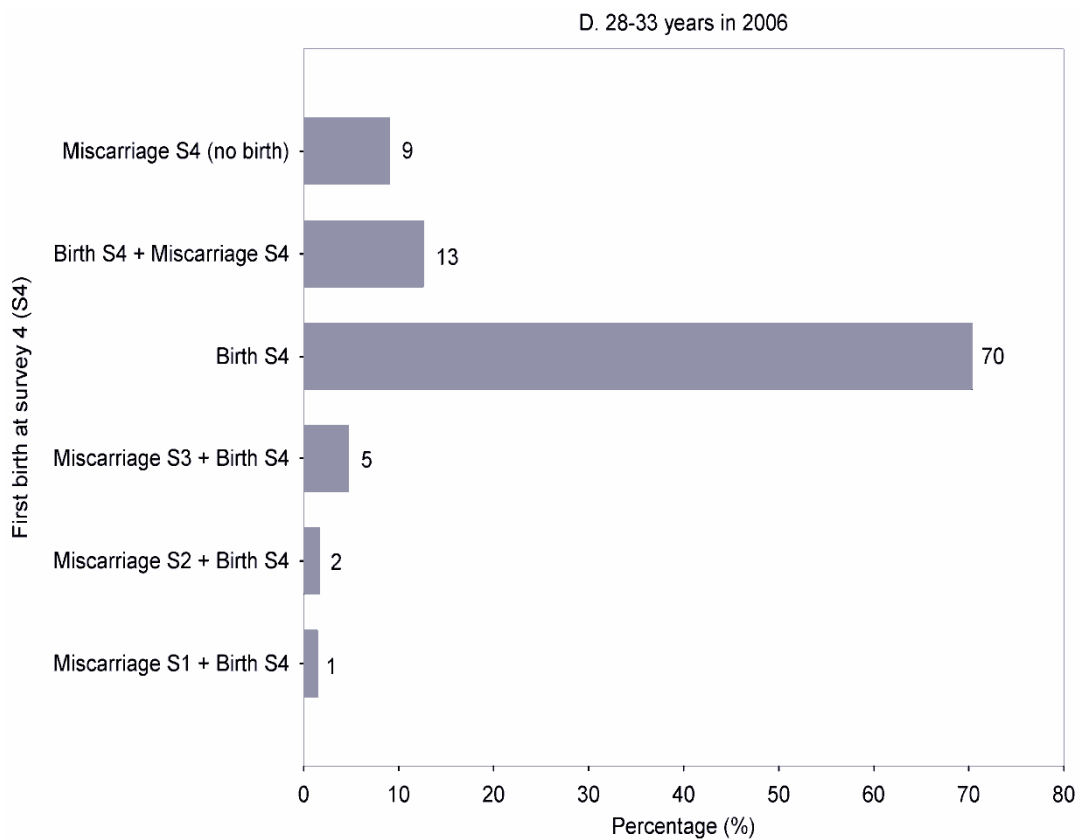
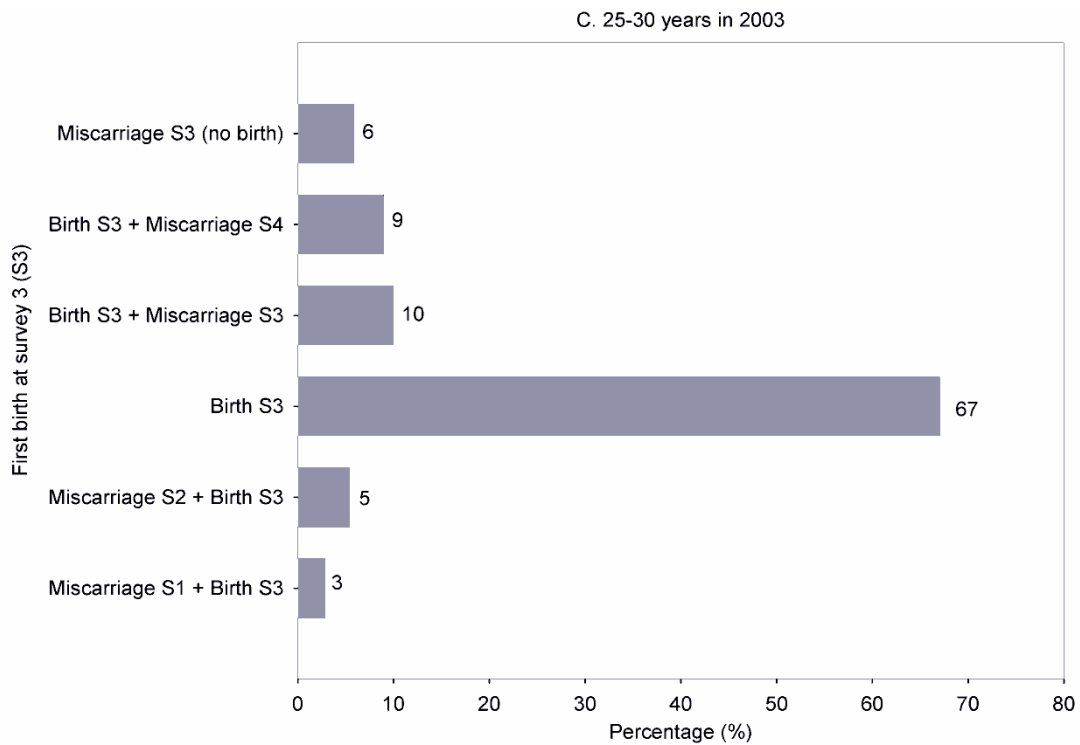
Figure 5-1 graphs A-D show the reproductive patterns including first miscarriage or first birth (no miscarriage) expressed as a percentage of all patterns at the same survey. With birth only as the reference pattern at each survey, the timing of first miscarriage in relation to first birth was explored. At Survey 1, most first miscarriages occurred in the same time period as a first birth (15%); or the first birth was followed by a first miscarriage reported at Survey 2 (14%). At Survey 2, first miscarriages continued to cluster around first births. However, more first miscarriages occurred after a first birth, reported either at age 25-30 (Survey 3: 9%) or at age 28-33 (Survey 4: 6%). At Survey 3 the women reached 25-30 years and most first miscarriages were reported for the same survey period as a first birth (10%) or at the survey after a first birth (Survey 4: 9%). At Survey 4, the women were aged 28-33 years and most first miscarriages were reported at the same survey as a first birth (13%). The highest percentage (9%) of 'miscarriage only' (i.e. never had a live birth) was reported at Survey 4 when the women were aged 28-33 years.

The trends in first miscarriage as a proportion of first miscarriages or first births in Survey 4 participants of the same age are shown in Figure 5-2. In 1996, half (51%) of all first births or first miscarriages in women aged 18-19 ended in miscarriage compared with 41% in women four years older (22-23 years). Four years later (in 2000), women aged 22-23 continued to report more first miscarriages (44%) than women aged 26-27 (36%). The proportions of women at Survey 3 (aged 25-30 in 2003) and Survey 4 (aged 28-33 in 2006), who reported first miscarriages were similar between age groups (Survey 3: 33%; Survey 4: 30%). Further information and the raw numbers for Figure 5-1 and Figure 5-2 are provided in Appendix C (Table C-1).



**Figure 5-1 Reproductive patterns of first birth and first miscarriage or first miscarriage only (no birth) in the 1973-1978 cohort**

Key: S1 = Survey 1; S2 = Survey 2; S3 = Survey 3; S4 = Survey 4. For example, Miscarriage S1 + Birth S2 = First miscarriage at Survey 1 and first birth at Survey 2.



**Figure 5-1 (cont.) Reproductive patterns of first birth and first miscarriage or first miscarriage only (no birth) in the 1973-1978 cohort**

Key: S1 = Survey 1; S2 = Survey 2; S3 = Survey 3; S4 = Survey 4. For example, Miscarriage S1 + Birth S4 = First miscarriage at Survey 1 and first birth at Survey 4.



**Figure 5-2 Trends in first miscarriage as a proportion of first miscarriages and first births in the 1973-1978 cohort**

## 5.4. Self-reported infertility, medical advice and use of treatment

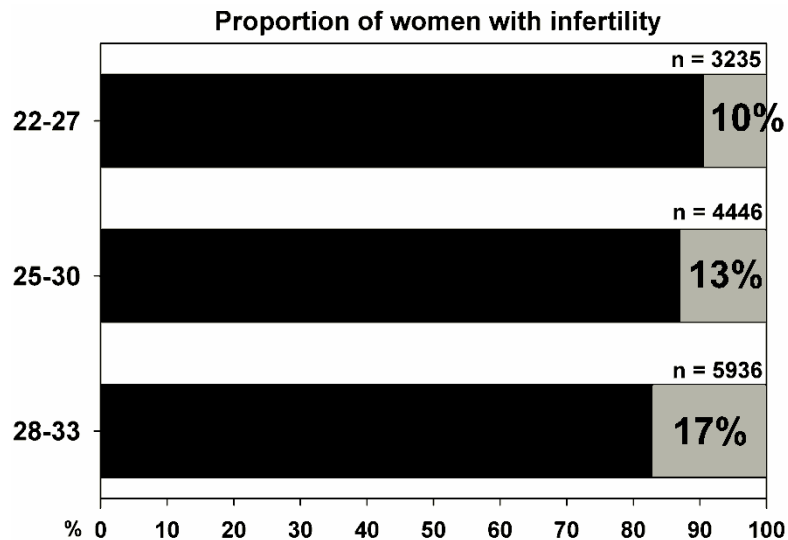
The objective of this section is to identify within a general population of women with recognised infertility, the proportion of women who sought advice and used treatment. Further, it identifies the factors associated with infertility, advice and use of treatment (Herbert, Lucke & Dobson, in press). It also identifies the factors associated with not seeking advice and not using treatment among women with recognised infertility; these women were therefore not included in the ART treatment registry (Wang et al., 2008). Women were included in the analysis if they had ever tried to conceive or had been pregnant. Women who met these criteria were able to report on their fertility status.

At Surveys 2, 3 and 4, participants were asked: 'Have you and your partner (current or previous) ever had problems with infertility (Survey 2) / fertility (Survey 3 and 4), that is, tried unsuccessfully to get pregnant for 12 months or more?' Respondents were asked to choose only one response from four options: a) 'no, never tried to get pregnant'; b) 'no, had no problem with infertility' (Survey 2) / 'fertility' (Survey 3 and 4); c) 'yes, but have not sought help/treatment'; d) 'yes, and have sought help/treatment'. Using this question, participants were categorised according to the relevant outcome measures: 1) had infertility; 2) sought advice; 3) used treatment. The respective comparison groups were women who: 1) had not had infertility; 2) had not sought advice; 3) had not used treatment.

The first outcome was developed for women who indicated that they had infertility (options c and d) compared with women without problems (option b). The phrase 'sought help/treatment' was shortened to 'sought advice' in order to distinguish between the second and third outcome measures. For the second outcome, women with infertility were examined to compare those

who had (option d) or had not (option c) sought advice. The third outcome was developed at Survey 4 for participants who responded 'yes' or 'no' to two statements: 'I am using/have used fertility hormones (e.g. Clomid)'; and 'I am using/have used in vitro fertilisation (IVF)'.

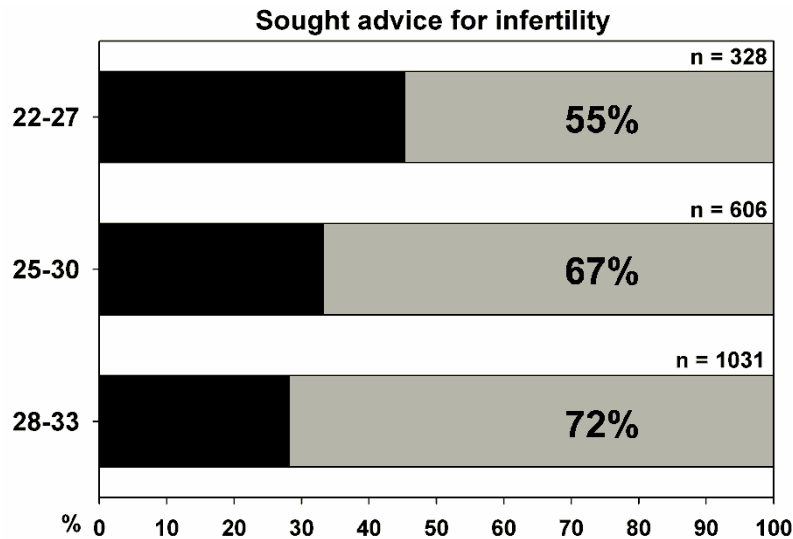
For women aged 28-33 years at Survey 4 who had ever tried to conceive or had been pregnant, 17% reported infertility. The proportion of women who had infertility increased from 10% at Survey 2 and 13% at Survey 3 to 17% at Survey 4 (Figure 5-3).



**Figure 5-3 Infertility in the 1973-1978 cohort**

*Proportion of women with infertility (grey shading) compared with the proportion of women without infertility (black shading).*

The proportion of women with infertility who sought advice increased as the women became older: from 55% at Survey 2; to 67% at Survey 3 and 72% at Survey 4 (Figure 5-4). At Survey 4, the remaining 28% of women with infertility had not sought advice and not used treatment. Among women with infertility who sought advice, 50% used treatment. For women who used treatment, 53% used hormones only; 31% used hormones and IVF; and 16% used IVF only.



**Figure 5-4 Seeking advice for infertility in the 1973-1978 cohort**

*Proportion of women who sought advice for infertility (grey shading) compared with the proportion of women with infertility who did not seek advice (black shading).*

More women reported infertility as they became older. Table 5-3 describes the cumulative reproductive histories of women who had infertility and sought advice as reported at Surveys 2 and 3. Table 5-4 describes the cumulative reproductive histories of women who had infertility, sought advice and used treatment as reported at Survey 4. In comparison with women without infertility, higher proportions of those with infertility had histories of miscarriage only (8% vs. 9% at Survey 2; 6% vs. 11% at Survey 3; 4% vs. 8% at Survey 4) or birth/miscarriage (7% vs. 12% at Survey 2; 11% vs. 13% at Survey 3; 14% vs. 19% at Survey 4). Although, as more women reported pregnancy outcomes from Survey 2 to Survey 4, decreasing proportions of women with infertility had not been pregnant: 43% at Survey 2; 33% at Survey 3; 27% at Survey 4.

At Survey 2, women with infertility who had or had not sought advice had similar reproductive histories. In comparison with women who had not sought advice at Survey 3, higher proportions of women who sought advice had histories of birth only (Survey 3: 25% vs. 32%). Furthermore at Survey 4, higher proportions of women who sought advice had histories of birth only (24% vs. 35%) and miscarriage only (5% vs. 9%). There were no differences in the reproductive histories of women who had, or had not, used treatment.

**Table 5-3 Associations between reproductive histories and having infertility and sought advice for women aged up to 25-30 years in the 1973-1978 cohort**

Aged 22-27 in 2000 (Survey 2)	Infertility			Advice		
	No	Yes	<i>p</i>	No	Yes	<i>p</i>
Total women	n=2907	n=328		n=145	n=183	
<b>Biological and behavioural</b>	%	%		%	%	
Reproductive histories						
Birth only	34	23	<b>&lt;0.001</b>	22	24	0.4
Miscarriage only	8	9		10	7	
Termination only	28	2		5	0	
Miscarriage + termination	3	3		3	4	
Birth + miscarriage	7	12		9	13	
Birth + termination	7	4		3	5	
Birth +miscarriage+termination	3	4		5	4	
No pregnancy	10	43		43	43	
<b>Total</b>	<b>100</b>	<b>100</b>		<b>100</b>	<b>100</b>	
<b>Aged 25-30 in 2003 (Survey 3)</b>	<b>Infertility</b>			<b>Advice</b>		
	<b>No</b>	<b>Yes</b>	<b><i>p</i></b>	<b>No</b>	<b>Yes</b>	<b><i>p</i></b>
Total women	n=3840	n=606		n=206	n=400	
<b>Biological and behavioural</b>	%	%		%	%	
Reproductive histories						
Birth only	40	30	<b>&lt;0.001</b>	25	32	<b>0.03</b>
Miscarriage only	6	11		12	10	
Termination only	20	3		7	1	
Miscarriage + termination	2	2		3	2	
Birth + miscarriage	11	13		12	13	
Birth + termination	9	3		3	3	
<b>Aged 25-30 in 2003 (Survey 3)</b>	<b>Infertility</b>			<b>Advice</b>		
	<b>No</b>	<b>Yes</b>	<b><i>p</i></b>	<b>No</b>	<b>Yes</b>	<b><i>p</i></b>
Birth +miscarriage+termination	4	5		3	6	
No pregnancy	8	33		35	33	
<b>Total</b>	<b>100</b>	<b>100</b>		<b>100</b>	<b>100</b>	

*p* values shown in bold are significant by chi square analysis at *p*<0.05



**Table 5-4 Associations between reproductive histories and having infertility, sought advice and used treatment for women aged 28-33 years in the 1973-1978 cohort**

Aged 28-33 in 2006 (Survey 4)	Infertility			Advice			Treatment		
	No	Yes	<i>p</i>	No	Yes	<i>p</i>	No	Yes	<i>p</i>
Total women	4905	1031		303	728		372	356	
<b>Biological and behavioural</b>	%	%		%	%		%	%	
Reproductive histories									
Birth only	45	32	<b>&lt;0.001</b>	24	35	<b>&lt;0.001</b>	37	33	0.3
Miscarriage only	4	8		5	9		7	11	
Termination only	12	3		6	2		3	2	
Miscarriage + termination	2	2		1	2		2	3	
Birth + miscarriage	14	19		21	18		16	19	
Birth + termination	11	3		4	3		3	3	
Birth +miscarriage+termination	6	6		9	5		6	4	
No pregnancy	6	27		30	26		26	25	
<b>Total</b>	<b>100</b>	<b>100</b>		<b>100</b>	<b>100</b>		<b>100</b>	<b>100</b>	

*p* values shown in bold are significant by chi square analysis at *p*<0.05

## 5.5. Factors associated with self-reported infertility, medical advice and use of treatment

Table 5-5 describes the socio-demographic, biological and behavioural factors of women aged 28-33 years who had infertility, sought medical advice and used treatment. The respective comparison groups were women without infertility, those who had not sought advice and not used treatment. Women with infertility were more likely to be: married, have polycystic ovary syndrome (PCOS) or endometriosis, or be obese; daily smokers; in professional occupations; live outside major cities or manage on income without difficulty.

Women with infertility who sought advice were more likely to be: married, have PCOS or endometriosis; university qualified and non-drinkers; younger than 32-33 years. In contrast, daily smokers and obese women were less likely to have sought advice. Women with infertility who sought advice and used treatment were more likely to have PCOS or endometriosis.

Women who had infertility, sought advice or used treatment had similar mental and physical health as women without infertility or women with infertility who did not seek advice or did not use treatment.

The most significant factors associated with women who had infertility, sought advice or used treatment are shown in Table 5-6. Women had higher odds of having infertility when they: lived outside major cities; had lower qualifications; had PCOS or endometriosis; were obese. Women had lower odds of infertility when they were: younger; single or in de-facto relationships; had been pregnant.

Women with infertility had higher odds of having sought advice when they were: younger; had histories of birth only or miscarriage only; had PCOS or endometriosis. Women had lower odds of having sought advice when they were obese or daily smokers. Women who had infertility and sought advice had higher odds of having used treatment when they had PCOS or endometriosis. In contrast, women had lower odds of having used treatment when they were single or had a history of abnormal Pap smear results.

**Table 5-5 Factors associated with having infertility, sought advice and used treatment in the 1973-1978 cohort**

	Infertility			Advice			Treatment		
	No	Yes	p	No	Yes	p	No	Yes	p
Total women	4905	1031		303	728		372	356	
<b>Socio-demographic</b>	%	%		%	%		%	%	
Age									
28-29	31	29	0.3	28	29	<b>0.04</b>	25	32	0.09
30-31	43	43		38	45		46	45	
32-33	26	28		34	26		29	23	
Marital status									
Single	11	4	<b>&lt;0.001</b>	6	3	<b>&lt;0.001</b>	3	2	0.6
Married	67	80		68	84		83	86	
De-facto	16	12		21	8		9	7	
Ex-partnered	6	4		5	5		5	5	
Area of residence									
Major city	65	61	<b>0.03</b>	55	63	0.05	62	64	0.6
Inner regional	21	24		27	23		22	23	
Outer/remote area	14	15		18	14		16	13	
Highest qualification									
High school	27	28	0.1	34	25	<b>0.003</b>	25	25	0.8
Trade/certificate/ diploma	29	32		32	32		33	31	
University	44	40		34	43		42	44	
Occupation									
Manual/other	31	26	<b>0.02</b>	29	25	0.3	24	26	0.8
Trade/service	28	32		31	32		32	31	
Professional	41	42		40	43		44	43	
Manage on income									
Always difficult	14	15	<b>0.03</b>	18	14	0.05	14	14	0.2
Sometimes difficult	33	28		32	27		30	24	
Not difficult	53	57		50	59		56	62	
<b>Biological and behavioural</b>									
PCOS									
Yes	3	23	<b>&lt;0.001</b>	10	29	<b>&lt;0.001</b>	19	38	<b>&lt;0.001</b>
No	97	77		90	71		81	62	
Endometriosis									
Ever	5	18	<b>&lt;0.001</b>	7	22	<b>&lt;0.001</b>	19	26	<b>0.03</b>
Never	95	82		93	78		81	74	

	Infertility			Advice			Treatment		
	No	Yes	<i>p</i>	No	Yes	<i>p</i>	No	Yes	<i>p</i>
Abnormal pap									
Ever	36	38	0.4	37	38	0.9	41	34	0.07
Never	64	62		63	62		59	66	
Body mass index									
Underweight	56	49	<b>&lt;0.001</b>	6	4	<b>0.001</b>	4	5	0.1
Healthy weight	4	5		45	51		52	51	
Overweight	24	23		18	25		22	27	
Obese	16	23		31	20		22	17	
Smoking status									
Never smoker	54	60	<b>&lt;0.001</b>	49	64	<b>&lt;0.001</b>	64	64	1.0
Ex-smoker	25	24		26	24		23	24	
Non-daily	5	3		4	2		3	2	
Daily	16	13		21	10		10	10	
Alcohol use									
Never	11	14	0.1	9	15	<b>0.003</b>	16	15	1.0
Low risk	85	82		84	82		81	82	
High risk	4	4		7	3		3	3	
Mental health									
Good	86	84	0.1	83	85	0.5	82	87	0.1
Poor	14	16		17	15		18	13	
Physical health									
Good	75	74	0.3	75	73	0.6	72	75	0.4
Poor	25	26		25	27		28	25	

*p* values shown in bold are significant by chi square analysis at  $p < 0.05$

**Table 5-6 Effect of selected significant factors on having infertility, sought advice and used treatment for women aged 28-33 years in the 1973-1978 cohort**

<b>Selected significant factors</b>	<b>Infertility</b>	<b>Advice</b>	<b>Treatment</b>
<b>Socio-demographic</b>			
Age			
28-29	Less likely to be younger than 32-33	More likely to be younger than 32-33	ns
30-31			
32-33			
Marital status			
Single	Less likely to be single or de-facto than married	ns	Less likely to be single than married
Married			
De-facto			
Ex-partnered			
Area of residence			
Major city	More likely to live outside a major city	ns	ns
Inner regional			
Outer/remote area			
Highest qualification			
High school	More likely to have qualifications below university	ns	ns
Trade/certificate/diploma			
University			
<b>Biological and behavioural</b>			
Reproductive histories			
Birth only	Less likely to have prior pregnancies than never been pregnant	More likely to have history of birth only or miscarriage only (no live birth) than never been pregnant	ns
Miscarriage only			
Termination only			
Miscarriage + termination			
Birth + miscarriage			
Birth + termination			
Birth + miscarriage + termination			
No pregnancy			
Polycystic ovaries (PCOS)			
Yes	More likely to have PCOS	More likely to have PCOS	More likely to have PCOS
No			
Endometriosis			
Ever	More likely to have endometriosis	More likely to have endometriosis	More likely to have endometriosis
Never			
Abnormal pap smear			
Ever	ns	ns	Less likely to have had abnormal Pap smear results
Never			

Selected significant factors	Infertility	Advice	Treatment
Body mass index			
Underweight	More likely to be obese than healthy weight	Less likely to be obese than healthy weight	ns
Healthy weight			
Overweight			
Obese			
Smoking status			
Never smoker	ns	Less likely to be daily smoker than non-smoker	ns
Ex-smoker			
Non-daily smoker			
Daily smoker			

ns = not significant, i.e.,  $p$  value is  $\geq 0.05$ .

## 5.6. Discussion

### 5.6.1. Pregnancy losses

For every ten women aged 28-33 years in Australia in 2006: four women had not had a recognised pregnancy, five women had a live birth (with or without a recognised pregnancy loss), and one woman had a recognised pregnancy loss only. Women in their mid twenties were more likely to report a live birth (with or without pregnancy loss) than when they were younger. Younger women were more likely to report a loss only or no pregnancy. By the time they were aged 32-33 years, women who had given birth at a young age (<24 years) were most likely to have lost a subsequent pregnancy by miscarriage.

The well-documented pattern of delayed childbearing in Australia is supported by our finding that 4-in-10 women aged 28-33 years in 2006 had yet to report a pregnancy outcome. The inclusion of women reporting pregnancy loss only (1-in-10 women) with women who had never reported a pregnancy means that 5-in-10 (or 1-in-2) women aged 28-33 years had yet to report a birth. Records of childbearing typically detail live births as the measure of fertility. Birth statistics for Australia in 2006 show that women aged 30-34 years had the highest fertility (120.1 babies/1000 women) of any five-year age group and that the median age of all mothers was 30.8 years (the highest yet recorded) (Australian Bureau of Statistics, 2007). This age group was comparable to the women in this study aged 28-33 years in 2006, however, the official statistics exclude the one woman in ten who had not given birth but had a reproductive history of pregnancy loss and thus has proven fecundity. The pattern of delayed childbearing is expected to continue, however the extent of this pattern will need to be documented in future studies.

Women who were early childbearers (i.e., <28 years at first birth) were most likely to have had a first miscarriage around the same time period as a first birth. The clustering of miscarriages around births suggests pro-active family formation by women who appear to intend to have more than one pregnancy in order to complete their families at an earlier age. Pregnancies in the early childbearers that occurred seven to ten years after their first birth were increasingly likely to be lost by a first miscarriage. Women who delayed childbearing until age 28+ years had the highest proportion of live births. Within this same age group, however, many births occurred around the same time period as miscarriages and many of these women lost their first pregnancies by miscarriage.

Pregnancy losses are very common, especially miscarriage before first live birth among younger women. Recognised pregnancy losses are an important measure of fecundity in the general population because they indicate successful conception and maintenance of pregnancy to varying reproductive end-points. The findings of this study point to the value of a research approach that mirrors clinical practice and maintains the focus on an individual woman's complete reproductive history. Longitudinal studies can make an important contribution to this goal. Many recognised pregnancy losses will not be documented in medical records and therefore women's self-reported histories are of particular value. It is imperative that government policy continues to support quality health services for induced pregnancy losses and management of spontaneous pregnancy losses. Such policies will protect the future fecundity and fertility of all women, and are particularly relevant for women who delay childbearing.

### **5.6.2. Self-reported infertility, seeking advice and use of treatment**

Among the 5936 women aged 28-33 years who had tried to conceive or had been pregnant, one-in-six had experienced infertility. Of these women, two-thirds sought advice but only half used treatment. The main factors associated with having infertility, seeking advice and using treatment were identifiable predictors of infertility: PCOS, endometriosis and miscarriage. Women with a history of PCOS consistently had higher odds of infertility, seeking advice and using treatment than women with a history of endometriosis. Women with infertility and a history of abnormal Pap smear results did seek advice but were unlikely to use treatment.

This study provides findings on the prevalence of infertility in women before age 35 years. The ages of the women in this study are younger (28-33 years) than 35, the age after which there is a well-documented detrimental impact of increased age on fertility. The ALSWH uses self-reported data and includes women with infertility who had never sought advice and/or never used treatment. Importantly, the format of the survey question on infertility is consistent with the clinical definition of infertility, that is, more than twelve months without spontaneous conception.

In a discussion of infertility, it is also important to consider how male factor infertility (i.e. low or zero sperm counts) impacts on the ability to conceive. In the ALSWH, however, there are no men included as it is a study of women's health. Despite the lack of men, this study does include women reporting infertility due to male factor infertility. These women may receive the ART treatment and undergo surgical procedures for their partners' infertility, irrespective of their own fertility status. Furthermore, women who have unexplained infertility that cannot be identified as being due to female or male factors also receive the ART treatment and are included in this study.

Our study found a lifetime prevalence of infertility of 17% for women aged 28-33 years who had tried to conceive or had been pregnant. Our findings indicate a higher prevalence of infertility in the general population than reported in other studies due to inclusion of women who have never sought advice. Our findings contribute significant descriptions of women who had never sought advice; women who may be excluded from other epidemiological studies of infertility. Based on our findings, for each woman aged 33 years or younger who used treatment, there were two women with infertility who did not use treatment. These women represent those who would not be included in the ANZARD treatment registry.

Our findings showed women with a history of PCOS or endometriosis were more likely to seek advice and use treatment. This finding suggests that when women seek advice for infertility from medical professionals, the significant clinical indications of PCOS and endometriosis promote further investigation and treatment. Medical professionals may recommend fertility treatment depending on the mildness or severity of PCOS and endometriosis. The age of the women (<35 years) in combination with a mild case of PCOS or endometriosis may be a reason that they pursued neither pro-active investigations nor used treatment. Treatment may be more delayed

following a diagnosis of endometriosis compared with PCOS. As women with recognised infertility become older, that is, 35 years or older, the impact of endometriosis is compounded and medical advice may then change to recommend treatment. Unfortunately, the effect of increasing age will have a detrimental impact on the likelihood of a successful response to treatment and pregnancy (Wang, Healy, Black & Sullivan, 2008). In contrast, women with infertility who have had an abnormal Pap smear and did seek advice were unlikely to use treatment. Women who have had a cancer scare with an abnormal Pap smear may be unwilling to use high doses of hormones with fertility treatment for fear of cancer or may have been advised not to undertake fertility treatment.

There was clear evidence that a larger proportion of women who had miscarriages also had infertility compared with women without infertility. This finding suggests miscarriages were recognised by women as an indicator of infertility and prompted them to seek advice. In contrast, women with negative lifestyle factors, that is, obesity or daily smoking, were less likely to seek advice for infertility. These women may have already received advice from GPs to lose weight and stop smoking to improve their general health. It is important to improve general health prior to accessing fertility advice and treatment. Further, obesity and daily smoking may be markers of socio-economic status and an ability to afford the extra medical costs of treatment. Some medical professionals may restrict further investigations for infertility until women lose weight, stop smoking and improve their general health.

The Australian government partially funds ART consultations and treatment through the national Medicare scheme. The Medicare Safety Net (MSN) reduces the total out of pocket expenses incurred by couples using ART after a threshold of personal expenditure has been reached. The MSN provides for equity of access to ART treatment. A minority, which includes single women and gay (female) couples, have limited access to ART but do not have access to Medicare funded treatment for social infertility due to the absence of a male partner. For the majority of Australians, therefore, ART is more affordable and accessible than it would be without the Medicare subsidy. This study has shown that even with the availability of the Medicare subsidy only one-third of women with infertility used treatment. For women who had used treatment, the majority accessed the low cost and non-invasive methods of fertility hormones (see Section 5.4: hormones only, 53%; hormones and IVF, 31%). Any reduction in the Medicare funding would result in only those with higher incomes being able to afford ART. Maintenance of Medicare funding is important for equitable access to fertility treatment, particularly for the two-thirds of women with infertility who had not yet used treatment.

As women continue the pattern of delayed childbearing there may be a greater demand for fertility treatment. Future studies are needed to identify whether women will heed fertility advice and try to conceive earlier to counteract the impact of maternal age on fertility. Their male partners must also heed fertility advice to improve their general health to improve the quality of their sperm and chance of conception. Positive lifestyle choices will improve the general health of both women and men and, in turn, improve the fecundity and fertility of couples who desire to conceive. Furthermore, over the next decade and beyond, increasing proportions of women and men who, themselves, were conceived by fertility treatment may try to conceive. Their likely success is, as yet, unknown.

Among women born in 1973-1978 with recognised infertility, only one-third had sought advice and used treatment by the time they were aged 28-33 years. Women with an identifiable cause for their infertility (e.g. PCOS and endometriosis), were the most proactive in seeking advice and using ART treatment. There is a strong need to raise awareness of infertility issues and treatment options among the general population and medical professionals from whom advice is sought in the first instance. Upon seeking advice for recognised infertility, prompt referral for

further investigations would maximise a woman's chance of pregnancy before she reaches the age of 35 years.

## 5.7. References

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## 6. Prenatal and maternal health behaviours

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### 6.1. Key findings

This section focuses on the health behaviours of women at the life stage when they are starting their families. The three subsections include: a summary of past ALSWH work that has examined diet and physical activity among women of childbearing age; analyses of linked ALSWH and Pharmaceutical Benefits Scheme (PBS) data that investigate medications prescribed during the pre-pregnancy, pregnancy and post pregnancy periods; and the use of alcohol and tobacco during pregnancy.

- While women appear to make alterations to their diets while pregnant, many fail to meet nutrient recommendations that are important during this period (e.g. folate, iron).
- Life events such as getting married (or moving into a de facto relationship) and having children are associated with decreases in physical activity.
- Women who gave birth in 2005 were more likely to be prescribed medications in the pre- or post-pregnancy period than during the pregnancy period.
- Of women pregnant in 2005, 4% continued to have claims for antidepressants during pregnancy.
- 30% of women who were smokers and not pregnant at any survey quit smoking over the ten years from 1996 to 2006.
- At least half the women who were smokers before pregnancy quit smoking during pregnancy, but 30% or more did not.
- 40% of women who were drinking at risky levels (for pregnant women) but were not pregnant at any survey stopped risky drinking over the ten years from 1996 to 2006.
- More than half the women who were drinking at risky levels (for pregnant women) before pregnancy stopped drinking at those levels during pregnancy, but 35% or more did not.
- Women who were younger were more likely to smoke or to consume alcohol at risky levels during pregnancy.

### 6.2. Diet and physical activity

Healthy diets and regular physical activity are key health behaviours that promote and maintain good health throughout life. Low consumption of fruit and vegetables and physical inactivity were estimated to be responsible for 2% and 7%, respectively, of the total burden of disease and injury in Australia in 2003 (Begg et al., 2007). These health behaviours are particularly important before, during and after pregnancy, as they can have a significant impact on health outcomes for both mother and child. It is important therefore to identify whether Australian women have healthy dietary and physical activity behaviours during these critical periods. The ALSWH has collected data on dietary and physical activity behaviours of women of childbearing

age that can be used to inform the development of health promotion and policy strategies for improving the health of women at this life stage.

### 6.2.1. Diet

The Dietary Guidelines for Australian Adults incorporate recommendations for pregnant and lactating women (NHMRC, 2003). Pregnant women are encouraged to increase their intake of iron, zinc and water, and to avoid certain foods such as soft cheeses and cold meats (NHMRC, 2003). ALSWH data have provided an opportunity to examine the diet quality of a large sample of Australian women according to pregnancy status. This section includes summaries of analyses that have been undertaken by ALSWH researchers and collaborators where the diets of pregnant women have been examined<sup>3</sup>.

A recent ALSWH study by Hure and colleagues (2008) investigated diet and pregnancy using data from Survey 3 of the 1973-1978 cohort. This survey, conducted in 2003, included the Victorian Cancer Council food frequency questionnaire (FFQ), which asked about the frequency of consumption and portion size of a variety of food items over the previous 12 months. From their responses to the FFQ, an Australian Recommended Food Score (ARFS) was calculated for each participant in the study. (The ARFS measures the consistency of an individual's consumption of food items with national recommendations, with higher ARFS scores indicating better quality diet). Based on pregnancy status, participants were categorised into four groups: (i) pregnant, (ii) trying to conceive, (iii) had a baby in the last 12 months, and (iv) other. The study found that pregnancy status was predictive of diet quality - women who were pregnant and those who had given birth in the previous 12 months reported a higher ARFS than non-pregnant women (Hure, Young, Smith & Collins, 2008). However, although the results were statistically significant, the differences in diet quality between pregnant and non-pregnant women were small. The results also showed that while women appeared to make alterations to their diet while they were pregnant, many failed to meet nutrient recommendations that are important during this period (e.g. for folate, iron) (Hure et al., 2008). These findings indicate that many women need to increase the intake of specific nutrients before, during and after pregnancy.

Iodine is a nutrient of significance to women of childbearing age, as it is critical to fetal and infant development. Iodine cannot be stored in the body, so small amounts need to be consumed regularly. During pregnancy and breastfeeding, iodine requirements increase substantially (from 150 µg/day for all adults to 200 µg/day for pregnant and lactating women), yet Australian studies consistently suggest that the iodine intake of pregnant women is

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<sup>3</sup> For more details please see:

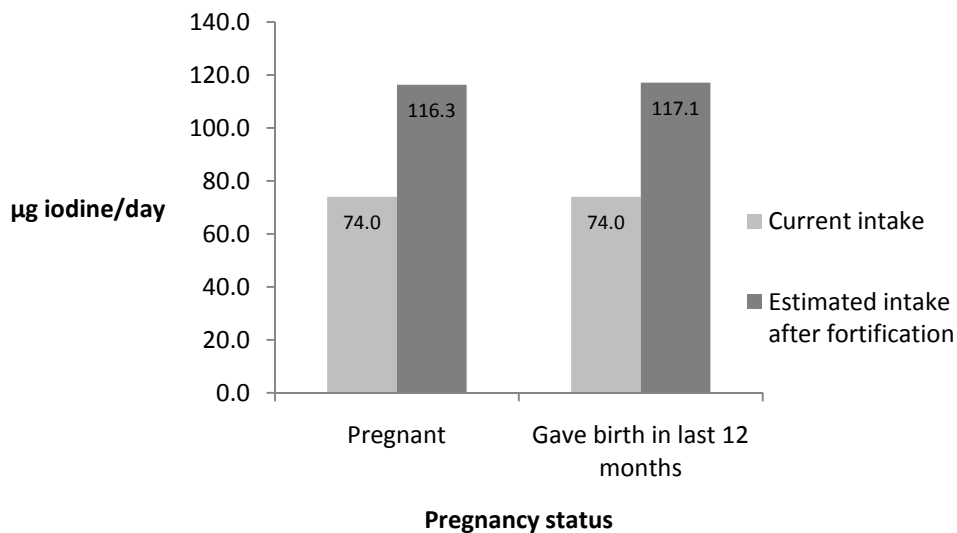
Hure, A., Young, A., Smith, R., & Collins, C. (2008). The relationship between diet and pregnancy status in Australian women. *Public Health Nutrition*, In press. DOI: 10.1017/S1368980008003212

Mackerras, D., Powers, J., Boorman, J., Loxton, D., & Giles, G. G. (2008). Estimating the impact on pregnant and post-partum women of fortifying bread with iodine. Paper presented at the Population Health Congress, A Global World- Practical Action for Health and Well-being, Brisbane, July 7-9. Abstract appears in the ALSWH 2008 Annual Report, available at: [http://www.alswh.org.au/Reports/annual\\_reports.html](http://www.alswh.org.au/Reports/annual_reports.html)

Patterson, A. J., Brown, W., Powers, J. R., & Roberts, D. C. K. (2000). Iron deficiency, general health and fatigue: Results from the Australian Longitudinal Study on Women's Health. *Quality of Life Research*, 9(5), 491-497.

Patterson, A. J., Brown, W., & Roberts, D. (1998). Development, prevention and treatment of iron deficiency in women. *Nutrition Research*, 18(3), 489-502.

inadequate (Australian Population Health Development Principal Committee (APHDPC), 2007). ALSWH researchers are currently examining iodine intake, and recently estimated the impact of iodine fortification on the diet of pregnant and post-partum women from the 1973-1978 cohort (Mackerras, Powers, Boorman, Loxton & Giles, 2008). They categorised women according to pregnancy and childbirth status, and applying the iodine concentrations used by food standards authorities, first estimated current iodine intake gained through consumption of key foods containing iodine, such as bread, and then estimated increases that mandatory fortification of bread with iodine might cause (Figure 6-1). Consumption was determined based on responses to the Victorian Cancer Council FFQ included in the 2003 ALSWH survey. They found women who were pregnant or had recently given birth consumed more bread than other women, but iodine intake was still below dietary recommendations. (Mackerras et al., 2008). However, their findings suggest fortification of bread with iodine would increase the likelihood of pregnant and lactating women reaching the 200 µg/day intake of iodine recommended in the current guidelines.



**Figure 6-1 Estimated iodine intake from consumption of key foods containing iodine by pregnant and post-partum women from the 1973-1978 cohort**

Iron deficiency is common in women of childbearing age. The consequences of iron deficiency include fatigue, poor cognitive functioning and anaemia (Patterson, Brown, & Roberts, 1998). However, iron deficiency is a preventable and treatable condition. Data from the ALSWH have provided evidence that low iron is associated with lower general health and wellbeing. For instance at the baseline survey (1996), 24% of the 1973-1978 cohort and 31% of the 1946-1951 cohort reported (ever) having 'low iron' (Patterson, Brown, Powers, & Roberts, 2000). Women from both the 1973-1978 and 1946-1951 cohorts who reported ever having low iron were more likely than women with no history of low iron to have poorer physical and mental health. However, the greatest effect for women of both cohorts was lack of vitality. Women who reported having low iron were also more likely to report constant tiredness than women with no history of low iron (1973-1978: 67 and 45%, respectively, 1946-1951: 63 and 48%, respectively) (Patterson et al., 2000). These data support the importance of encouraging women to increase

their uptake of iron during the childbearing period, as recommended by the Australian Dietary guidelines.

### 6.2.2. Physical Activity

The health benefits of physical activity are well known. They include prevention and management of most of the national health priorities, including cardiovascular disease, type 2 diabetes, depression, some cancers, and musculoskeletal problems such as arthritis and osteoporosis. Physical activity is also important for the prevention of overweight and obesity, which are also common risk factors for most of these chronic health problems (Adamson et al., 2007). Current Australian Physical Activity Guidelines advocate at least 30 minutes of moderate to intense physical activity on all or most days (Australian Government, 1999).

Women are also encouraged to achieve this level of physical activity before, during and after pregnancy (Brown, 2002). The benefits and risks of exercise during and following pregnancy are summarised in the Sports Medicine Australia statement (Brown, Finch, Robinson, Torode, & White, 2002). The benefits include:

- Maternal weight control (and prevention of excess weight gain)
- Maternal fitness (and therefore ability to cope with the physical demands of labour and caring for a new baby)
- Management (and possibly also prevention) of gestational diabetes mellitus
- Maternal mental health and emotional well-being.

Physical activity data collected by the ALSWH are unique in Australia as they provide information on trends and changes in physical activity in women during the life stage when pregnancy and childbirth are most common.

Early cross-sectional analyses showed that physical activity declines with increasing age, and that physical activity levels were higher in the 1973-1978 cohort than in the other two cohorts (Brown, Mishra, Lee, & Bauman, 2000). During the first four years of the study (1996-2000), when the women transitioned from ages 18-23 to 22-27 years, there was no overall change in the physical activity levels of the 1973-78 cohort; 57% were found to be meeting the guidelines at both surveys. However, almost 20% became *active* (i.e. met the guidelines at the second survey when they had not at the first) and another 20% became *inactive* (i.e. did not meet the guidelines at the second survey when they had at the first). During this period, life-stage transitions (from home to school to university or the workforce) were associated with declining physical activity (Bell & Lee, 2005), and women who reported specific life events, such as getting married and having a baby were more likely to be in the *decreasing* physical activity category (Brown & Trost 2003).

More recent work has shown that physical activity levels in the 1973-1978 cohort declined between 2000 and 2003 (Brown, Heesch, & Miller, 2009). In 2000 about 10% of the 1973-1978 cohort reported doing no physical activity and just over half were *active* (i.e. meeting the guidelines). In 2003 the proportions in these categories were largely unchanged. However, only 36% of the 1973-1978 cohort were *active* at both surveys; this is explained by the fact that the proportions of women who moved into a higher (23%) and lower (22%) activity category were the same (Brown et al. 2009). During this period the most common life events were clustered around the transitions of leaving home (28%), getting married or starting to live with someone (27%), beginning work (18%), and starting a family (16%). The odds for *increasing* physical activity were also significantly *lower* for women who reported birth of first ( $p<0.0001$ ) or second baby ( $p=0.027$ ), having a child with a serious disability or illness ( $p=0.002$ ), decreased income ( $p=0.016$ ), and beginning work outside the home ( $p=0.038$ ).

The findings for the 1973-1978 cohort are consistent with the hypothesis that factors that impact on discretionary time, such as starting work, getting married and having babies are significantly associated with changes in physical activity at this life stage. The impact on discretionary time of increased caring responsibilities and women's propensity to put family needs before their own (Miller & Brown, 2005) may explain the decreased level of physical activity observed in some of the women at this life stage.

It is important that strategies are developed to help women overcome the significant social challenges to being physically active at specific life-stages. While a focus on physical environments and the provision of opportunities for and access to physical activity options is crucially important, we must be more cognisant of the impact of social factors on physical activity if optimal levels of physical activity are to be maintained across the life-span. Overall, the findings suggest that there is a need for targeted interventions and public health messages that encourage women to adopt or maintain healthy diets and levels of physical activity throughout life transitions, particularly as they move into new personal relationships, during pregnancy and into motherhood, when the health benefits are great.

### **6.3. Prescription medication, prenatal and maternal health behaviours**

The use of prescription medication during pregnancy has been linked with an increased risk of harm to the developing fetus. Consequences of fetal drug exposure have included birth defects, low birth weight, preterm delivery, spontaneous abortion and malnutrition (Anwar, 2007). These conditions are an emotional and economic burden to society, and are particularly devastating for affected families.

Due to the physiological changes caused by pregnancy (e.g. increased water and plasma volume), the metabolism of drugs and their effects may be different. However, limited data are available on the short term and long term effects of medications on fetal and maternal health. Many women have pre-existing chronic conditions, such as epilepsy (Vajda et al., 2003), or develop pregnancy induced conditions, such as gestational diabetes mellitus (Egen-Lappe & Hasford, 2004), that require prescription medication. These women and their health care providers are faced with the decision of whether the potential benefits of taking prescribed medication justify the potential risks to the developing fetus. To assist health care providers and women to make complex decisions about medications, the Australian Drug Evaluation Committee developed a categorisation of risk of drug use in pregnancy (Medicines in Pregnancy Working Party of the Australian Drug Evaluation Committee, 1999). The categorisation is based on current evidence about the potential harm of a medication and amendments are made after new evidence becomes available. Table 6-1 summarises the categories.

International research indicates that many women use prescription medication at some time throughout the prenatal and postnatal period. For example, a large German study (N=41 293) found that 96% of women received at least one prescription drug (including vitamins and minerals) during pregnancy (Egen-Lappe & Hasford, 2004). Excluding vitamins and minerals, 85% of women received at least one prescription medication, with a median of three drugs per woman. Two other large studies in Norway and the UK found that approximately 83% of women were prescribed medication during pregnancy (Engeland et al., 2008; Headley et al., 2004). International research has shown that the common medications used during pregnancy include antacids, analgesics and antibiotics, gynaecological anti-infectives and vitamin and mineral supplements, particularly iron (Egen-Lappe & Hasford, 2004; Hardy et al., 2006; Headley et al., 2004; Malm et al., 2003; Riley et al., 2005). This is not surprising, as many women will experience health problems such as indigestion, nausea, constipation, haemorrhoids and

urinary tract infections during pregnancy. Furthermore, dietary supplements are recommended during pregnancy (as was discussed in the previous section).

A large USA study (N=81 975) found that 65% of mothers had at least one prescription medication of any type 90 days prior to the earliest pregnancy record and during early pregnancy (Hardy et al., 2006). Category C and D medications were prescribed to 49% of women prior to pregnancy; however, these declined in the early pregnancy stage. Category X medications were prescribed to 5714 (7%) of women prior to pregnancy and 501 (0.6%) during early pregnancy. Another large USA study (N=114 165) found that 6600 (6%) women received category D or X drugs during the 270 days before delivery (Andrade et al., 2006).

**Table 6-1 Categories of risk of drug use in pregnancy**

Category of risk	Definition
A	Drugs which have been taken by a large number of pregnant women and women of childbearing age without any proven increase in the frequency of malformations or other direct or indirect harmful effects on the fetus having been observed.
C	Drugs which, owing to their pharmacological effects, have caused or may be suspected of causing, harmful effects on the human fetus or neonate without causing malformations. Their effects may be reversible.
B1	Drugs which have been taken by only a limited number of pregnant women and women of childbearing age, without an increase in the frequency of malformation or other direct or indirect harmful effects on the human fetus having been observed. Studies in animals have not shown evidence of an increased occurrence of fetal damage.
B2	Drugs which have been taken by only a limited number of pregnant women and women of childbearing age, without an increase in the frequency of malformation or other direct or indirect harmful effects on the human fetus having been observed. Studies in animals are inadequate or may be lacking, but available data show no evidence of an increased occurrence of fetal damage.
B3	Drugs which have been taken only by a limited number of pregnant women and women of childbearing age, without an increase in the frequency of malformation or other direct or indirect harmful effects on the human fetus having been observed. Studies in animals have shown evidence of an increased occurrence of fetal damage, the significance of which is considered uncertain in humans.
D	Drugs which have caused, are suspected to have caused or may be expected to cause, an increased incidence of human fetal malformations or irreversible damage. These drugs may also have adverse pharmacological effects.
X	Drugs which have such a high risk of causing permanent damage to the fetus that they should not be used in pregnancy or when there is a possibility of pregnancy.

Source: Medicines in Pregnancy Working Party of the Australian Drug Evaluation Committee, 1999.

There is a lack of research examining use of prescription medication during pregnancy in Australia. A small Australian study examined the patterns of medication use by interviewing 140 pregnant women attending the Women's and Children's Hospital in Adelaide (Henry &

Crowther, 2000). The women used on average 0.7-0.8 prescribed and 2.3-2.6 non-prescribed medications over the three trimesters. Antibiotics were the most commonly prescribed medication. However, this was a small hospital-based study. The following results describe the medications that were prescribed to women in the ALSWH 1973-1978 cohort while they were pregnant.

## 6.4. Participant characteristics

The women of the ALSWH 1973-1978 cohort were aged between 28-33 years in 2006 when they were surveyed for the fourth time. Of the 9145 women who completed Survey 4, 3872 consented to the release of their PBS data. Table 6-2 shows the demographics of three groups of ALSWH participants from the 1973-1978 cohort who consented to data linkage: those who did not give birth in 2005 and who had no children by Survey 4; women who had children by Survey 4 and who did not give birth in 2005; and those women who gave birth in 2005.

Approximately 50% of women who were pregnant in 2005 were having their first child.

- Women who had not had children by Survey 4 were the most likely to live in urban areas, to have post Year 12 qualifications and to find managing on their available income to be 'not too bad' or 'easy'. They were least likely to be married or living in a de facto relationship or to have a Health Care Card.
- Women with children who did not give birth in 2005 were the least likely to find managing on their available income 'not too bad' or 'easy' and the most likely to have a Health Care Card.
- Women who gave birth in 2005 were the most likely to be married or living in a de facto relationship.

**Table 6-2 Demographics and medications at Survey 4 of women from the 1973-1978 cohort who consented to data linkage by pregnancy status**

	No children, did not give birth in 2005 (N = 2026) %	Children, did not give birth in 2005 (N=1310) %	Gave birth in 2005 (N = 535) %
Number of children			
None	100	–	–
One child	–	43	47
More than one child	–	57	53
Marital Status			
Not married or defacto	43	12	2
Married/De Facto	57	88	98
Highest qualification			
Year 12 only	11	29	16
Post Year 12	89	71	84
Income management			
Impossible or difficult	29	52	46
Not too bad or easy	71	48	54
Possess a Health Care Card	7	20	11
Area of residence*			
Non-urban	32	56	47
Urban	68	44	53

\* The 'urban' category is used to describe those women who live in major metropolitan areas.

Table 6-3 shows claims for PBS prescriptions for each of the three groups during 2005. Forty-three percent of women who gave birth in 2005 had a medication claim at some point through the pre-pregnant, pregnancy and post-pregnant periods. These women had an average of 1.6 different medications and a maximum of six medications during 2005. Women who gave birth in 2005 were less likely to have PBS claims than women who did not give birth in 2005. Women who gave birth in 2005 had forty different types of medication prescribed compared with 89 different types for each of the other two groups.

**Table 6-3 Medications claimed during 2005 by women from the 1973-1978 cohort by pregnancy status**

<b>Per Woman</b>	<b>No children, did not give birth in 2005</b>	<b>Children, did not give birth in 2005</b>	<b>Gave birth in 2005*</b>
<b>Different medications</b>			
Average	1.3	1.5	1.6
Maximum	11	20	6
<b>No of Scripts</b>			
Average	7.9	6.6	3.7
Maximum	139	59	31

*Percentages in table have been adjusted to account for sampling by area*

*\* These figures include medication claims from either the pre-pregnant or post-pregnant period as well as the pregnancy period.*

#### **6.4.1. Prescribed medication use by women before, during and after pregnancy**

Of the women who consented to data linkage, 535 had given birth in 2005. Survey data collected from these women were linked to PBS data. The data included in the following tables shows three time periods for these 535 women: the year before pregnancy; the period of the pregnancy; and the period up to one year after the birth of the child.

Table 6-4 shows the PBS claims of women who gave birth in 2005. Just over one quarter of women had PBS claims during the pre-pregnancy period; this dropped to 17% during pregnancy and rose to 29% in the post-pregnancy period. The average number of medications claimed was lower during pregnancy compared with pre- and post-pregnancy. As might be expected, the number of different types of medications claimed in this group was also reduced during the pregnancy period.



**Table 6-4 PBS medications claimed by women who were pregnant in 2005 by pre-pregnancy, pregnancy and post-pregnancy periods**

Period	Pre-pregnancy	During pregnancy	Post-pregnancy
Percentage of women prescribed medications	26%	17%	29%
Average number of different medications prescribed per woman	1.6	1.4	1.6
Maximum number of different medications prescribed	9	5	8
Number of different medications per category	55	34	47

*Percentages in table have been adjusted to account for sampling by area*

Table 6-5 shows the top ten medications that were claimed by women who gave birth in 2005. Antidepressant medications (N06A) were amongst the most commonly claimed medications; 7-8% of women claimed antidepressants in the pre-pregnant and post-pregnant period. During pregnancy this figure was reduced to 4%; however, antidepressants were the most commonly claimed medication for pregnant women.

Women in the 1973-1978 cohort who gave birth during 2005 were not likely to claim medications that could cause potential harm to the developing fetus. Only five participants claimed the level D drugs: Paroxetine, Doxycycline or Neomycin in the three time periods (5/535 = 0.98%). Only six women of the 535 who were pregnant in 2005 claimed Ventolin, and only one participant claimed Ventolin over the three time periods.

**Table 6-5 Top ten medications claimed by women in the 1973-1978 cohort who gave birth in 2005**

<b>Pre-Pregnant</b>	<b>%</b>	<b>Pregnant</b>	<b>%</b>	<b>Post-Pregnancy</b>	<b>%</b>
N06A Antidepressants	8	N06A Antidepressants	4	G03A Hormonal contraceptives for systemic use	8
G03A Hormonal contraceptives for systemic use	3	J01D Other beta-lactam antibacterials	2	N06A Antidepressants	7
J01C Beta-lactam antibacterials, penicillins	3	R03A Adrenergics, inhalants	2	G02B Contraceptives for topical use	6
G03G Gonadotropins and other ovulation stimulants	3	A03F Propulsives	2	J01C Beta-lactam antibacterials, penicillins	5
R03A Adrenergics, inhalants	3	R03B Other drugs for obstructive airway diseases, inhalants	2	R03A Adrenergics, inhalants	3
M01A Antiinflammatory and antirheumatic products, non-steroids	2	J01C Beta-lactam antibacterials, penicillins	1	J01D Other beta-lactam antibacterials	2
J01D Other beta-lactam antibacterials	2	A10A Insulins and analogues	1	B01A Antithrombotic agents	2
A02B Drugs for peptic ulcer and gastro-oesophageal reflux disease (GORD)	2	G03G Gonadotropins and other ovulation stimulants	1	N02A Opioids	1
R03B Other drugs for obstructive airway diseases, inhalants	2	A02B Drugs for peptic ulcer and gastro-oesophageal reflux disease (GORD)	1	A02B Drugs for peptic ulcer and gastro-oesophageal reflux disease (GORD)	1
G03D Progestogens	1	D07A Corticosteroids, plain	1	D07A Corticosteroids, plain	1

*Percentages in table have been adjusted to account for sampling by area*

## 6.4.2. Differences in medication prescriptions by area of residence

Figure 6-2, Figure 6-3 and Figure 6-4 show the top ten medications (as shown in Table 6-5) claimed by women who gave birth in 2005 across urban and non-urban areas for the three time periods.

Within the pre-pregnant period (Figure 6-2):

- Women in urban areas were more likely to claim medications for peptic ulcer and gastro-oesophageal reflux disease (GORD), and gonadotropins and other ovulation stimulants than women from non-urban areas (2.4% compared with 0.8% and 3.8 with 2.5%).

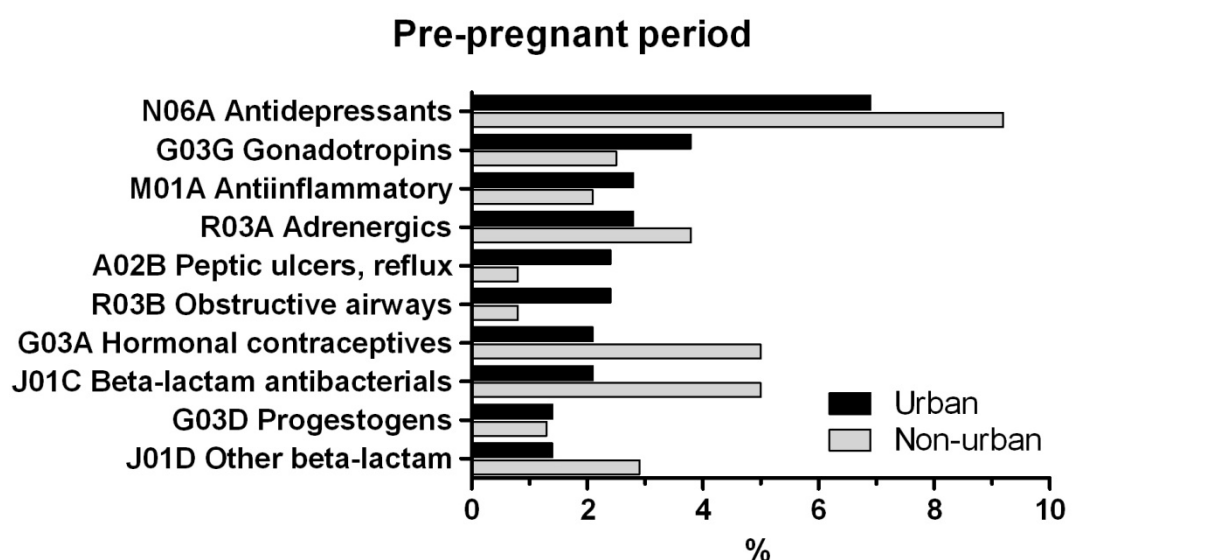
Within the pregnancy period (Figure 6-3):

- Women in urban areas were more likely to claim insulin and analogues and anti-bacterials than women in non-urban areas.
- Antidepressants were claimed by 4.6% of non-urban women in the 1973-78 cohort compared with 3.5% in urban areas during the pregnancy period.

Within the post-pregnancy period (Figure 6-4):

- Women in non-urban areas were more likely to claim antidepressants and adrenergics/inhalants after the birth of their child than women in the urban areas.
- Prescription hormonal contraceptives were more commonly claimed by non-urban compared with urban women. (This does not include contraceptives bought over the counter.)

Overall the findings indicated that antidepressant claims were more common among non-urban than urban women across all three time periods. By contrast, urban women were more likely to claim medications for GORD than non-urban women across all three time periods.



**Figure 6-2 Medications claimed in the pre-pregnancy period by area for women in the 1973-1978 cohort who gave birth in 2005**

### Pregnant period

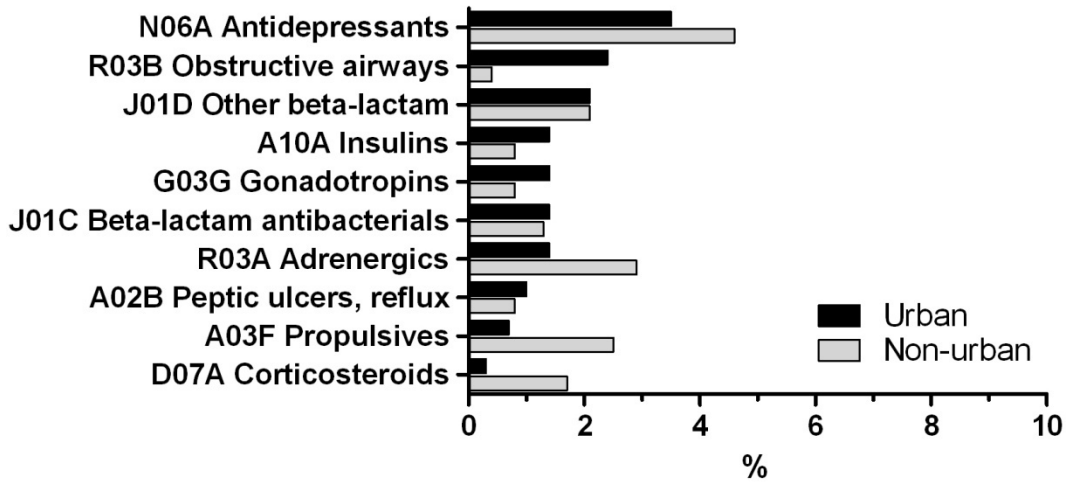


Figure 6-3 Medications claimed in the pregnancy period by area for women in the 1973-1978 cohort who gave birth in 2005

### Post-pregnant period

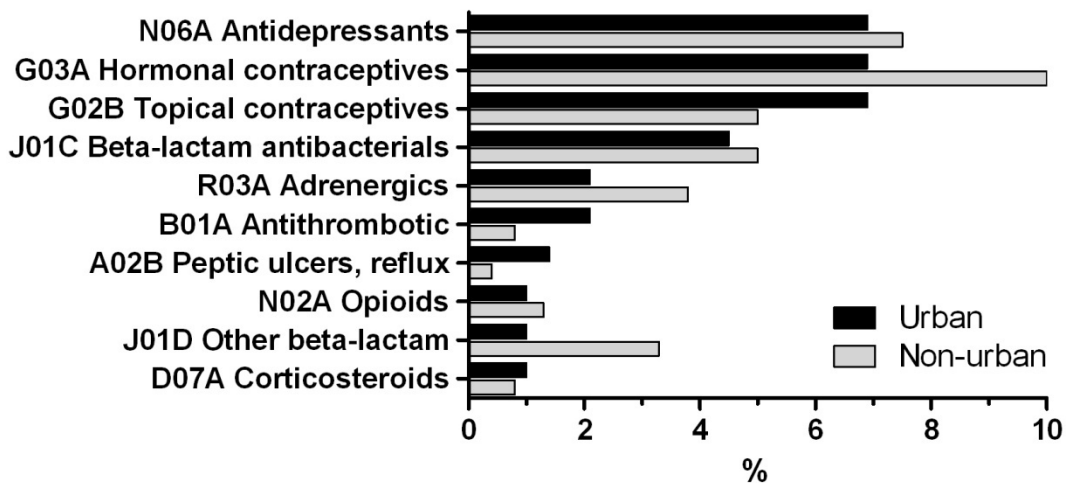


Figure 6-4 Medications claimed in the post-pregnancy period by area for women in the 1973-1978 cohort who gave birth in 2005

### **6.4.3. Conclusion**

Although claims for prescription medication decline during the pregnancy period, some women continue to claim prescription medication throughout pregnancy. The most common medications claimed during pregnancy include antidepressant, anti-bacterial and adrenergic/inhalant medications. Results for women who were pregnant in 2005 indicated that use of medications in the D and X categories (those with high risk to healthy fetal development) were rarely claimed by pregnant women. While claims for PBS medication declined for both urban and rural women during pregnancy, differences in PBS claims by area were noted: urban pregnant women were less likely to claim antidepressant medication and more likely to claim medications for GORD than non-urban women.

## **6.5. Use of tobacco and alcohol during pregnancy**

Smoking and heavy use of alcohol during pregnancy can harm the fetus, and can have long term adverse effects on the learning ability and behaviour of the child (O'Leary, 2004; Suarez et al., 2008). Indeed, smoking during pregnancy is associated with pregnancy complications, poor perinatal outcomes and adverse infant and childhood health outcomes (Cnattingius, 2004; Laws, Grayson & Sullivan, 2006; McDermott, Russell & Dobson, 2002; US Department of Health and Human Services, 2001). The frequent consumption of large amounts of alcohol during pregnancy has been shown to have similar effects, however the effects of lower amounts of alcohol are not known and no safe lower level of intake has been established (Henderson, Gray & Brocklehurst, 2007; Whitehall, 2007).

Several international studies have examined the prevalence of alcohol consumption during pregnancy. A Norwegian study found that while 89% of women drank during pregnancy, only 23% drank in their first trimester (Alvik et al., 2006). Behavioral Risk Factor Surveillance System data and vital statistics data on births in the United States were used to show that 54% of women drank before pregnancy and only 11% while they were pregnant (Anderson et al., 2006). An Irish study found that 54% of women drank during pregnancy (Donnelly et al., 2008). In Australia, 59% to 76% of women reported drinking while pregnant (Colvin et al., 2007; Young & Powers, 2005).

At present there are no Australian national data available on smoking prevalence during pregnancy. While most states and territories currently collect smoking data as part of routine perinatal data collections, the measures vary widely and there are no nationally agreed data items on smoking during pregnancy in Australia (Laws et al., 2006). In 2006, the proportion of women who smoked while pregnant ranged from 13% in New South Wales to 29% in the Northern Territory (Laws & Hilder, 2008). Overall, approximately 17% of women in Australia smoked during pregnancy in 2006, a prevalence that is consistent with the 13% to 24% found in other developed countries (such as the USA, France and Germany) (Cnattingius, 2004; Laws & Hilder, 2008; Roske et al., 2008; Schneider & Schutz, 2008).

Alcohol consumption has also been consistently associated with smoking during pregnancy (Connor & McIntyre, 1999; Kahn, Certain & Whitaker, 2002; Martin et al., 2008; Severson et al., 1995). One United States study found that mothers who consumed one or more drinks per week were up to five times more likely to smoke during pregnancy (Martin et al., 2008).

An important determinant in the cessation or continuation of substance use during pregnancy is the pattern of consumption prior to pregnancy. A United States study using data from the National Longitudinal Study of Youth examined the relationship between drinking in early adulthood (18-21 years) and drinking during pregnancy, and found that women who reported drinking frequently during early adulthood were more likely to drink while pregnant (Bobo, Klepinger & Dong, 2007). While some women do not cease drinking during pregnancy, they may be reducing their intake of alcohol. Rayburn et al. (2007) found around half of hazardous drinkers continued drinking after recognising that they were pregnant however the frequency of drinking and the number of drinks per day decreased (Rayburn et al., 2007). An Australian study found that of women drinking one to two drinks

a day, the number of occasions on which they drank declined from the consumption patterns three months prior to pregnancy (Colvin et al., 2007). Continuation of alcohol use during pregnancy has also been related to pre-pregnancy frequency of alcohol use (Harrison & Sidebottom, 2008).

Studies of tobacco use and pregnancy use varying definitions of cessation and data collection methods. Reports of smoking cessation rates among pregnant women in developed countries vary from less than 20% (Connor & McIntyre, 1999) to more than 40% (Carmichael & Ahluwalia, 2000; Lindqvist & Aberg, 2001). Australian data indicate that 34% to 55% of women who were smokers at the time they became pregnant quit smoking (Giglia, Binns & Alfonso, 2006; Hotham et al., 2008; McDermott, Dobson & Russell, 2004). While the majority of pregnant 'quitters' stop smoking in the first trimester (Ford et al., 1993), smoking prevalence generally remains relatively stable across the three trimesters of pregnancy (Hotham et al., 2008). As with the general population of women smokers, alcohol consumption is associated with a lower likelihood of quitting during pregnancy (Martin et al., 2008).

Different factors are associated with drinking and smoking during pregnancy. Women with low socio-economic status, less education, unmarried and younger women are more likely to smoke during pregnancy (Chan & Sullivan, 2008; Isohanni et al., 1995; Laws et al., 2006; Schneider & Schutz, 2008; Walsh et al., 1997). In contrast, women with higher incomes, more education and older women were more likely to consume alcohol while pregnant (Alvik et al., 2006; Wallace et al., 2007).

Women are advised not to smoke during pregnancy, but the messages about drinking have been mixed. The 1992 guidelines recommended no alcohol consumption during pregnancy but that advice was changed in 2001 (National Health and Medical Research Council 2001; O'Leary et al. 2007). The 2001 guidelines recommended that if women chose to drink while pregnant they should have less than seven standard drinks in a week and no more than two standard drinks on any day (Table 6-6).

**Table 6-6 Definition of levels of risk for alcohol consumption among pregnant and non-pregnant women (2001)**

	<b>Pregnant women</b>	<b>Non-pregnant women</b>
Low risk	Up to 2 standard drinks per day and less than 7 standard drinks per week	Up to 2 standard drinks per day and less than 15 standard drinks per week
Risky	3 or more standard drinks per day or 7 or more standard drinks per week	3 or more standard drinks per day or 15 or more standard drinks per week

The new *Australian Guidelines to Reduce Health Risks from Drinking Alcohol* released in March 2009 (Table 6-7) recommend that not drinking is the safest option for women who are pregnant or planning a pregnancy. Likewise, not drinking is recommended for women who are breastfeeding.

**Table 6-7 Australian Guidelines to Reduce Health Risks from Drinking Alcohol- Recommended low risk alcohol consumption for women and their developing babies (2009)**

	<b>Pregnant &amp; breastfeeding women (foetal &amp; infant alcohol exposure)</b>	<b>Healthy, non-pregnant women</b>
Reducing the risk of alcohol related harm over a lifetime (reducing long term risk)	Not drinking is the safest option	No more than 2 standard drinks on any day
<i>Reducing the risk of injury on a single drinking occasion (reducing short term risk)</i>	Not drinking is the safest option	No more than 4 standard drinks on any single occasion

The 2009 alcohol guidelines state that maternal alcohol consumption may adversely affect the development of the fetus or young baby during the breastfeeding period. The level of risk to the fetus is highest when maternal alcohol intake is high and frequent. It is likely to be low if a woman has consumed only small amounts of alcohol (such as one or two standard drinks per week) before she knew she was pregnant or during pregnancy.<sup>4</sup> However, no level of alcohol exposure has been established as safe for the developing fetus.<sup>5</sup> For more information, the guidelines are available at [www.nhmrc.gov.au/publications/](http://www.nhmrc.gov.au/publications/).

Few studies have examined pregnancy related changes in alcohol and tobacco consumption and these have mainly been restricted to studies of women attending antenatal clinics or for specific groups such as low-income pregnant women (Hotham et al., 2008; Ockene et al., 2002; Pirie et al., 2000). The purpose of this section is to describe changes in the use of two common legal substances (tobacco and alcohol) among non-pregnant women and changes in tobacco and alcohol consumption before, during and after pregnancy. Hence this section includes data from 5323 women of the 1973-1978 cohort who were not pregnant at any survey and women who were pregnant at only one of the four surveys:

- Pregnant in 1996 (n=116) when the women were 18-23 years old
- Pregnant in 2000 (n=245) when the women were 22-27 years old
- Pregnant in 2003 (n=383) when the women were 25-30 years old
- Pregnant in 2006 (n=603) when the women were 28-33 years old

Women who were pregnant at more than one survey were excluded from the analyses.

<sup>4</sup> Australian Guidelines to Reduce Health Risks from Drinking Alcohol. Page 5.

<sup>5</sup> Ibid. Page 67.

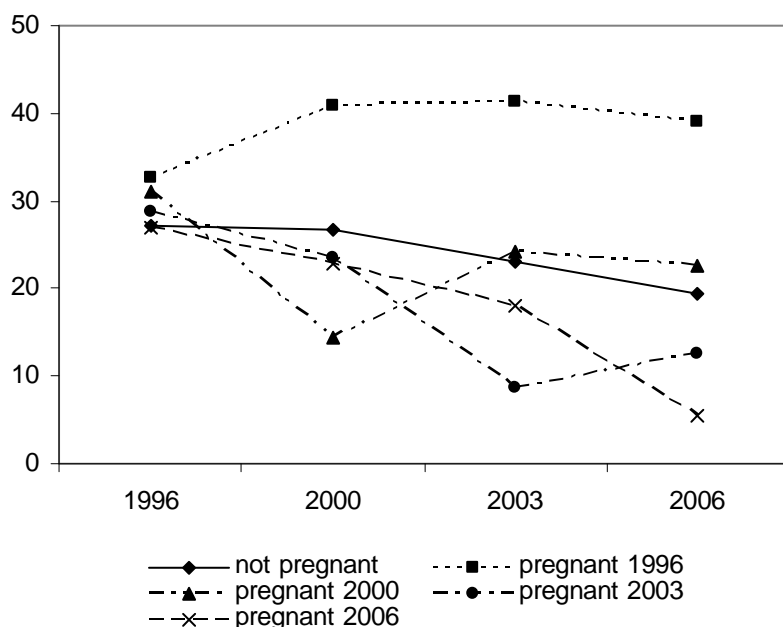
The following graphs show the prevalence of tobacco and alcohol consumption for non-pregnant women and women who were pregnant in 1996, 2000, 2003 or 2006. As the women were pregnant before the introduction of the 2009 guidelines, the prevalence of alcohol consumption refers to the prevalence of drinking at a level that was considered risky for pregnant women according to the 2001 guidelines as shown in Table 6-6. That is, more than two standard drinks a day, or seven or more standard drinks a week. The majority of women do not drink at a level that was considered to be risky for non-pregnant women according to the 2001 guidelines (see Young & Powers, 2005).

Figure 6-5 shows the prevalence of smoking among the non-pregnant and pregnant groups.

The prevalence of smoking:

- was around 30% in 1996 for 18-23 year old women whether they were pregnant or not
- declined to 20% in 2006 for 28-33 year old women who were not pregnant at any survey
- declined below 15% when women were pregnant in 2000, 2003 or 2006
- increased after pregnancy by 10% for women who were pregnant in 1996 or 2000
- increased after pregnancy by 5% for women who were pregnant in 2003.

It is not possible to say whether the prevalence of smoking had declined for women who were pregnant in 1996 nor whether it will increase after pregnancy for women who were pregnant in 2006.

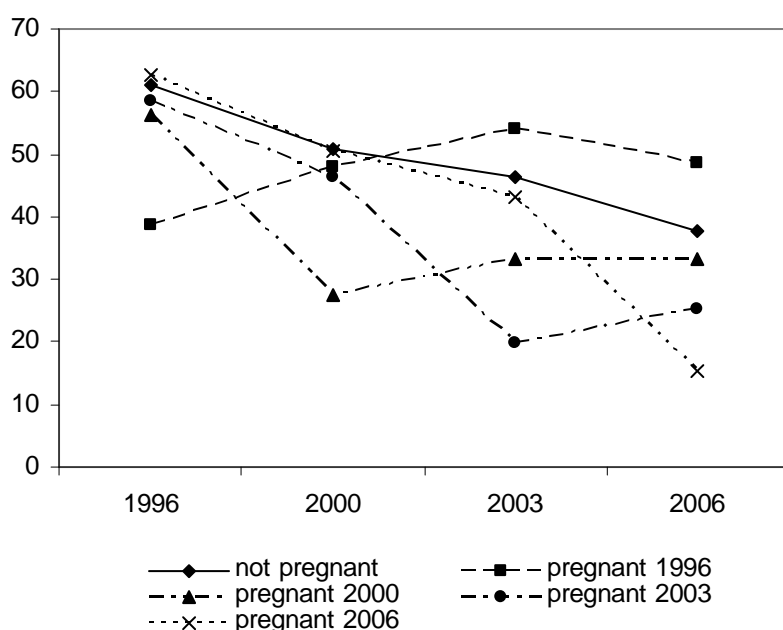


**Figure 6-5 Prevalence of smoking for women who were not pregnant at any survey or were pregnant at only one survey**



The prevalence of risky drinking (i.e. more than two drinks a day or seven or more drinks a week) is shown in Figure 6-6. In summary, the prevalence of risky drinking:

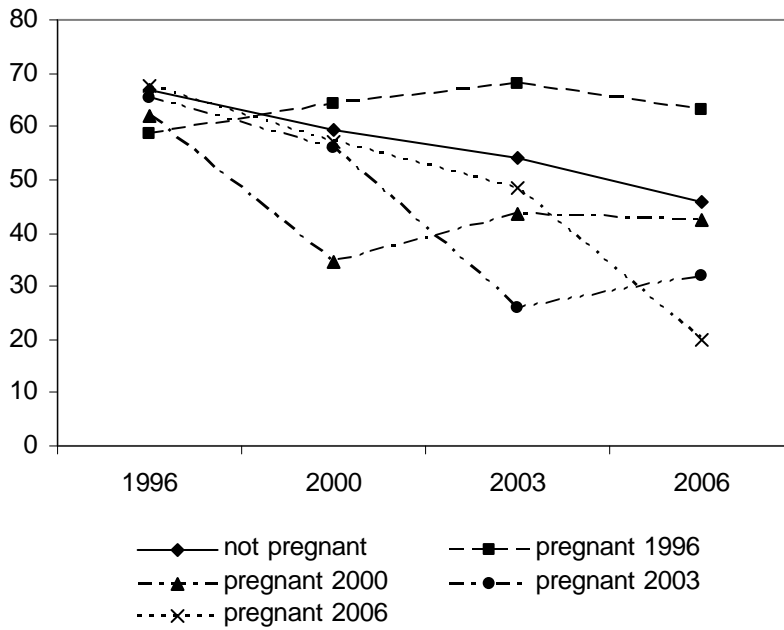
- was 60% for 18-23 year old women who were not pregnant in 1996
- was 40% for 18-23 year old women who were pregnant in 1996
- declined to 40% in 2006 for 28-33 year old women who were not pregnant at any survey
- declined to 30% for 22-27 year old women who were pregnant in 2000
- declined to 20% for 25-30 year old women who were pregnant in 2003
- declined to 15% for 28-33 year old women who were pregnant in 2006
- increased to 50% after pregnancy for women who were pregnant in 1996
- increased by 5% after pregnancy for women who were pregnant in 2000 or 2003.



**Figure 6-6 Prevalence of risky drinking among women who were not pregnant at any survey or were pregnant at only one survey**

Figure 6-7 shows the percentage of women who were either current smokers or drank at risky levels for pregnant women (i.e. more than two drinks a day or seven or more drinks a week). The prevalence of smoking or risky drinking:

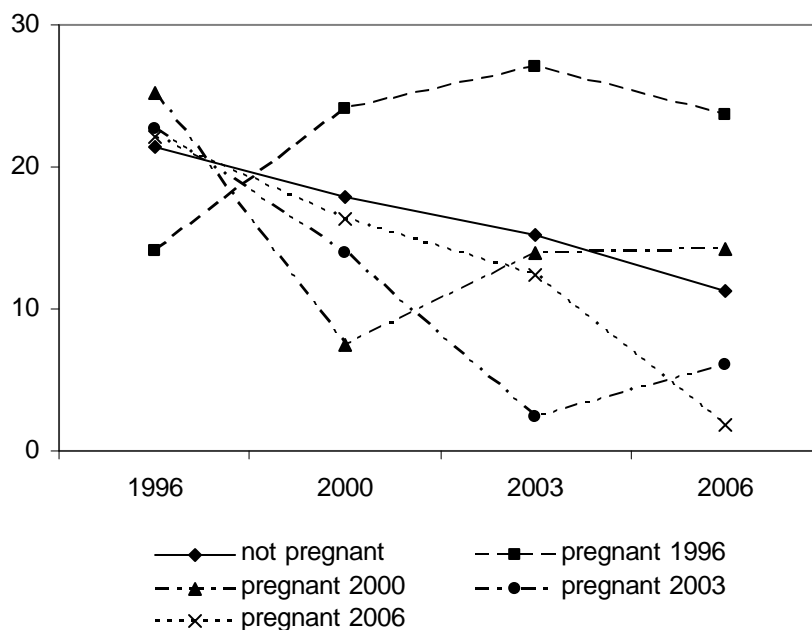
- was 60% to 70% in 1996 for 18-23 year old women who were not pregnant
- was 60% for 18-23 year old women who were pregnant in 1996
- declined to 45% in 2006 for women who were not pregnant at any survey
- declined to 35% during pregnancy for women who were pregnant in 2000
- declined to 25% during pregnancy for women who were pregnant in 2003
- declined to 20% during pregnancy for women who were pregnant in 2006
- increased by around 5% after pregnancy for women who were pregnant in 2000, 2003 or 2006.



**Figure 6-7 Prevalence of smoking or risky drinking among women who were not pregnant at any survey or were pregnant at only one survey**

Figure 6-8 shows the prevalence of smoking and risky drinking (i.e. more than two drinks a day or seven or more drinks a week) among the non-pregnant and pregnant groups. The prevalence of smoking and risky drinking:

- was 20% for 18-23 year old women who were not pregnant in 1996
- declined to 11% in 2006 for 28-33 year old women who were not pregnant at any survey
- was 14% for 18-23 year old women who were pregnant in 1996
- declined below 10% during pregnancy for women who were pregnant in 2000, 2003 or 2006
- increased after pregnancy for women who were pregnant in 2000 or 2003.



**Figure 6-8 Prevalence of smoking and risky drinking among women who were not pregnant at any survey or were pregnant at only one survey**

### 6.5.1. Summary

This section examined the prevalence of tobacco and alcohol consumption among non-pregnant women and before, during and after pregnancy. Of women who were smokers and not pregnant at any survey 30% quit smoking over the ten years from 1996 to 2006. At least half the women who were smokers before pregnancy quit smoking during pregnancy, but 30% or more did not. Of women who were drinking at risky levels (for pregnant women) but were not pregnant at any survey, 40% stopped risky drinking over the ten years from 1996 to 2006. More than half the women who were drinking at risky levels (for pregnant women) before pregnancy stopped drinking at those levels during pregnancy, but 35% or more did not. Women who were younger were more likely to smoke or to consume alcohol at risky levels during pregnancy.

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# 7. Maternal health

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## 7.1. Key findings

This section examines the general health, symptoms and mental health of mothers and women without children at Survey 4. It focuses on the predictors of postnatal depression and examines the role of demographics, previous depression and anxiety, life events and social support on whether women had experienced postnatal depression.

- Women whose children were under 12 months had higher self rated physical and mental health than women whose children were older than 12 months and higher than women without children.
- While women with children under 12 months had higher self rated health than other women, they were more likely to experience some symptoms (e.g. incontinence, severe tiredness).
- Mothers with a history of depression and anxiety and those who had experienced more stressful life events were more likely to experience postnatal depression (PND).
- Those mothers who reported limited social support were also more likely to report experiencing PND, especially those who had limited affectionate support and positive social interactions.

## 7.2. Introduction

The World Health Organization's 5<sup>th</sup> Millennium Development Goal is to reduce the maternal mortality ratio by three quarters by 2015 and has recently also been increased to incorporate universal access to reproductive health care (United Nations Population Fund (UNFPA), 2008). The Safe Motherhood Initiative has been established in order to meet these targets, and has emphasised the importance of improved maternal health on a global scale. This initiative has seen much needed improvements in the rates of maternal and infant mortality in developing nations, through effective service delivery (UNFPA, 2008). This initiative has also seen a shift in academic focus in developed nations from maternal mortality and major morbidity to overall maternal wellness.

On a national scale, in 2008 the Australian Government Department of Health and Ageing (DoHA) conducted a review of maternity services in Australia (Australian Government Department of Health and Ageing, 2008). The review examined a range of services and support for women in the perinatal period. Maternity service reforms were also the subject of a recent Australian Health Ministers' Advisory Council (AHMAC) paper (Australian Health Ministers' Advisory Council 2008), that described a framework for primary maternity services, that was endorsed by all state and territory Ministers. Both the DoHA review and the AHMAC paper emphasise the importance of improved access to and choice of health care services for women and their babies to improve health outcomes for mothers, and establish a healthy start to life for children.

Improved maternal health not only positively affects the mother, but numerous studies have shown the interconnectedness of maternal health with infant health (Murray, 1992; Petterson & Albers, 2001). To date only a small number of studies have focused on maternal wellness, with the more common focus being on major morbidity and mortality. The purpose of this section was to examine maternal wellbeing in keeping with the current view of maternal health endorsed by the WHO and DoHA, that is, in terms of overall physical and mental wellbeing, rather than focusing on the absence of chronic or acute conditions. Also in keeping with current national priorities, the section examines postnatal depression in detail.

## **7.3. The health of mothers**

Most previous research into the physical health of mothers has focused on maternal morbidity and mortality, however little is known about the potentially more prevalent and less severe forms of morbidity in the postpartum (Ansara et al., 2005). Indeed the definition of the postpartum is problematic, as technically the postpartum refers to the six weeks following birth, however it has been suggested that several conditions prevail well beyond this time (Schytt & Waldenstrom, 2007). The current section focuses on women's physical wellbeing in the short and longer term after the birth of a child.

### **7.3.1. Participant characteristics**

The following analysis focused on the results of Survey 4 of the 1973-1978 cohort when the women were aged 28-33. At the time of completing this survey, 12% of the 9135 respondents were pregnant, and the responses of these women were not included in the analyses in this section. Participants were divided into four categories based on motherhood status relative to survey completion date: no children, youngest child under six months old, youngest child between six and 12 months old, all children over 12 months old.

Table 7-1 shows the demographic characteristics of women in each of the four categories. Compared with mothers, women without children were more likely to have a university education, live in an urban area, and be undertaking paid employment, and were less likely to experience financial stress or have a partner. Among women who were mothers, those with children less than six months and with children aged between 6 and 12 months were more likely than those whose children were all over 12 months to have a university education, live in an urban area and to not be experiencing financial stress. Women with children less than six months of age were the least likely to be undertaking paid work, as might be expected. (Paid work and motherhood is discussed further in Section 8). Women without children and those with children over 12 months were more likely than women with younger children to be smokers. (Health related behaviour is discussed in more detail in Section 6.)



**Table 7-1 Demographic characteristics of women with and without children at Survey 4 (2006) of the 1973-78 cohort**

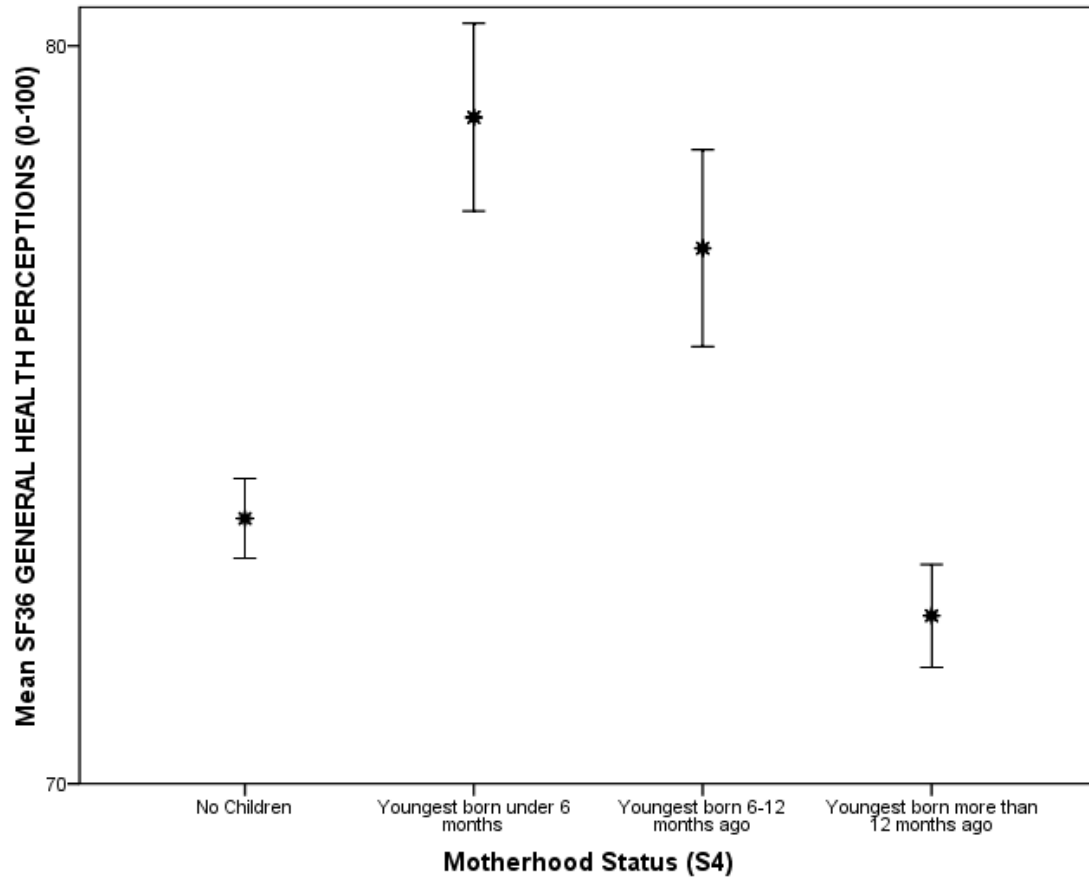
Motherhood status	No children	Youngest child under 6 months	Youngest child between 6-12 months	All children over 12 months
	n=4456 %	n=604 %	n=583 %	n=2402 %
Education				
Year 10 or less	4	9	7	14
HSC/ Trade/ TAFE	33	43	41	56
University	64	49	52	30
Financial stress				
Mod/ very/ extremely stressed	40	40	46	53
Somewhat/ not at all stressed	60	60	54	47
Area of residence				
Major city	78	67	67	60
Inner regional	13	21	20	26
Outer regional/ remote/very remote	9	12	14	17
Partner				
Partnered	53	97	96	84
Un-partnered	47	3	4	17
Labour force				
Employed	96	38	54	74
Non-employed	4	62	46	26
Current smoker				
Yes	21	12	12	24
No	79	88	86	76

*Percentages weighted to adjust for oversampling of women living in non-urban areas.*

### 7.3.2. General health, symptoms and mental health of mothers

The Medical Outcomes Study Short Form 36 Survey (SF-36) consists of several subscales and indexes to measure a range of health domains, and has been included in all ALSWH surveys (Ware et al., 1993). In order to measure overall health, the SF-36 General Health Perceptions subscale was used, where higher scores reflect better physical wellbeing. As can be seen in Figure 7-1 women with children 12 months and younger had better general health than women without children and women with children aged over 12 months.

Despite reporting better general health, mothers of children aged 12 months or younger were more likely to report back pain, constipation and haemorrhoids than other women, as can be seen in Figure 7-2, which shows the percentages of women in each category who experienced various symptoms 'sometimes' or 'often'. Mothers were more likely to experience tiredness and back pain than women without children, consistent with previous research findings, and indicative of the physical burden of motherhood.



**Figure 7-1 Mean SF-36 General Health Perceptions score by motherhood status at Survey 4 of the 1973-1978 cohort**

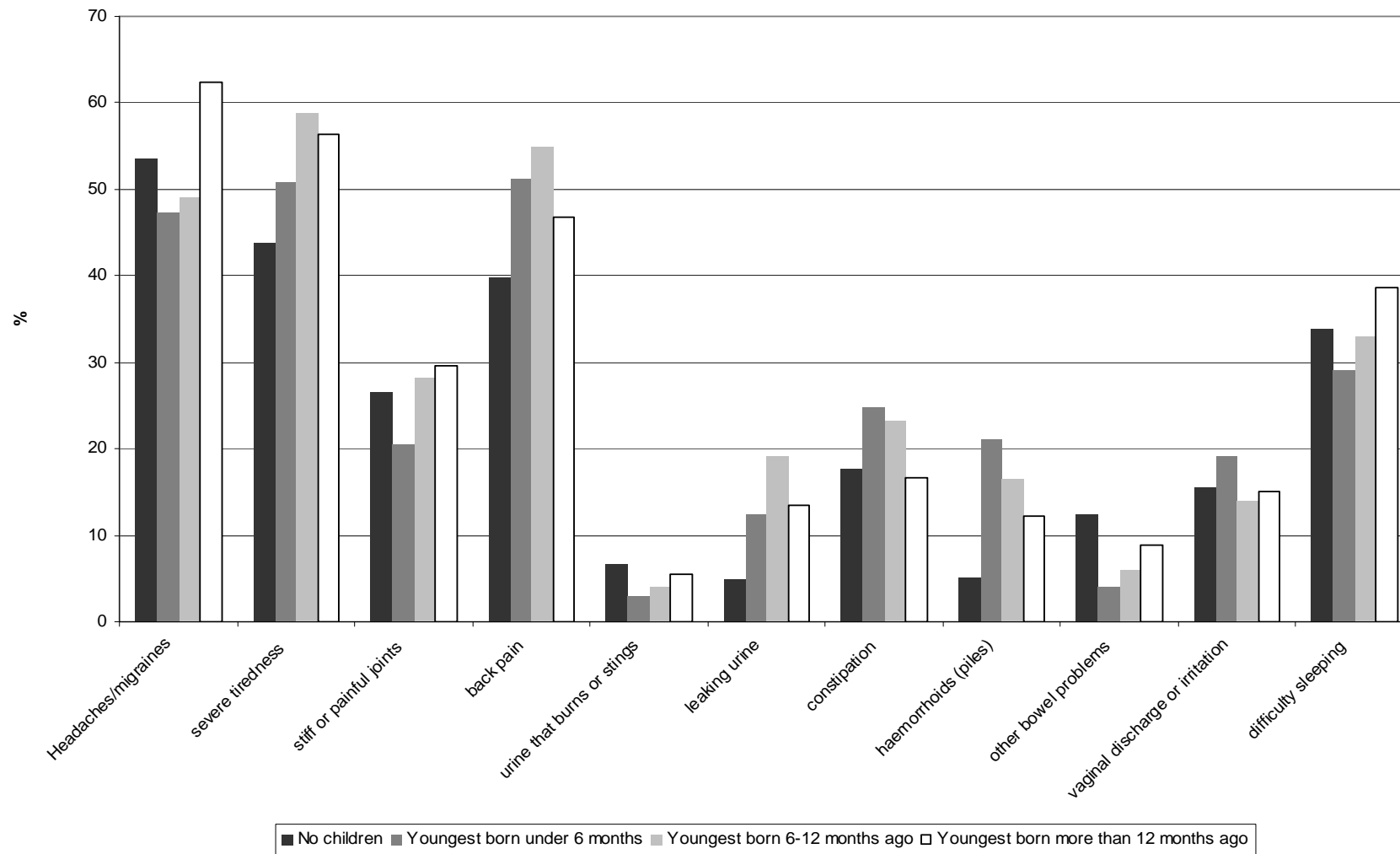
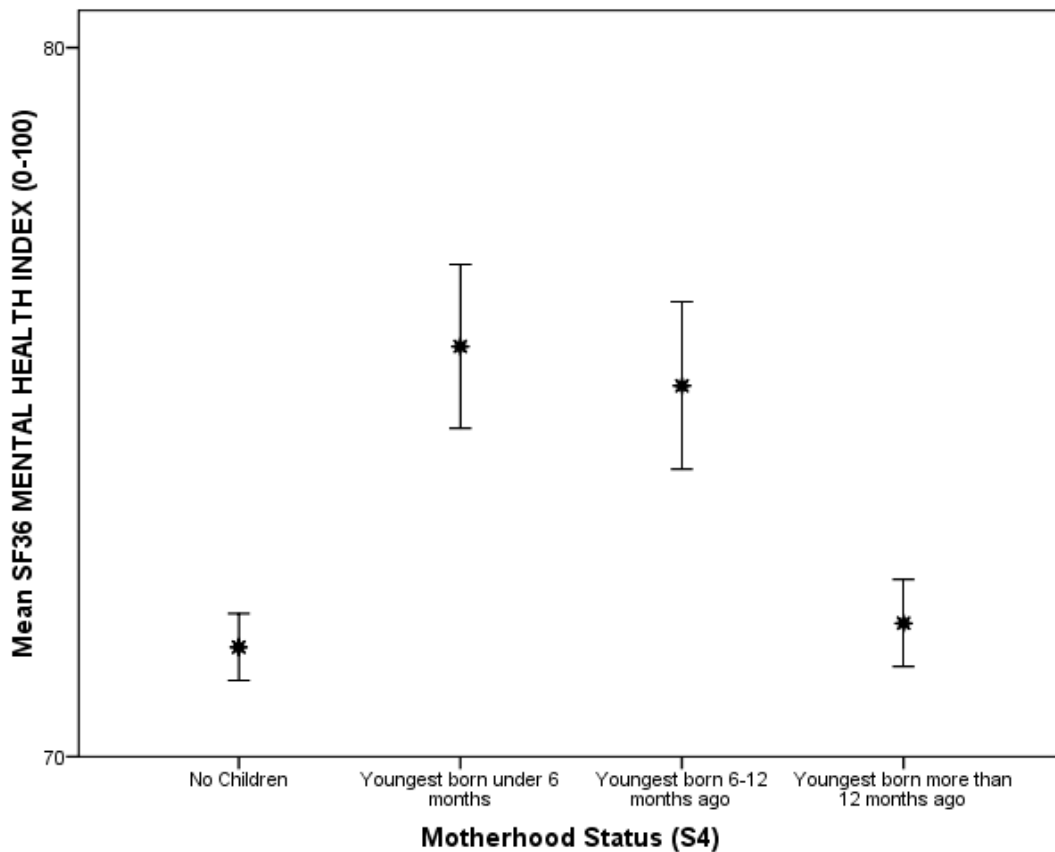


Figure 7-2 Percentages of symptoms experienced 'sometimes' or 'often' in 1973-1978 cohort at Survey 4 for mothers versus non-mothers

Among mothers, those with older children were the most likely to report headaches/migraines, painful joints and difficulty sleeping, and the least likely to report constipation and back pain. Interestingly, it was women with children aged six to 12 months, rather than under six months, who were the most likely to report severe tiredness.

Women who have given birth to a child were more likely to experience leaking urine than women without children. The relationship between childbirth and leaking urine has been previously investigated using ALSWH data, and a statistically significant relationship found. While other factors also influence the risk of urinary incontinence, it is clear that parity is a key issue that warrants continued exploration. For example, Chiarelli, Brown & McElduff (1999) suggest that prenatal interventions designed to prevent urinary incontinence be assessed for effectiveness over the long term.

In order to measure the mental health of mothers, the Mental Health Index of the SF-36 was used. Higher scores on this scale reflect better mental health. As can be seen in Figure 7-3 the self rated mental health of women in the 1973-1978 cohort across motherhood status follows a similar trend as self rated physical health. Women whose youngest child was under 6 months of age rated their mental health better than other women, and women without children rated their mental health the lowest of all groups.



**Figure 7-3 Mean SF-36 Mental Health Index score by motherhood status at Survey 4 (2006) of the 1973-1978 cohort**

Women whose youngest child was under 12 months had higher self-rated physical and mental health than other women, in contrast to previous research that suggests these women are at the most risk of experiencing health problems compared with other women. However, while their self-rated health was high, experience of various symptoms was also high. It is unclear as yet why there is a divergence in experience of symptoms and self-rated health for new mothers, and this relationship requires further investigation in order to better understand the underlying factors that impact on new mother's health perceptions. Furthermore, it appears that women whose children were all older than 12 months were experiencing the worst physical and mental health of all mothers. Current research and policy are focusing on the immediate post-partum period, in particular on PND (discussed further in the following section). While the postpartum period does have important health implications, the current results suggest that more research into the health of mothers of older children is also warranted to explore the factors that are impacting on their self-rated physical and mental health.

## **7.4. Postnatal depression**

Depression is predicted to be the second greatest burden of disease by 2020 (Murray & Lopez 1996). Depression is the most commonly treated mental illness in Australia, and is more common among women than men across all ages. In particular, high rates of depression are experienced in women aged 18-24, with up to one in ten women suffering from an episode of depression in a twelve month period (Andrews et al., 1999). Women in this age range may experience many new and distinctive life events, with the birth of a child being one of the most life-changing (Boyce, 2003; Evans et al., 2001). The ability to cope with life transitions is an important determinant in the development of depression at any life stage, and is particularly important at a time such as the birth of a child, which is associated with many physical, mental, social and financial changes (Brockington, 2004). Within the first twelve months after childbirth, the associated changes in lifestyle along with other risk factors contribute towards susceptibility to PND.

Depressive episodes are the most common form of morbidity in the period after childbirth (Dennis & Chung-Lee, 2006). There are three main depressive mood disorders associated with pregnancy – baby blues, puerperal psychosis and PND (American Psychiatric Association, 1994; World Health Organization, 1992). The baby blues, or maternity blues, are terms used to describe the 'teary' episodes that occur between three and ten days after birth for around 80% of women (Brockington, 1996). This is a mild and transient form of depression that begins and ends within the first two weeks after childbirth (Glangeaud-Freudenthal & Boyce, 2003). Puerperal psychosis is a far more severe but less common disorder, affecting 0.2% of all mothers (NHMRC 2000). Puerperal psychosis typically presents in the same way as bipolar depressive episodes and has an onset usually within six weeks of the birth (Gregoire, 1995). While it is the least common of the postnatal mood disorders, puerperal psychosis is potentially the most harmful to both mother and baby, with an increased risk of suicide and infanticide (NHMRC, 2000). In a clinical setting, PND is identified using either DSM-IV or ICD-10 diagnostic criteria where the symptoms presented match the criteria for major or minor depressive disorder, and where they occur within either six (ICD-10) or four (DSM-IV) weeks of childbirth. The symptoms must have continued for at least two weeks, and typically the symptoms experienced are low energy, irritability, less concentration and feelings of guilt (NHMRC, 2000).

There have been several important Australian research projects that have contributed to shaping the direction of PND research and policy. Importantly, the beyondblue Depression Initiative established the PND Program in 2001 in order to measure the prevalence of PND in Australia, utilising the Edinburgh Postnatal Depression Scale as a screening tool, and to increase awareness of PND.

The Australian Government, and state and territory governments, have developed and are implementing the National Perinatal Depression Initiative to improve the prevention and early detection of antenatal and postnatal depression, and to provide better care, support and treatment for expectant and new mothers experiencing perinatal depression. The following key elements are integral to the National Perinatal Depression Initiative:

- routine and universal screening for perinatal depression
- follow up support and care for women assessed as being at risk of experiencing perinatal depression
- workforce training and development for health professional
- community awareness.

The reported prevalence of PND varies depending on the manner of data collection; current estimates put the percentage of mothers who are affected by PND at between 10 and 20% in Australia. The prevalence of PND in the ALSWH 1973-1978 cohort was assessed and is reported below. While several studies have examined the predictors of PND, little longitudinal analysis has been conducted. The following section describes some of the predictors of PND in a longitudinal context.

#### **7.4.1. Participants**

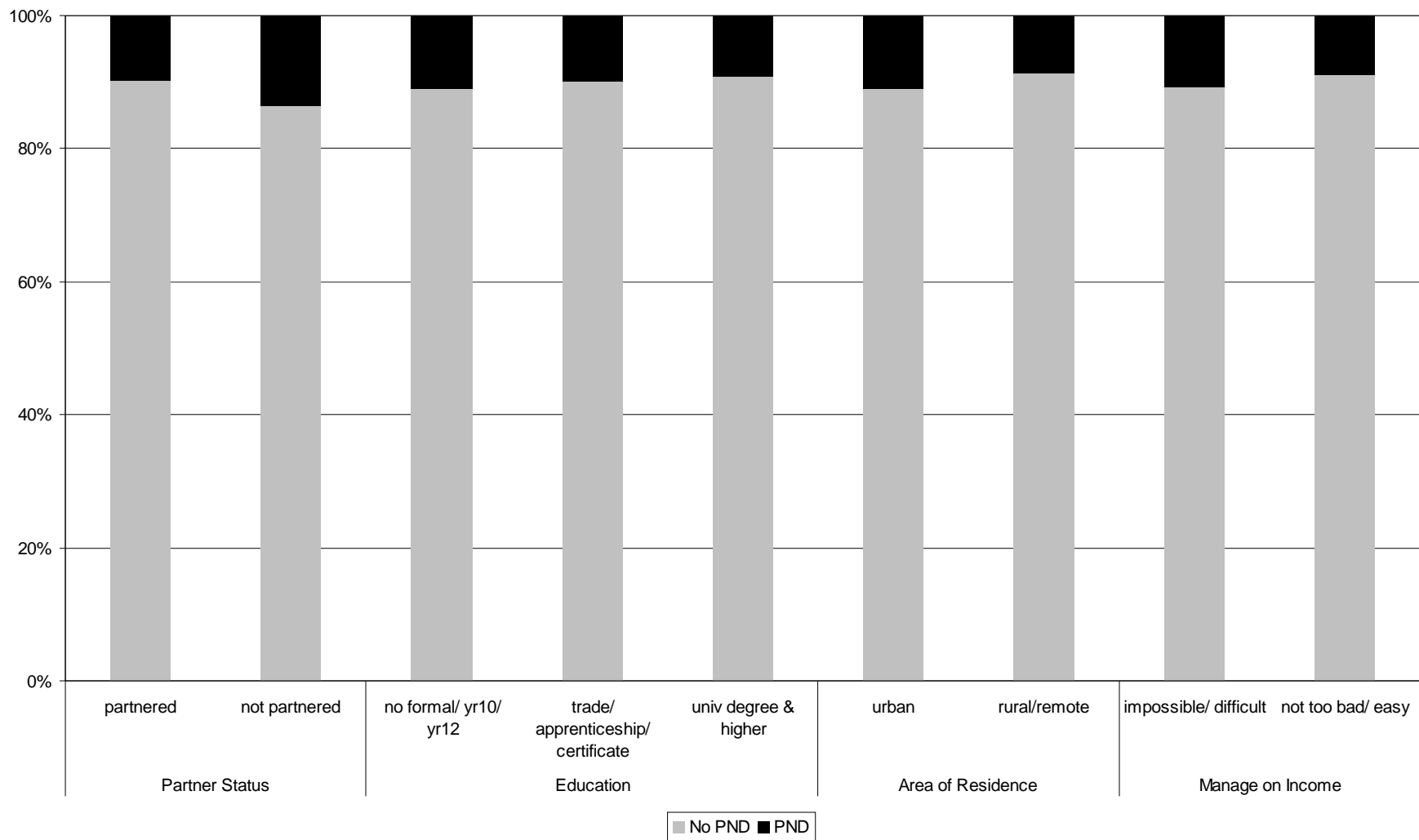
Data included in this section are only for those participants in the 1973-1978 cohort who completed Surveys 1 to 4. There were 6755 participants who completed all four surveys. Of these women, 2451 had had a live birth in the four years preceding Survey 4, and it is the data collected from these women that are the basis of the following analysis. Of the participants who had a live birth in the four years preceding Survey 4 in 2006, 10% reported being diagnosed or treated for PND in the last three years.

#### **7.4.2. Predictors of postnatal depression**

Many studies have explored the potential predictors of PND particularly related to childbirth events (such as obstetric interventions, and mode of delivery) and pregnancy (such as antenatal depression). However, very little is known about the more distal predictors of PND. The following analysis explored the relationship between several socio-demographic and distal conditions and PND.

#### **7.4.3. Demographics**

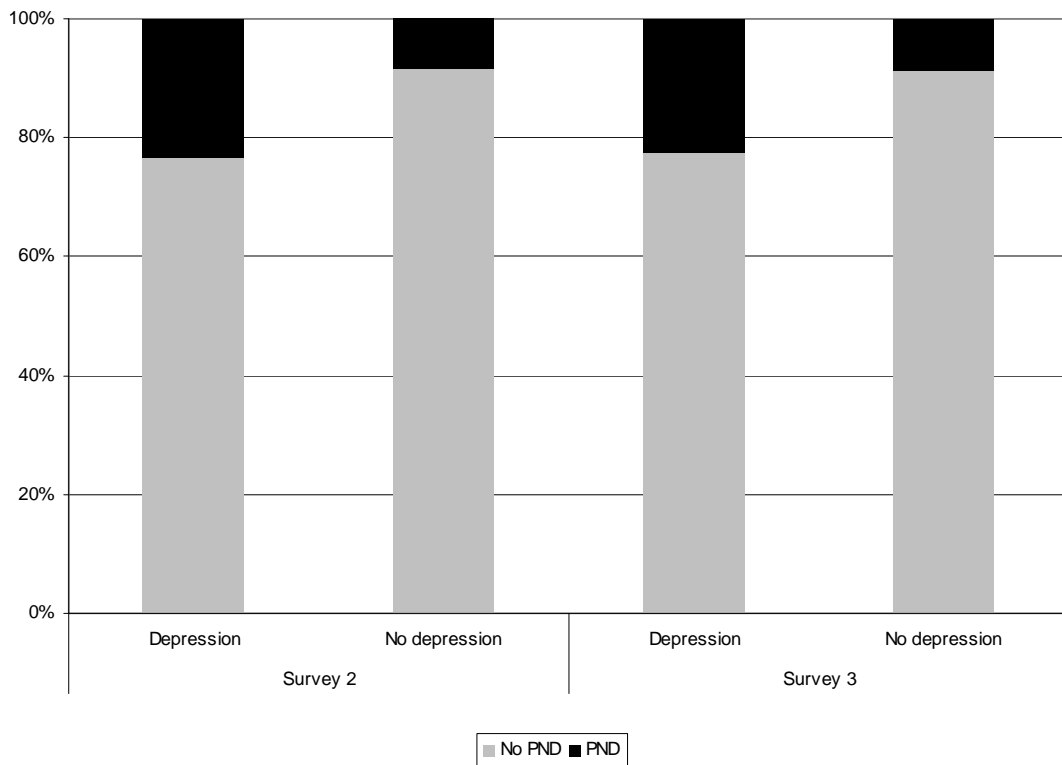
Figure 7-4 shows several demographic characteristics of those women who had a baby in the four years prior to Survey 4 (2006) according to reported diagnosis or treatment for PND. No statistically significant differences were apparent between partnered and non-partnered women. Education was also assessed, and again no significant results were found. There was only a very small difference between women living in rural and remote areas compared with those living in urban areas, although it appears that women living in urban areas were more likely to report experiencing PND than other women. Ability to manage on income was also measured, and those women who found managing on their income either impossible or difficult all or some of the time were more likely to report PND than other women.



**Figure 7-4 Demographic characteristics at Survey 4 (2006) of women who gave birth between 2002-2006 by PND status**

### 7.4.4. Previous depression

The relationship between antenatal depression and the development of PND has been reported in much of the current literature. However the ALSWH allows the examination of the relationship between more distal mental health issues and PND. Figure 7-5 shows the percentage of women who had ever been diagnosed with or treated for depression at Survey 2, and who had been diagnosed with or treated for depression by Survey 3, and who of these women went on to be diagnosed with PND at Survey 4. Those women who experienced depression by Survey 2 were more than three times as likely to experience PND at Survey 4. Similarly, those women who experienced depression by Survey 3 were more than three times as likely to experience PND at Survey 4 compared with other mothers.

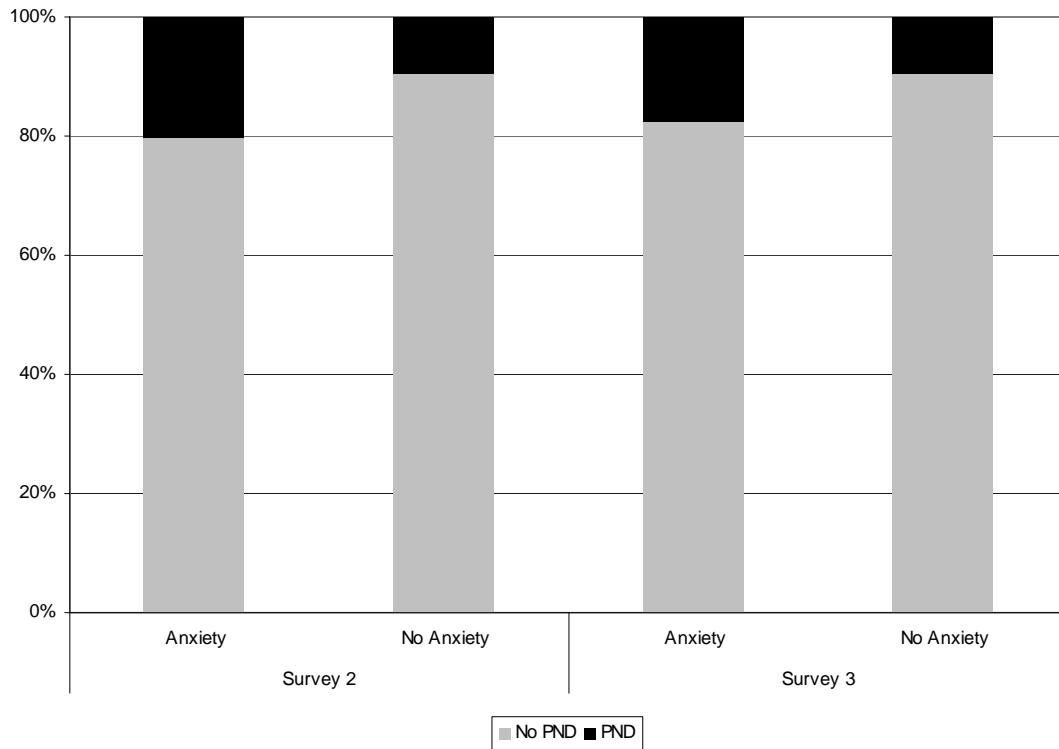


**Figure 7-5 The relationship between history of depression at Survey 2 (2000) or 3 (2003) and PND at Survey 4 (2006) among women who gave birth to a child 2002-2006**

### 7.4.5. Previous anxiety

Figure 7-6 shows similar results for women who were ever diagnosed or treated for anxiety by Survey 2, or who had been diagnosed or treated for anxiety by Survey 3. Those women who were diagnosed or treated for anxiety by Survey 2 were almost two and a half times as likely to be diagnosed or treated for PND at the Survey 4. Although not statistically significant, there was also a similar trend for women with anxiety by Survey 3.

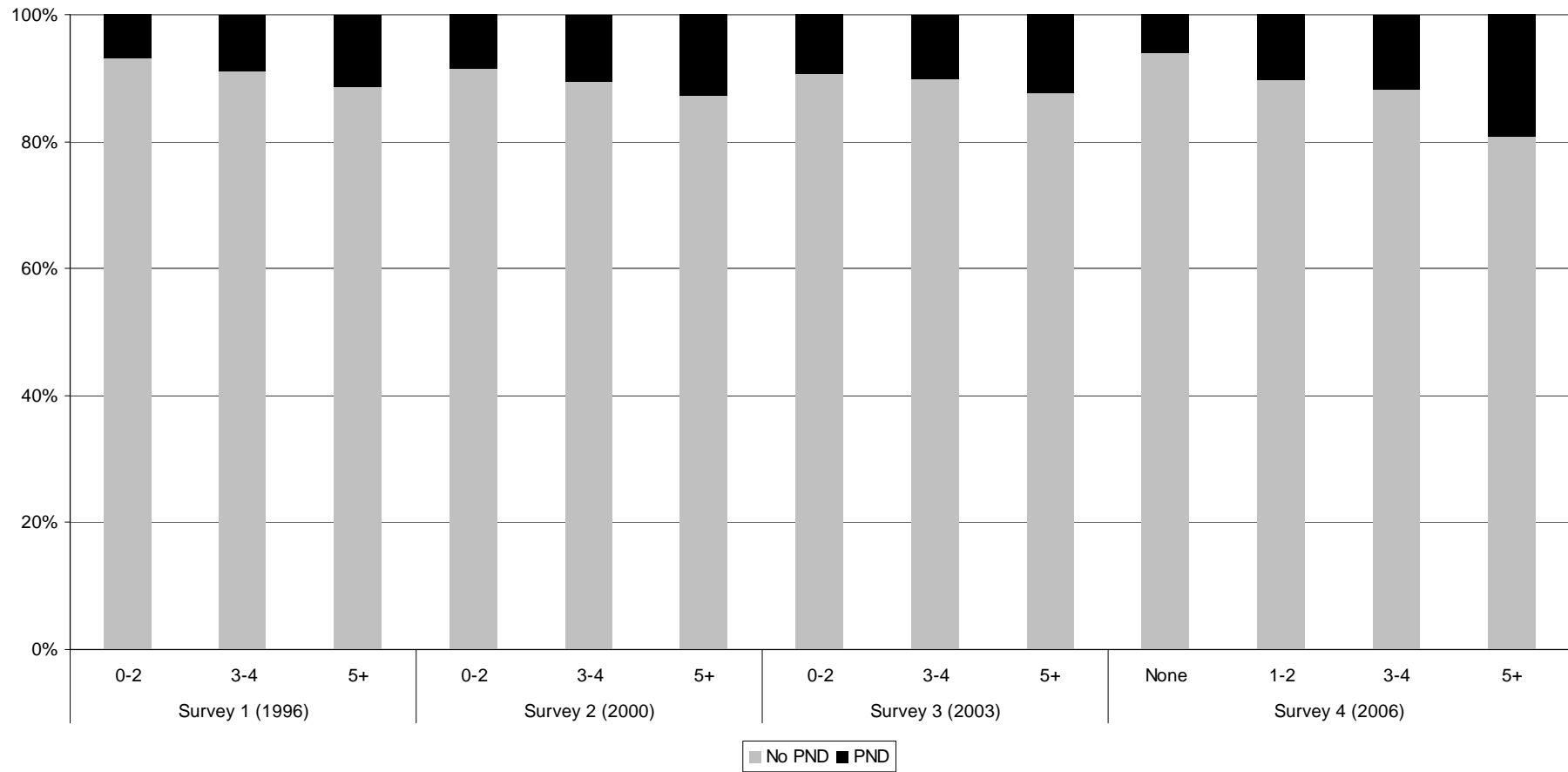




**Figure 7-6 The relationship between anxiety at Survey 2 (2000) and Survey 3 (2003) and PND at Survey 4 (2006) among women who gave birth to a child 2002-2006**

### 7.4.6. Life Events

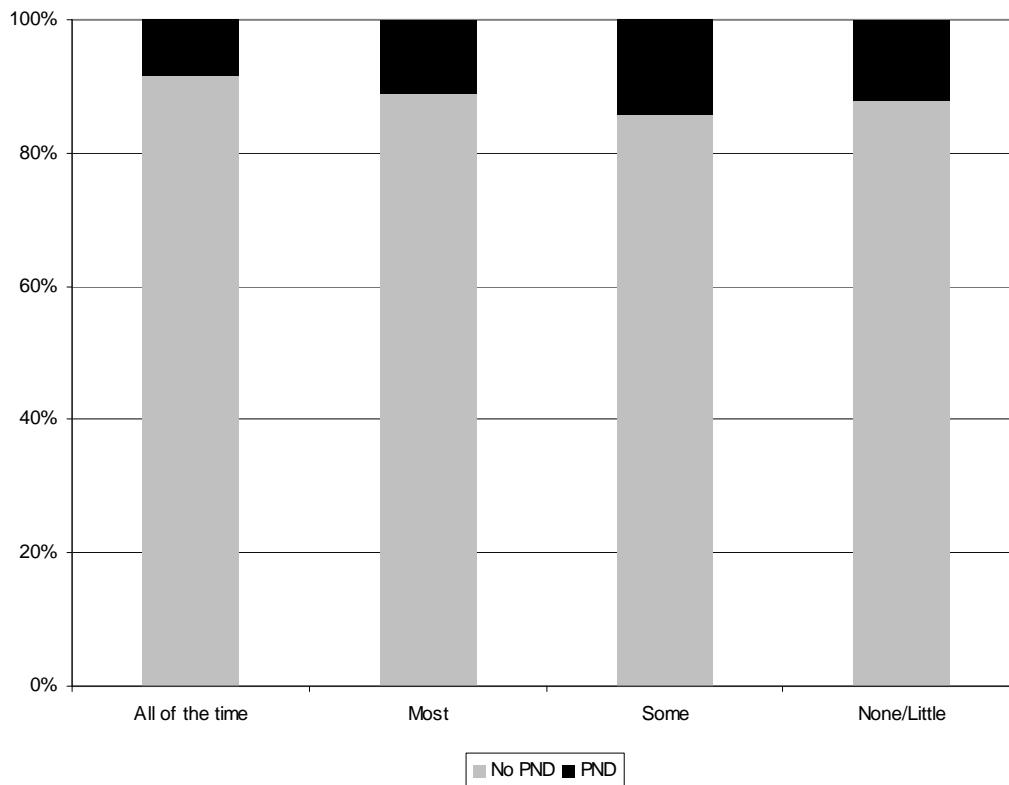
Each of the four surveys of the 1973-1978 cohort contain a measure of life events modified from Norbeck's life events questionnaire (Norbeck, 1984). The items measured include relationships, work stresses, beginning or resuming study and other events relevant to the age group. For the purposes of this analysis, number of life events were calculated and categorised as: 0-2, 3-4 or 5 or more for Surveys 1 to 3 and none, 1-2, 3-4 and 5 or more for Survey 4. At Survey 1, women who reported experiencing five or more life events in the twelve months prior to the survey were more than one and a half times more likely to report PND at Survey 4. Results were not statistically significant for Surveys 2 and 3. However, at Survey 4, those who experienced five or more life events in the 12 months prior to the survey were over three times as likely to have also reported PND. Those who experienced 3-4 life events were twice as likely, and those who experienced 1-2 life events were nearly twice as likely than those women who experienced no life events to also report PND. These results show that both distal and proximal life events can have a significant impact on the mental health of mothers, something that requires further consideration and investigation.



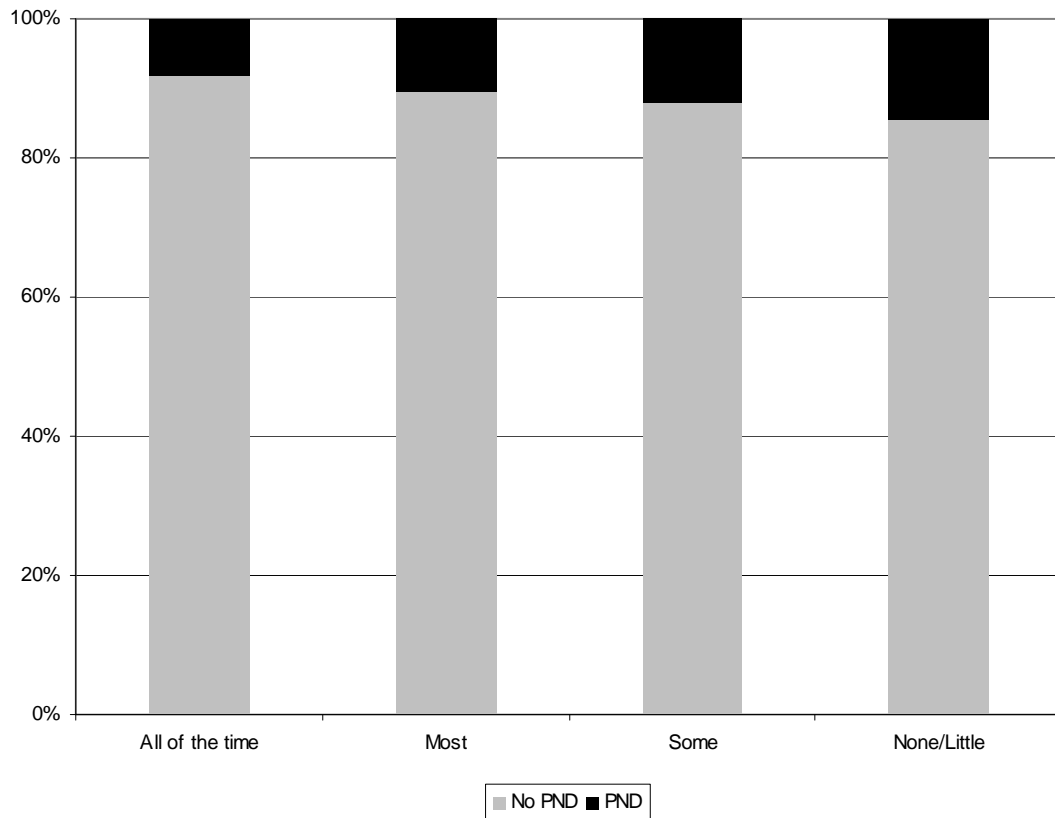
**Figure 7-7 Number of stressful life events experienced for Surveys 1-4 for women who gave birth between 2002-2006 by PND status at Survey 4**

### 7.4.7. Social support

The MOS Social Support Index was included in Survey 4 and contains three factors that were used in this analysis: emotional/informational support, tangible support, affectionate support and positive social interaction. The emotional/informational subscale contains measures such as 'someone to count on to listen to you when you need to talk' and 'give you good advice about a crisis'. The tangible support subscale includes items such as 'someone to help you if you are confined to a bed' and 'take you to the doctor if you need it'. The affectionate support and positive social interaction combined factor includes items such as 'someone to have a good time with' and 'someone to love and make you feel wanted'.



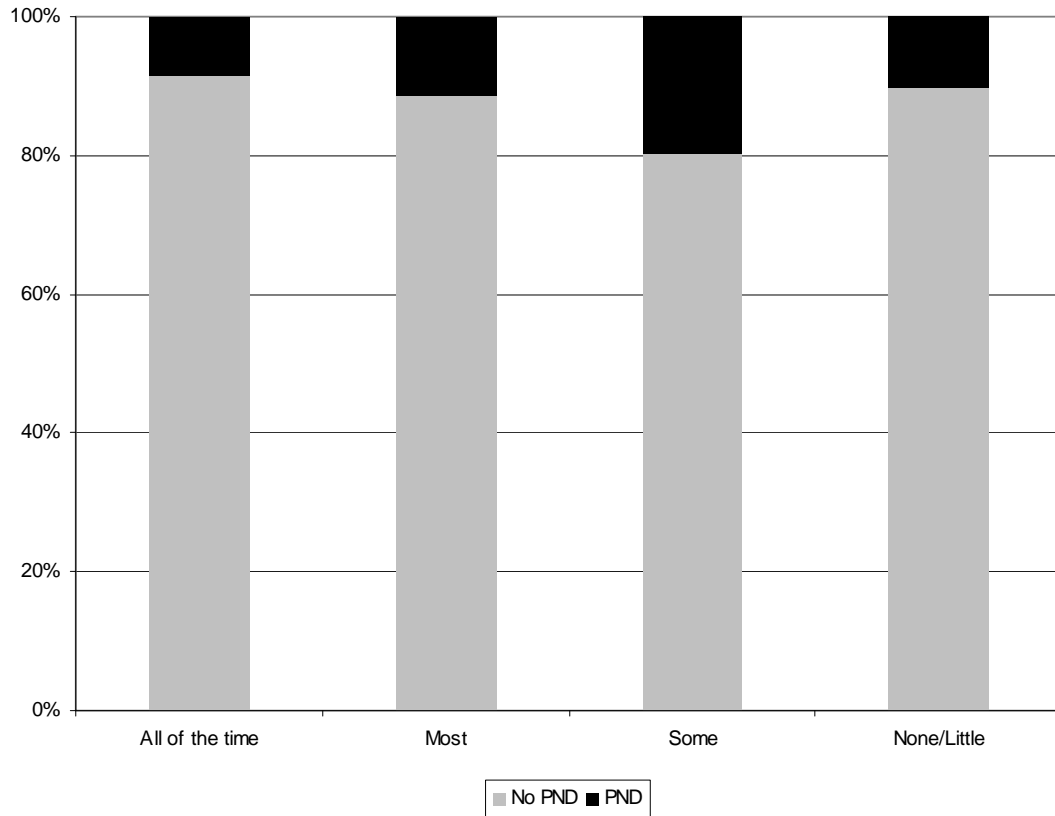
**Figure 7-8 The relationship between emotional/informational support and PND at Survey 4 (2006) among women who gave birth to a child 2002-2006**



**Figure 7-9 The relationship between tangible support and PND at Survey 4 (2006) among women who gave birth to a child 2002-2006**

Figure 7-8 shows responses to the emotional/informational support domain. There were no significant differences between those women who had been diagnosed or treated for PND and those who had not. Figure 7-9 shows the tangible support results. There were no statistically significant results found for the tangible support measure.

Significant differences were found between groups on the affectionate support and positive social interaction factor, as seen in Figure 7-10. In this analysis, relative to women who rated their support available 'all of the time', women who rated their support available 'some of the time' were over twice as likely to report PND. No causal inferences can be made of these results because the reporting of social support is for the same time period as the reporting of PND, however it appears that affectionate support and positive social interactions are important factors in the reporting of PND.



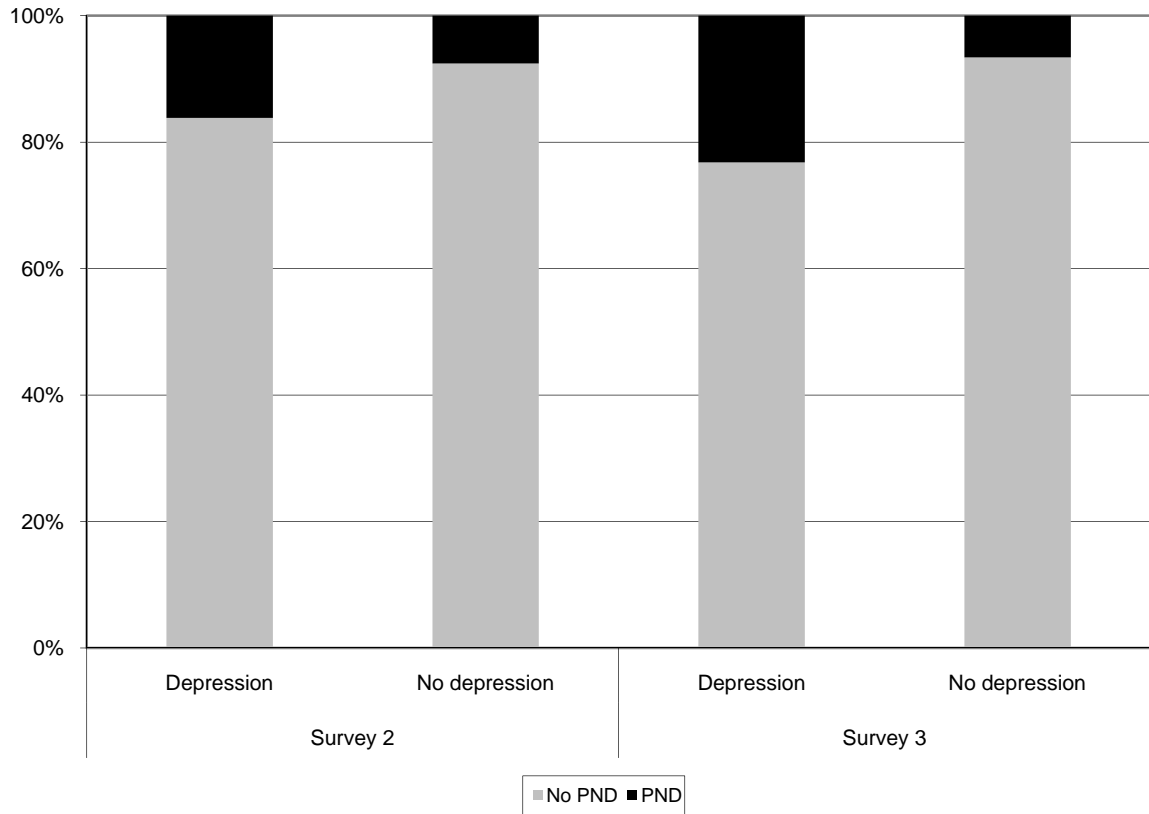
**Figure 7-10 The relationship between affectionate support/positive social interaction and PND at Survey 4 (2006) among women who have given birth to a child 2002-2006**

#### **7.4.8. Participants – first births only**

The above analysis was repeated for women who have had their first and only child in the four years preceding Survey 4 of the 1973-1978 cohort, in order to eliminate the effect of prior births on PND, and to more clearly examine the relationship between PND and previous events. Data included in this section are only for those participants who completed Surveys 1 to 4. Of the women who had ever given birth by Survey 4, 1111 women had their first baby in the four years prior to the survey, and 8.3% of these women reported being diagnosed or treated for postnatal depression. The following results should be considered with caution because at this survey time point (2006) women who have only had one birth differ from women with more than one child on several demographic measures, including education and area of residence.

#### **7.4.9. Previous depression – first births only**

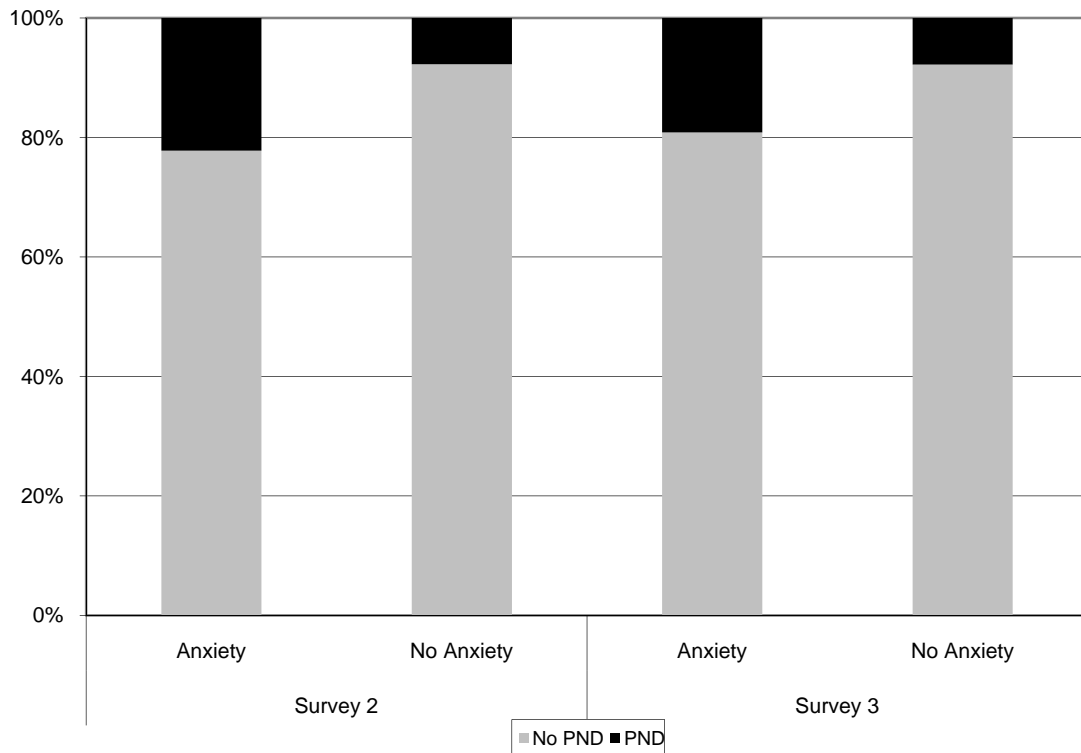
Figure 7-11 shows the percentage of women who had ever been diagnosed or treated for depression at Survey 2 and who had been diagnosed with PND at Survey 4. Those women who experienced depression by Survey 2 were more than two times as likely to experience PND at Survey 4. Similarly, those women who experienced depression by Survey 3 were more than two times as likely to experience PND at Survey 4 compared with other mothers.



**Figure 7-11 The relationship between history of depression at Survey 2 (2000) or 3 (2003) and PND at Survey 4 (2006) among women who have given birth to their first child 2002-2006**

### 7.4.10. Previous anxiety – first births only

Figure 7-12 shows similar results for women who were ever diagnosed or treated for anxiety by Survey 2 or who had been diagnosed or treated for anxiety by Survey 3. Those women who were diagnosed or treated for anxiety by Survey 2 were almost three times as likely to be diagnosed or treated for PND at Survey 4. Women who had been diagnosed or treated for anxiety at Survey 3 were three times as likely to be diagnosed for PND at Survey 4.



**Figure 7-12 The relationship between history of anxiety at Survey 2 (2000) or 3 (2003) and PND at Survey 4 (2006) among women who have gave birth to their first child 2002-2006**

## 7.5. Conclusion

Mothers, particularly those with babies under 12 months of age had higher self-rated physical and mental health than both other mothers and women without children. Women whose youngest child was under 12 months had higher self-rated physical health than other women. While these women rated their health higher than other women, they also reported experiencing several symptoms such as urinary incontinence and severe tiredness. In addition to higher self-rated physical health, these women also had higher self-rated mental health, despite many of these women reporting a diagnosis of PND. Women whose children were all over 12 months of age also reported experiencing more symptoms, and had lower self-rated health than other mothers. This group is frequently overlooked and initiatives targeting maternal health should be widened to include this under-researched and potentially under-served group. In turn, a focus on maternal wellbeing may improve child and infant health and wellbeing as previous evidence has suggested a close connection between maternal and infant health (Murray, 1992; Petterson & Albers, 2001).

The strongest predictor for PND was a history of previous mental health problems, such as depression and anxiety. There was also an association between lack of social support and PND and between the experience of stressful life events and PND, indicating that both previous health and social influences have an impact on the reporting of PND. These findings were also replicated for women who had only one birth in the targeted time period, indicating a prevailing association between previous mental health problems and PND. These findings warrant further investigation utilising the longitudinal data collected by the ALSWH. After data collection for Survey 5 is available in 2010, more detailed explorations of the predictors and antecedents of PND will be possible. Further research into the risk factors for PND will inform intervention strategies that can be put in place to assist in reducing the number of women and families who suffer from this debilitating condition.

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## 8. Motherhood and paid work

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### 8.1. Key findings

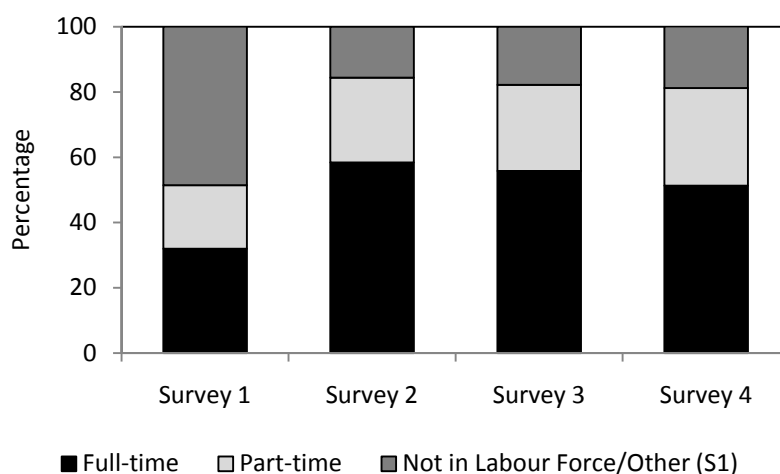
This section explores how women's employment patterns change after their first child and also examines the relationships between maternity leave and mental health, stress and vitality among mothers.

- Across the four surveys, 22.5% of women in the 1973-1978 cohort alternated between full-time paid and part-time paid employment while 63% of women were not in the paid labour force at least once across the four surveys.
- More women who worked full-time prior to their first birth remained in the paid labour force after having their first birth compared with women who worked part-time or who were not in the labour force before their first birth.
- Compared with women with no children, women having a first birth were likely to change from full-time to part-time paid employment or to change from full-time or part-time employment to not being in the labour force.
- For employed 22-33 year old women who had their last child between 2000 and 2006, two thirds of women took paid or unpaid maternity leave.
- More than 70% of women with maternity leave took 12 weeks or more off work.
- Paid maternity leave was more common among women with university qualifications; taking no maternity leave was more common among women who had other children.
- Women with both paid and unpaid leave had the best mental health but this difference disappeared after adjusting for number of general practitioner visits prior to pregnancy, time since birth of the last child and number of other children.
- Women who took less than 6 weeks maternity leave had worse mental health and more stress than women who took 12 or more weeks maternity leave but these differences disappeared after adjusting for number of general practitioner visits prior to pregnancy, time since birth of the last child and number of other children.
- Women who took less than 6 weeks maternity leave had less vitality than women who took 12 or more weeks maternity leave, even after adjusting for number of general practitioner visits prior to pregnancy and time since birth of the last child.

## 8.2. Employment patterns

The purpose of this section is to describe the patterns of employment that occur for women after they have their first child. The employment patterns of the 1973-1978 cohort at Surveys 1, 2, 3 and 4 are described first, followed by results that demonstrate employment changes after the birth of a child.

Figure 8-1 presents the employment patterns for all women who participated in Surveys 1, 2, 3 and 4. At Surveys 2, 3 and 4, the most common employment pattern for women from the 1973-1978 cohort was full-time paid employment, although the proportion engaged in full-time paid employment declined from 58% at Survey 2 to 51% at Survey 4. The percentage of women engaged in part-time paid employment and not engaged in the labour force increased slightly from Survey 2 to Survey 4. At Survey 1, the majority of women were not in the labour force, with 65% of them studying.



**Figure 8-1 Employment patterns of the 1973-1978 cohort for Surveys 1, 2, 3 and 4**

Of women responding to all four surveys, 86% changed their employment status at some time between Survey 1 and Survey 4. Across the four surveys, 23% of young women alternated between full-time paid and part-time paid employment while 63% of women were not in the paid labour force at least once across the four surveys.

Of women responding to all four surveys only 14% reported the same employment status across all four surveys: 11% of women were engaged in full-time paid employment across all four surveys; 1% of women were in part-time paid employment and 2% of women were not in the labour force at all four surveys.

Many of the women who were not in the labour force at Survey 1 were in fact studying, Examination of data from Surveys 2, 3 and 4 reveals somewhat more stability in employment patterns across time. For example, 31% of women who completed Surveys 2, 3 and 4 were engaged in full-time paid-employment at all three surveys; 4% of women were engaged in part-time employment consistently across Surveys 2, 3 and 4, and 2% of women were not in the paid labour force at all three surveys. Nevertheless, many women still experienced changes in employment status: across Surveys 2, 3 and 4, 63% changed their employment status at some point, 32% alternated between full-time paid and part-time paid employment, while 30% were not in the paid labour force at least once across the three surveys.

## 8.2.1. Employment after first birth

One factor that influences changes in employment status is the birth of a child. Working part-time can be a way to balance caring responsibilities while also engaging in paid work, and other studies show that women returning to work after having their first child often return to part-time rather than full-time employment, (Baxter, 2005). Yet working part-time, along with periods of non-employment due to childbearing, can have a negative impact upon a woman's total lifetime earnings and career prospects (Human Resources and Equal Opportunities Commission (HREOC), 2008). This section explores the relationship between employment patterns and birth of the first child.

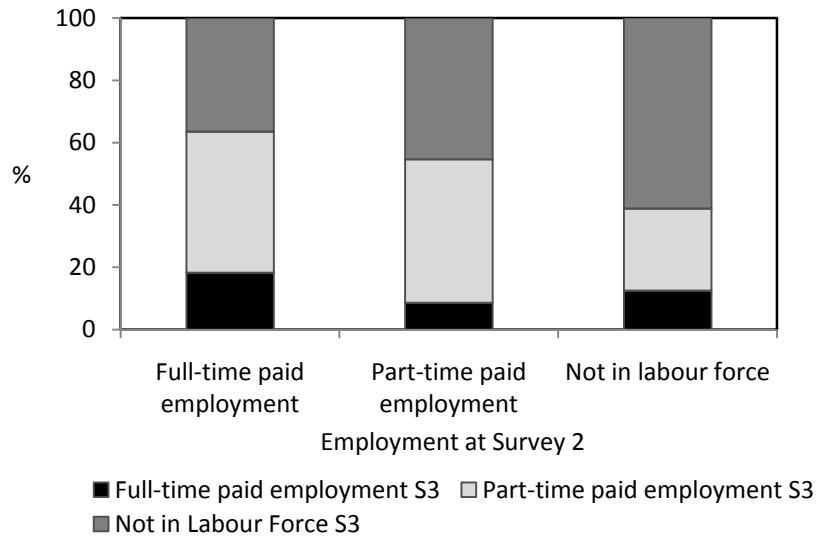
Table 8-1 presents the employment patterns of women who had their first births between Survey 2 and Survey 3, and Survey 3 and Survey 4. While the majority of women worked full-time prior to having their first birth, less than 20% worked full-time after the birth; just less than half worked part-time and the remainder was not in the labour force. These findings were the same at both transition periods and are congruent with other findings that show that of women who work following first birth, more work part-time than full-time (Baxter, 2005).

**Table 8-1 Employment of women having first birth between Survey 2 and Survey 3, and Survey 3 and Survey 4**

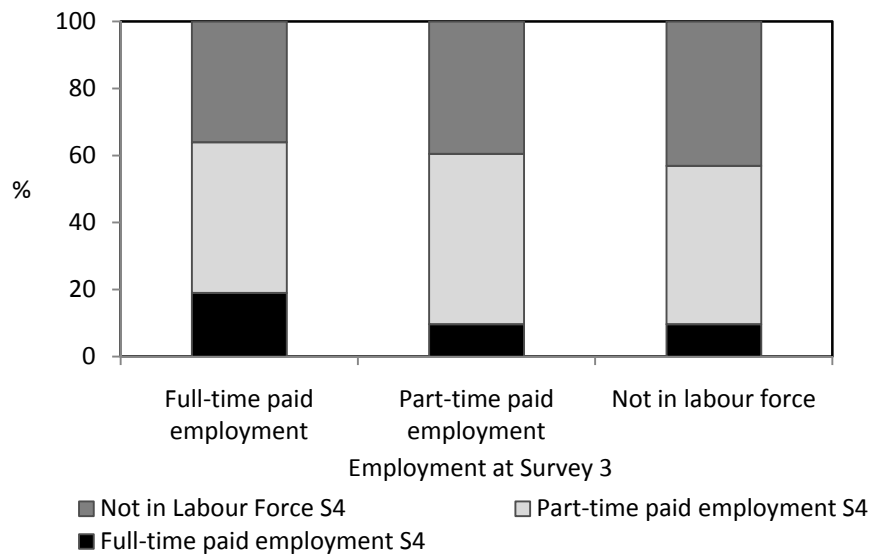
Employment	Survey 2 to Survey 3		Survey 3 to Survey 4	
	Pre-birth	Post-birth	Pre-birth	Post-birth
	%	%	%	%
Full-time	70	16	78	17
Part-time	22	44	17	46
Not in labour force	8	40	5	37

Figure 8-2 and Figure 8-3 present the longitudinal pre- and post-birth employment patterns for women who had their first birth between Surveys 2 and 3, and Surveys 3 and 4, respectively. Compared with women who worked part-time or were not in the labour force prior to having their first birth, women who worked full-time prior to having their first birth appeared slightly more likely to work full-time after having their first birth. More women who worked full-time prior to their first birth remained in the paid labour force after having their first birth compared with women who worked part-time or who were not in the labour force before their first birth.

For women working in part-time paid employment before having their first birth, and for women not in the paid labour force, the majority returned to part-time paid employment or were not in the labour force after having first birth. Women not in the paid labour force before having their first birth were the most likely to be out of the paid labour force after their first birth.



**Figure 8-2 Pre-birth and post-birth employment status between Survey 2 and Survey 3, of women who had had their first birth between surveys**



**Figure 8-3 Pre-birth and post-birth employment status between Survey 3 and Survey 4, of women who had had their first birth between surveys**

## 8.2.2. Employment status transitions and motherhood

To further examine changes in employment status, participant responses were grouped according to their employment transitions. Changes in employment status were categorised between Surveys 2 and 3, and between Surveys 3 and 4 as:

- no change in employment status
- employment changed from full-time paid to part-time paid employment
- employment changed from part-time paid to full-time paid employment
- employment status changed from being in the paid labour force (full-time or part-time) to not being in the labour force
- all other changes.

Table 8-2 presents the changes in employment of the 1973-1978 cohort from Survey 2 to Survey 3 and from Survey 3 to Survey 4. There is some variation in employment; with just over 40% of women changing their employment between Survey 2 to Survey 3, and between Survey 3 to Survey 4.

**Table 8-2 Employment status of the 1973-1978 cohort between Survey 2 and Survey 3 and Survey 3 to Survey 4**

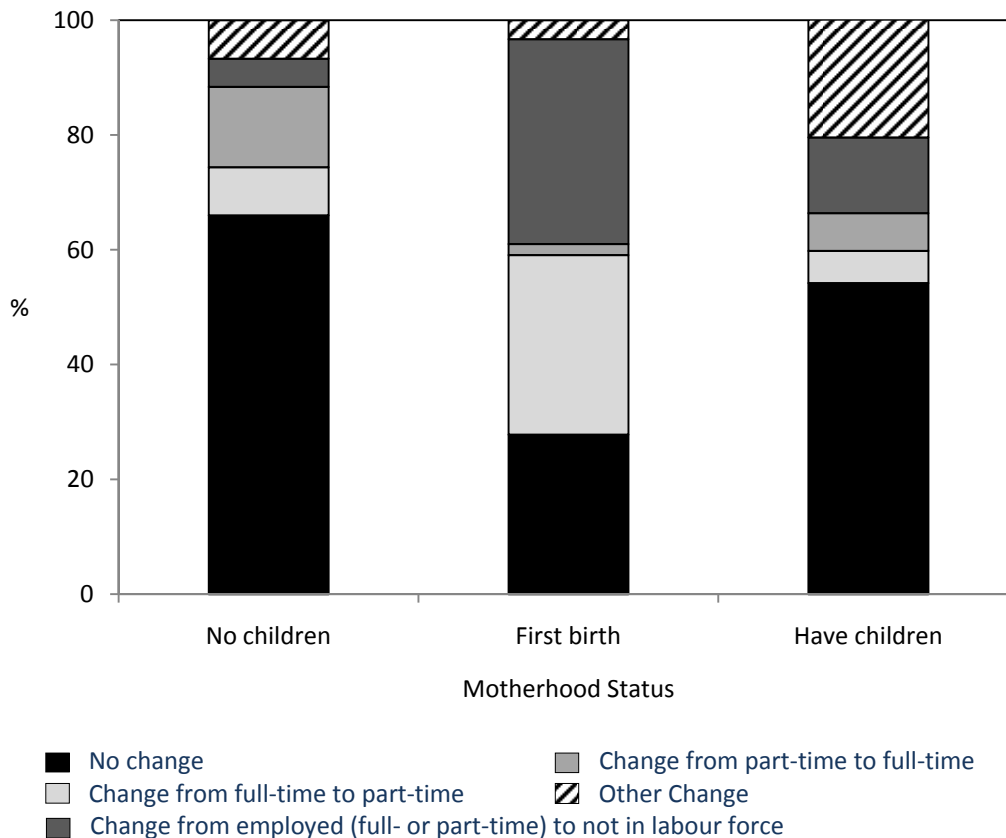
Employment across surveys	Survey 2 to Survey 3	Survey 3 to Survey 4
	(n = 7505) %	(n = 7584) %
No Change		
Consistently full-time	44	40
Consistently part-time	10	11
Consistently not in labour force	6	7
Full-time to part-time	11	12
Part-time to full-time	11	10
Employed to not in labour force		
Full-time to not in labour force	6	7
Part-time to not in labour force	4	4
Not in labour force to employed		
Not in labour force to full-time	4	3
Not in labour force to part-time	4	6

Women's motherhood status was also assessed longitudinally across two time periods: from Survey 2 to Survey 3, and from Survey 3 to Survey 4. Women were categorised into one of three groups: having first birth between surveys, already having children prior to the first survey, and not having any children at all (Table 8-3).

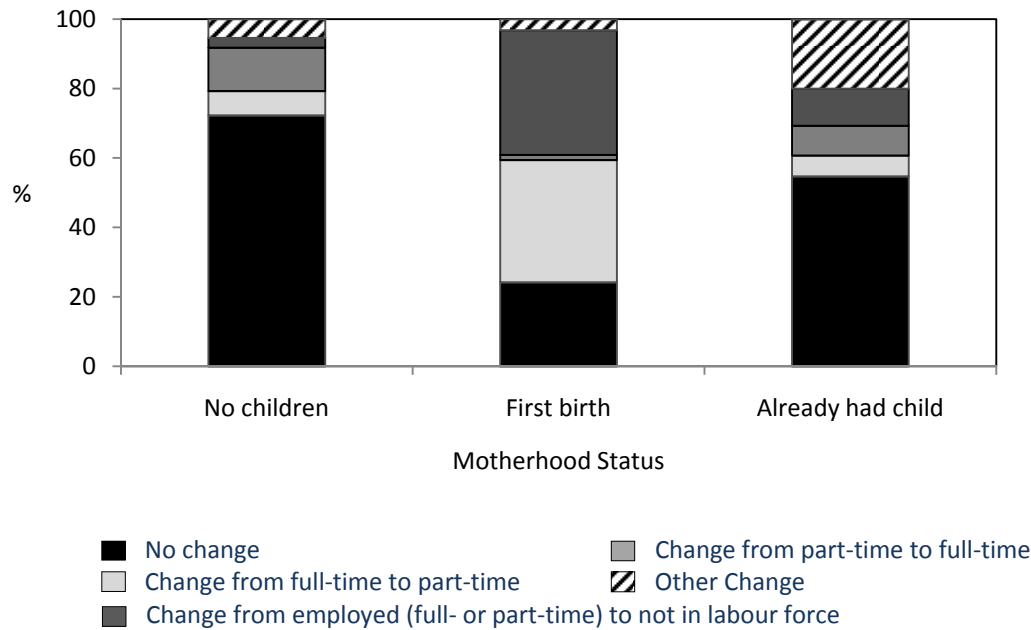
**Table 8-3 Motherhood status of 1973-1978 cohort from Survey 2 to Survey 3, and Survey 3 to Survey 4**

Births across surveys	Survey 2 to Survey 3	Survey 3 to Survey 4
	%	%
No births	72	53
First birth	13	19
Already had children	15	28

Figure 8-4 shows the associations between employment transitions and motherhood status from Survey 2 to 3, and Figure 8-5 shows employment transitions by motherhood status from Survey 3 to 4. Having a first birth was associated with the largest change in employment status. Compared with women with no children, women having a first birth were likely to change from full-time to part-time paid employment or to change from full-time or part-time employment to not being in the labour force. Women who already had children at the earlier survey were also likely to change from not being in the paid labour force to being in the labour force.



**Figure 8-4 Employment according to motherhood status from Survey 2 to Survey 3**



**Figure 8-5 Employment according to motherhood status from Survey 3 to Survey 4**

Earlier work with ALSWH data revealed that sole mothers taking part in the first two surveys of the 1973-1978 cohort had different employment patterns than partnered mothers (Loxton, 2005). In particular, sole mothers were more likely to be undertaking part time or casual paid work than partnered mothers. To re-examine the issue of sole motherhood and paid work, the life events scale (Norbeck, 1984) was used to identify those women who became a sole parent from Survey 2 to 3, or from Survey 3 to 4. Responses were categorized across surveys as:

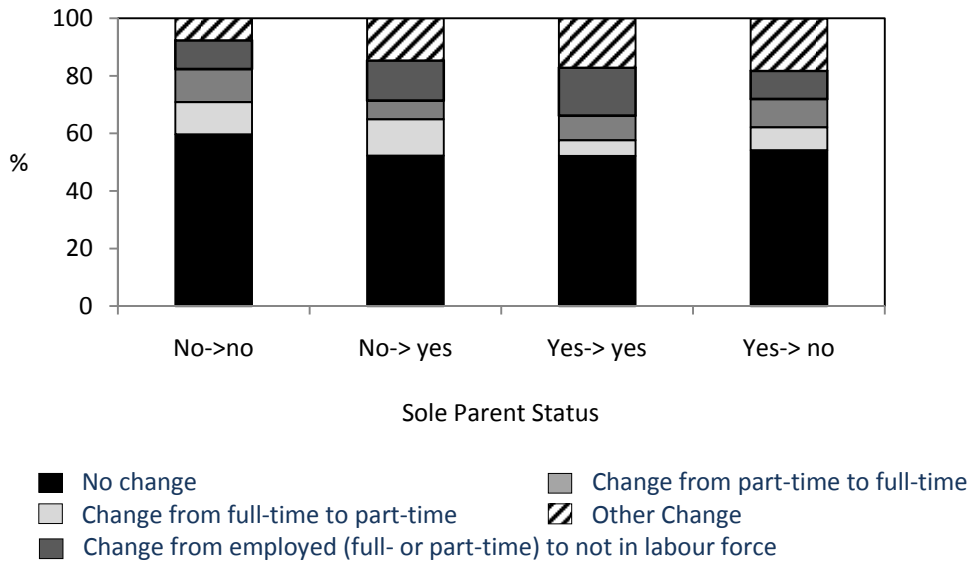
- not becoming a sole parent at either survey
- becoming a sole parent in the latter survey
- sole parent at the earlier survey but not at the latter survey
- remaining a sole parent at both surveys (see Table 8-4).

Figure 8-6 and Figure 8-7 show employment transitions by sole motherhood transitions. The most common experience for all groups of women was no change in their employment status. From Survey 2 to 3, women who became sole parents were more likely to move from full time to part time paid work, compared with all other groups. However, from Survey 3 to 4, women who became sole parents were less likely than those who were not sole parents at Survey 4 to have moved from full time to part time paid work. This change possibly reflects the ages of the children involved, and warrants further research. Results for transitions from Survey 3 to 4 also suggest that transitioning out of the paid workforce is more likely for women who become sole mothers than all other groups.

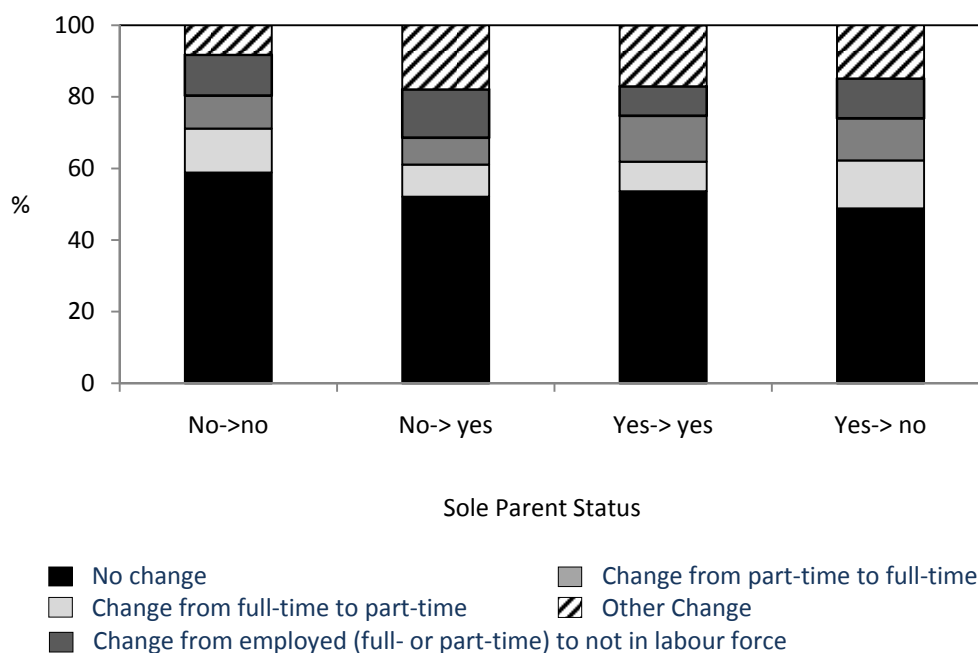


**Table 8-4 Percentages of women according to life transitions of sole parent status and education between Survey 2 and Survey 3, and Survey 3 and Survey 4**

	Survey 2 to Survey 3 %	Survey 3 to Survey 4 %
<b>Sole parent status</b>		
No->no	94	92
No-> yes	3	3
Yes-> yes	3	4
Yes-> no	1	2



**Figure 8-6 Employment according to sole parent status from Survey 2 to Survey 3**



**Figure 8-7 Employment according to sole parent status from Survey 3 to Survey 4**

### 8.3. Maternity leave and health

Although paid parental leave was introduced in the Australian Public Service in 1973, it did not become widespread until recently. There is still no set period of paid parental leave in Australia. Entitlements to unpaid parental leave were included in the Workplace Relations Act 1996 and in state-based industrial relations systems. Varying restrictions apply including how long the person has been with their employer and whether they are employed permanently or casually so not all employees are entitled to paid or unpaid parental leave. (Australian Government Productivity Commission, 2008).

The aim of this section is to investigate the possible impact of paid and unpaid maternity leave on the subsequent mental health, vitality and levels of stress experienced by the mother. In addition, time off work after the birth of the last child will be examined.

Questions on maternity leave were only asked of the 1973-1978 cohort at Survey 4 in 2006. The following analyses are restricted to women who have had their last child between 2000 and 2006, were employed and stated whether they did or did not take paid or unpaid maternity leave (n=1402).

Table 8-5 shows the distribution of paid and unpaid maternity leave for women who were employed at the time of birth of their last child. The findings were that:

- a third took paid maternity leave
- almost 60% took unpaid maternity leave
- less than 10% took only paid maternity leave
- a third took only unpaid maternity leave
- a third took no paid or unpaid maternity leave.

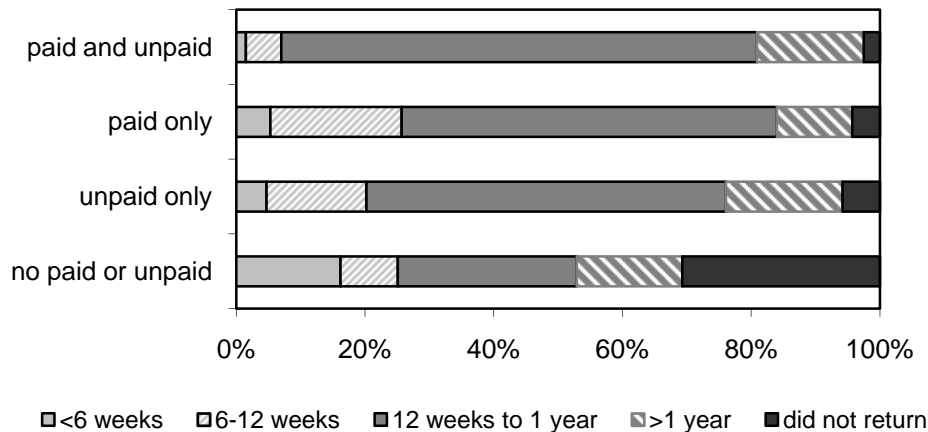
**Table 8-5 Paid and unpaid maternity leave at the time of birth of the last child**

Maternity Leave	N	%
Took paid and unpaid maternity leave	337	27
Took paid leave only	109	8
Took unpaid leave only	463	33
Did not take paid or unpaid leave	493	33
Total	1402	

*Percentages adjusted for over-sampling in rural and remote areas*

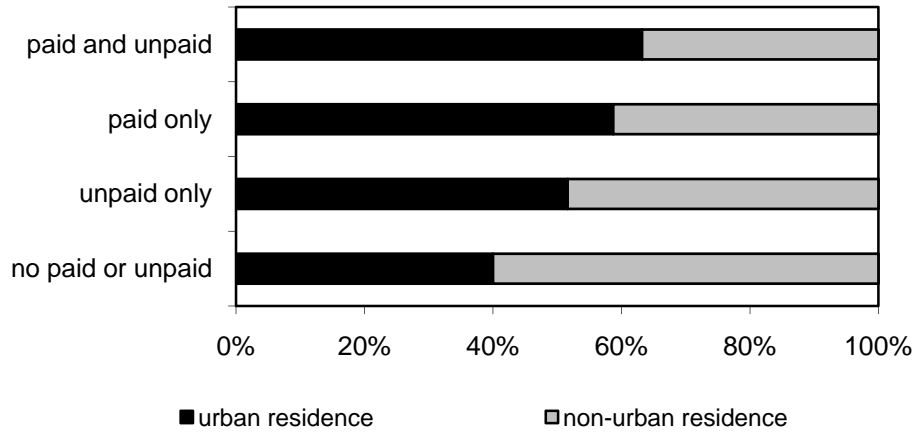
Figure 8-8 shows type of maternity leave by time after the birth of the last child that the mother returned to work. The results were that:

- over 90% of women with paid and unpaid leave took 12 weeks to more than a year off work
- 70% of women with either paid leave only or unpaid leave only took 12 weeks to more than a year off work
- 44% of women without paid or unpaid leave took 12 weeks to more than a year off work.

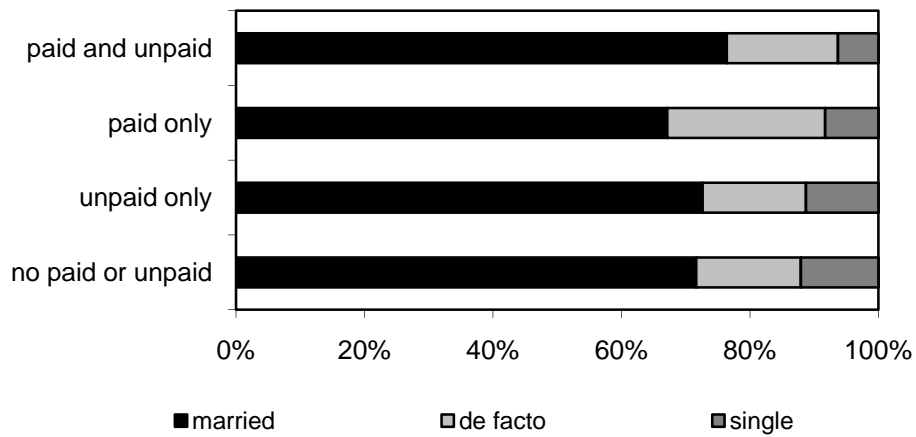


**Figure 8-8 Type of maternity leave by length of maternity leave after birth of last child**

The following figures show type of maternity leave by demographic and health factors for women aged 22 to 32 years at the birth of the last child. Women who had paid and unpaid leave were more likely to live in urban areas (Figure 8-9). The association between type of maternity leave and marital status was not statistically significant (Figure 8-10).

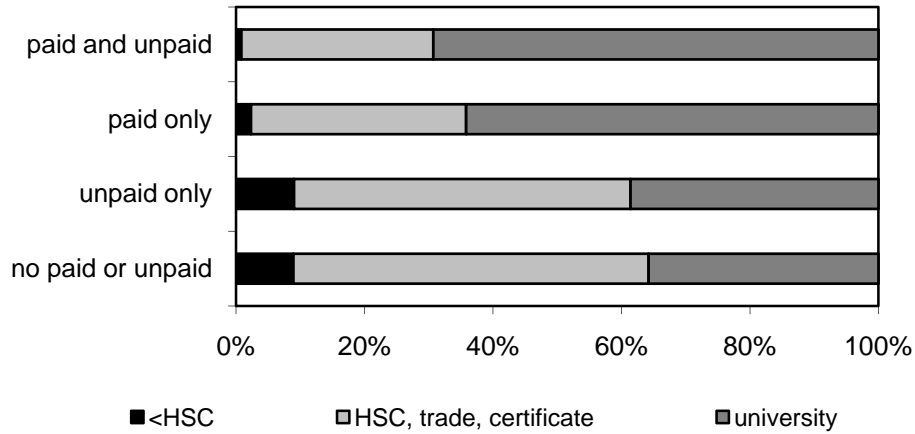


**Figure 8-9 Type of maternity leave by area of residence**

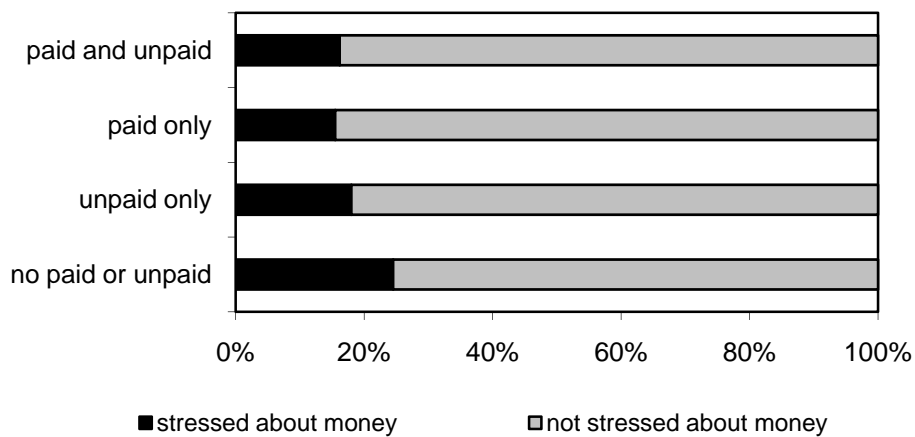


**Figure 8-10 Type of maternity leave by marital status**

Women who had paid and unpaid maternity leave were more likely to have university qualifications (Figure 8-11), and women who had no maternity leave were more likely to be stressed about money (Figure 8-12).

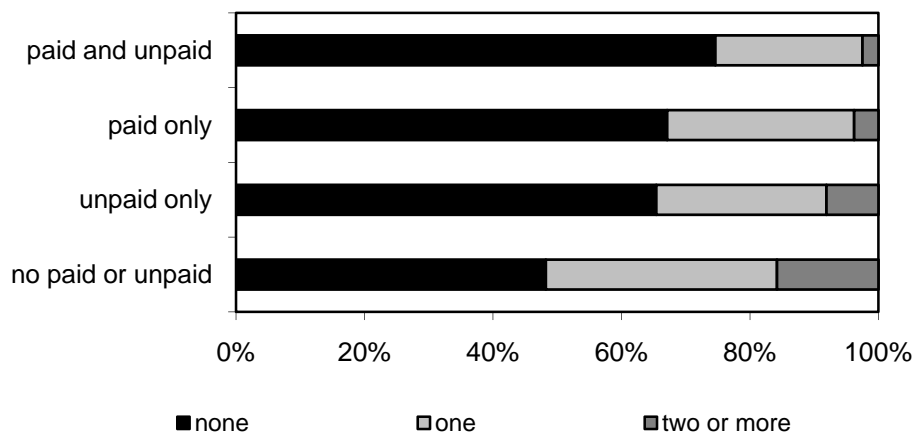


**Figure 8-11 Type of maternity leave by highest educational qualifications achieved**

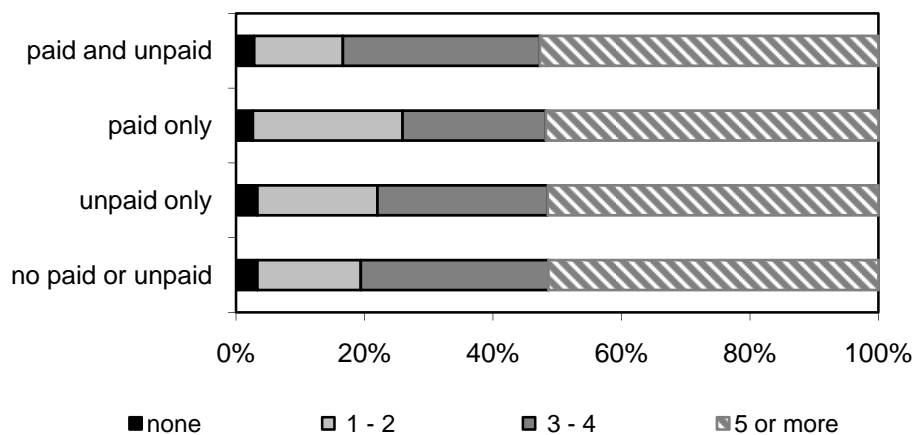


**Figure 8-12 Type of maternity leave by stress about money**

Women who were having their first child were more likely to have paid and unpaid maternity leave (Figure 8-13). Women who had no maternity leave were more likely to have other children. There was no association between number of general practitioner visits before the birth of the last child and type of maternity leave (Figure 8-14). There was no association between general practitioner visits after the birth of the last child and type of maternity leave.



**Figure 8-13 Type of maternity leave by number of other children**



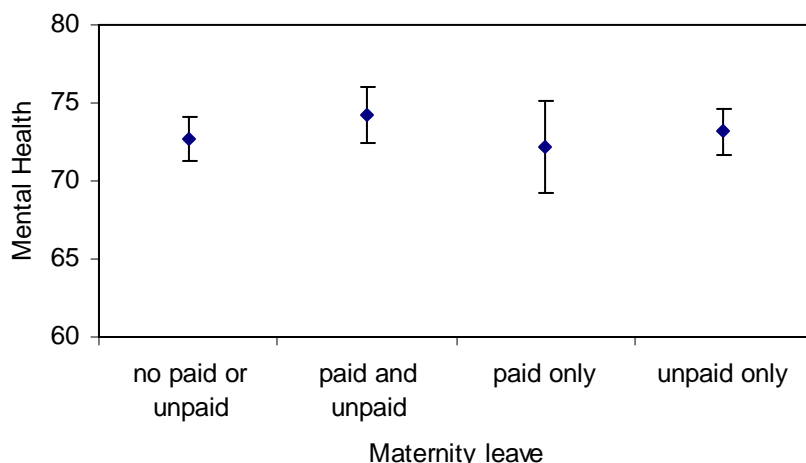
**Figure 8-14 Type of maternity leave by general practitioner visits.**

**Table 8-6 Mental health, vitality and stress levels after the birth of the last child by paid and unpaid maternity leave**

<b>Maternity leave</b>	<b>N</b>	<b>Mental health</b>	<b>Vitality</b>	<b>Stress score</b>
<b>Type of leave</b>				
Paid and unpaid	337	74.8 (73.1;76.6)	53.2 (51.1;55.3)	0.78 (0.73;0.83)
Paid only	109	72.6 (69.5;75.6)	49.3 (45.6;53.0)	0.87 (0.78;0.96)
Unpaid only	463	73.4 (72.0;74.9)	51.3 (49.5;53.1)	0.79 (0.75;0.84)
No paid or unpaid	493	72.3 (70.9;73.8)	50.9 (49.2;52.7)	0.84 (0.80;0.89)
<b>Return to work</b>				
Less than 6 weeks	121	70.7 (67.8;73.5)	48.2 (44.6;51.6)	0.91 (0.83;1.00)
6-12 weeks	163	71.9 (69.4;74.4)	48.9 (45.9;51.9)	0.87 (0.79;0.94)
12 weeks to a year	700	74.4 (73.2;75.6)	52.8 (51.4;54.3)	0.80 (0.76;0.83)
More than a year	228	72.1 (70.0;74.2)	51.1 (48.6;53.7)	0.82 (0.75;0.88)
Did not go back to paid work	190	73.7 (71.4;76.0)	51.2 (48.4;54.0)	0.76 (0.69;0.83)

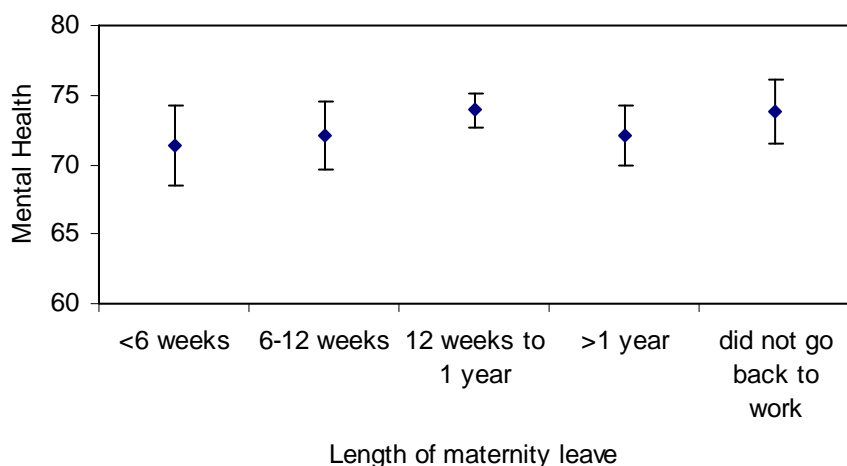
The generalised linear model procedure in SAS 9.1 was used to model the mental health, vitality and stress scores for women after the birth of their last child. The last child was born less than a year ago for 29% of women, one to two years ago for 42% of women and three years ago for 29% of women. Table 8-6 shows the least square means for mental health, vitality and stress scores by paid and unpaid maternity leave and by time after the birth of the last child that the mother returned to work. Higher scores are indicative of better mental health and vitality. On the other hand higher stress scores indicate more stress. The findings are that women with both paid and unpaid leave have the best mental health. Although these women also have better scores for vitality and stress, the differences were not statistically significant. Compared with women who took 12 weeks to one year to return to work, women who took less than 6 weeks had worse mental health, less vitality and more stress.

The mental health of women who had both paid and unpaid leave was significantly better than those who had no paid or unpaid leave. Socio-demographic variables (excluding stress about money) did not have a significant association with mental health. After controlling for time since birth of the last child and number of GP visits prior to pregnancy, women who had both paid and unpaid leave had significantly better mental health than women who did not. But once number of children was added to the model, there was no longer a significant difference in the mental health of women who had paid and unpaid maternity leave compared with those who did not (Figure 8-15).



**Figure 8-15 Mental health score for women with and without paid and unpaid maternity leave adjusted for year since the birth of their last child, number of GP visits prior to that birth and number of children**

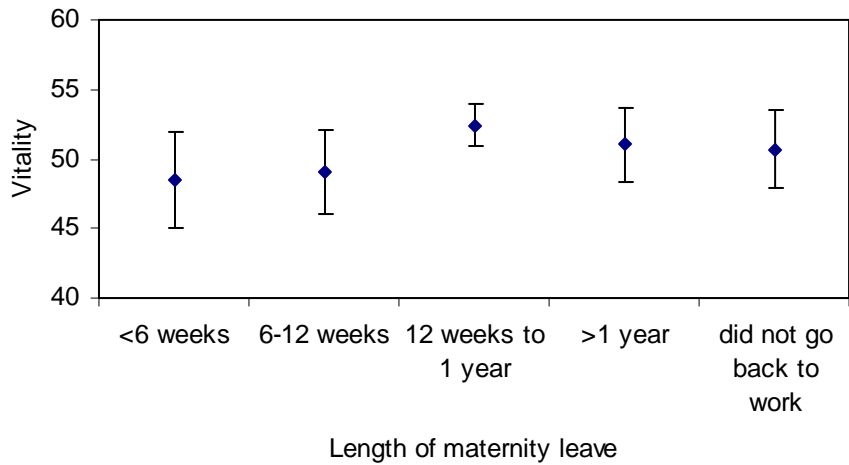
A similar pattern was seen with time off work. Women who had less than 6 weeks off work had significantly poorer mental health than women who had 12 weeks to a year off work. This effect remained after time since birth of the last child and number of GP visits was added to the model but disappeared when number of other children was included in the model (Figure 8-16).



**Figure 8-16 Mental health of women by length of maternity leave adjusted for time since birth of the last child, number of GP visits and number of children**

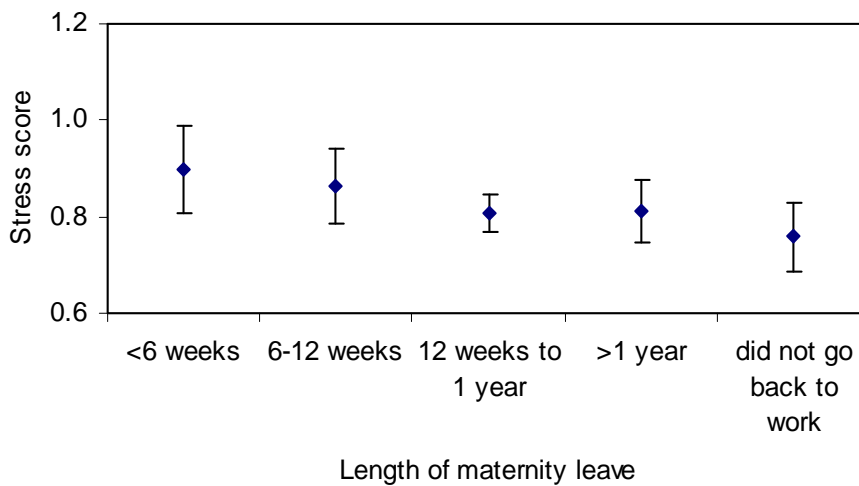
There was no difference in vitality for women who did or did not have paid or unpaid maternity leave. However women who had less than 12 weeks off work had significantly less vitality than those who had 12 weeks to one year off work. This effect remained in the final model that controlled for time since last child and GP visits (Figure 8-17). Socio-demographic variables and number of other children were not statistically significant.





**Figure 8-17 Vitality of women by length of maternity leave adjusted for time since birth of the last child and number of GP visits**

There was no difference in levels of stress among women who had paid and unpaid maternity leave and women who had no paid or unpaid maternity leave. Women who had less than 6 weeks off work had higher stress scores than those who had 12 weeks to one year off work. These effects remained when days since birth of the last child and GP visits were included in the model, but were no longer significant when number of other children was included (Figure 8-18).



**Figure 8-18 Stress score of women by length of maternity leave adjusted for time since birth of the last child, number of GP visits and number of children**

## 8.4. Discussion

The findings show that for women from the 1973-1978 cohort, having children corresponds to changes in employment, in keeping with past research (HREOC, 2008; Tomlinson, 2005). Having a first birth was associated with changes from full-time to part-time paid employment, and other employment changes. Successfully balancing paid work with family responsibilities remains a major challenge for a large number of Australians (HREOC, 2008), and part-time employment remains an alternative for women managing both paid work and family.

Two thirds of employed 22-33 year old women who had their last child between 2000 and 2006, took paid or unpaid maternity leave, and more than 70% of women with maternity leave took 12 weeks or more off work. Paid maternity leave was more common among women with university qualifications and less common among women who already had other children. Women with both paid and unpaid leave had the best mental health, but this difference disappeared after adjusting for number of general practitioner visits prior to pregnancy, time since birth of the last child and number of other children. Women who took less than 6 weeks maternity leave had worse mental health and more stress than women who took 12 or more weeks maternity leave, but these differences disappeared after adjusting for number of general practitioner visits prior to pregnancy, time since birth of the last child and number of other children. Women who took less than 6 weeks maternity leave had less vitality than women who took 12 or more weeks maternity leave, even after adjusting for number of general practitioner visits prior to pregnancy and time since birth of the last child.

A substudy of the 1973-1978 cohort could examine the reasons that women change their employment, the extent to which this is due to difficulty managing work and family, and what would support them in this situation. This would help to understand the needs of women to develop best practice work-family policies. These findings also underscore the need to conduct future research with younger cohorts of women. Further policy changes are being considered, such as a government-funded paid parental leave scheme which could have significant benefits for both men and women managing work and family. However, the effectiveness of this, as well as effectiveness of schemes such as the Baby Bonus, for future generations can only be assessed if we continue to conduct research about issues affecting younger generations. A study of a new cohort of young women would provide an ideal opportunity to do this.

## 8.5. References

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Tomlinson, J. (2006). Women's work-life balance trajectories in the UK: Reformulating choice and constraint in transitions through part-time work across the life-course. *British Journal of Guidance & Counselling*, 34, 365-382.

# Appendices

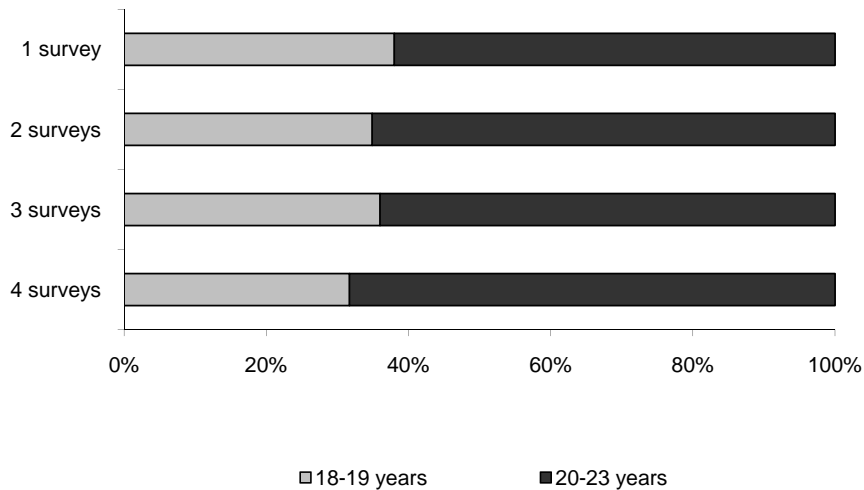
## Appendix A: ALSWH design, attrition and retention

Women in the 1973-1978 cohort were aged 18-23 when first surveyed in 1996. Over 14 000 of these women responded to the first survey and over 9000 of these women have responded to each of the subsequent surveys to date (Table A-1). The retention of women in this highly mobile age group compares well with retention obtained in other studies.

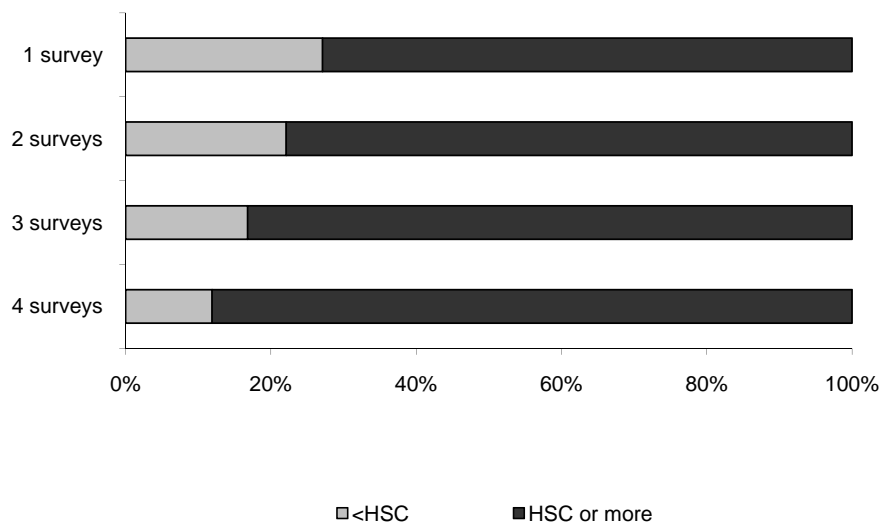
**Table A-1 Participation and retention of 1973-1978 cohort of women**

	Survey 1	Survey 2	Survey 3	Survey 4
Age in years	18-23	22-27	25-30	28-33
Eligible at previous survey		14 247	14 116	13 886
Ineligible				
deceased between surveys		22	10	15
frailty (e.g. intellectual disability)		3	6	4
withdrawn before mailout survey date		106	213	311
Total ineligible		131	229	330
Eligible at current survey		14 116	13 887	13 557
Non-respondents				
withdrawn from the project		124	200	171
contacted but did not return survey		1332	654	1372
unable to contact participant		2972	3952	2869
Total non-respondents		4428	4806	4412
Respondents				
completed survey	14 247	9688	9081	9145
Retention rate as % eligible		69%	65%	68%

For the purpose of investigating changes in behaviour over time it may be useful to only examine data from those women who answered all four surveys. However this may lead to some biases in the results due to potential differences between consistent and inconsistent responders. One method that can be used to assess bias is to compare the characteristics of the women at the first survey. The following figures show Survey 1 characteristics of women who were respondents to one (n=2691), two (n=2038), three (n=2678) or four (n=6840) surveys. Women who completed all surveys tended to be older and have more educational qualifications than women who completed only one survey (Figures A-1 and A-2).

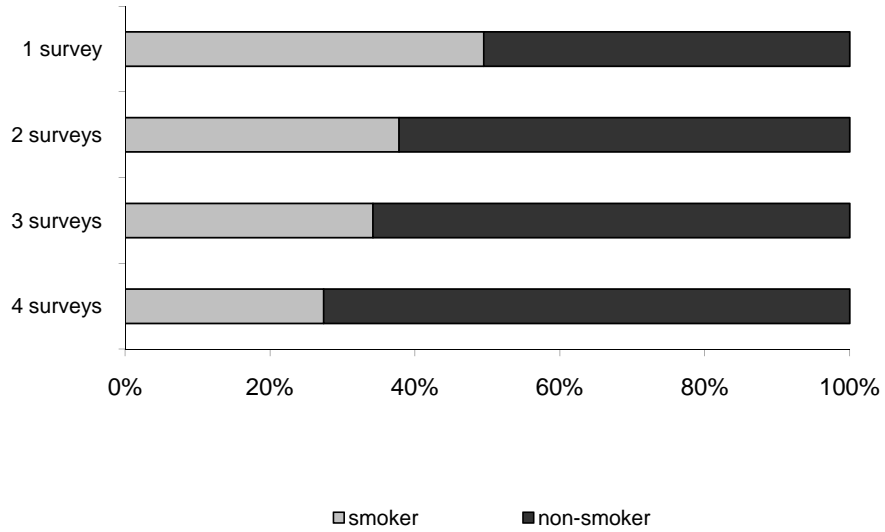


**Figure A-1 Age of women at Survey 1 by number of surveys completed**

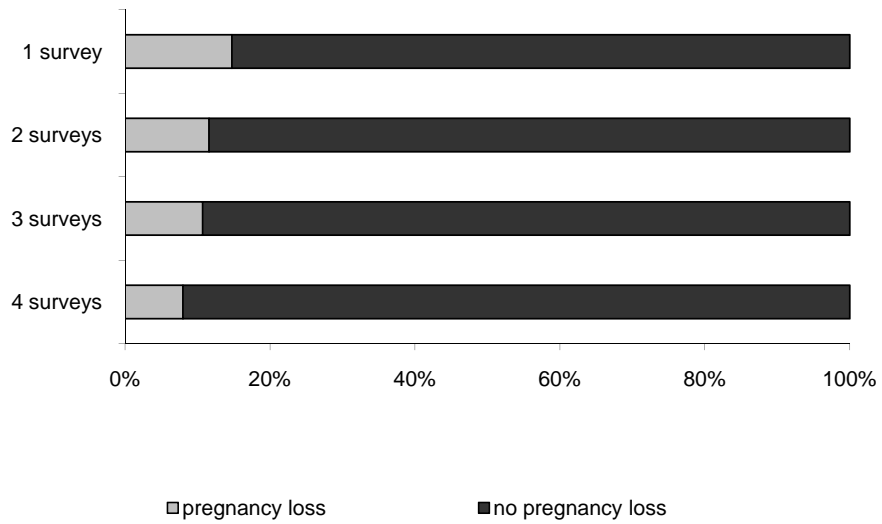


**Figure A-2 Highest educational qualification achieved at Survey 1 by number of surveys completed**

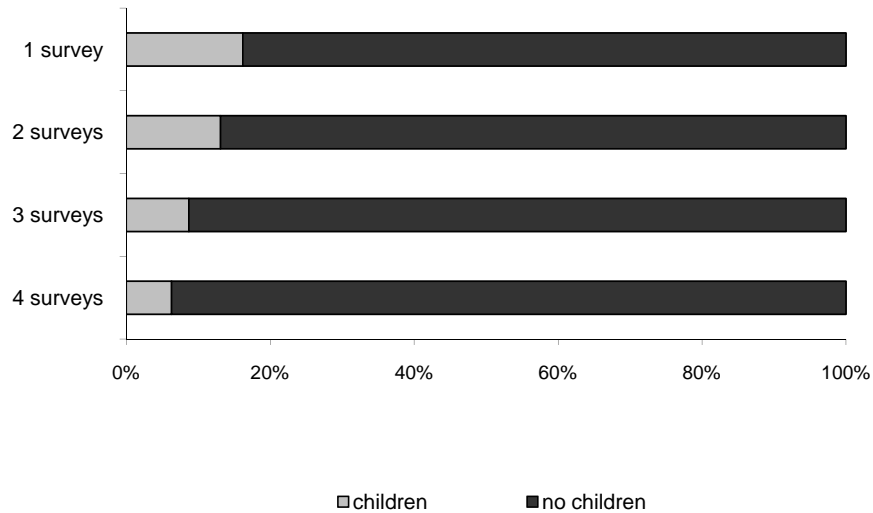
Women who completed all surveys were less likely to be smokers, less likely to have had a pregnancy loss, and less likely to have had children than women who completed only one survey (Figures A-3, A-4 and A-5).



**Figure A-3 Smoking status at Survey 1 by number of surveys completed**



**Figure A-4 Pregnancy loss at Survey 1 by number of surveys completed**




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**Figure A-5 Children at Survey 1 by number of surveys completed**

In summary, the prevalence of smoking, pregnancy loss and number of children is likely to be underestimated. However the relationship between variables is likely to be preserved. This is consistent with the conclusions from an analysis of attrition in the Michigan Panel Study of Income Dynamics by Fitzgerald, Gottschalk et al. 1998.

## References

Fitzgerald, J., Gottschalk, P. & Moffitt, R. (1998). An analysis of sample attrition in panel data: The Michigan Panel study of income dynamics, *Journal of Human Resources*, 33, 251-299.

## Appendix B: Supplementary information for Section 3 - Use of contraception

### Measurement of contraception in ALSWH surveys

#### *Questions about contraception*

Women in the 1973-1978 cohort were asked about their use of contraception in each of the four surveys. The questions vary between surveys, with the response options for methods of contraception and reasons for non-use becoming more extensive over time. The questions were similar between Surveys 1 and 2, and between Surveys 3 and 4. Women were also asked whether they were currently pregnant at the time of each survey. This question has been worded the same way in each survey; however, the response options at Survey 4 allowed pregnant women to indicate the stage of their pregnancy: 'Less than 3 months'; '3 to 6 months'; 'More than 6 months'. In all surveys the question has 'no' and 'don't know' response options. Tables B-1 and B-2 summarise the response options for the questions relating to pregnancy and contraception and their comparability across surveys.

**Table B-1 Response options relating to pregnancy and reasons for non-use of contraception**

Survey 1	Survey 2	Survey 3	Survey 4
Currently pregnant*	Currently pregnant*	Currently pregnant*	Currently pregnant*
		I am pregnant now/recently had a baby	I am pregnant now/recently had a baby
Don't need to use any (eg pregnant or no sex)	I don't need to use any contraception (e.g. pregnant or no sex)	I have no male sexual partners now	I have no male sexual partners now
Choose not to use any (eg want to be pregnant)	I choose not to use any contraception (e.g. want to be pregnant)	I am trying to become pregnant	I am trying to become pregnant
		I have had a tubal ligation or hysterectomy	I have had a tubal ligation
		My partner has had a vasectomy	I have had a hysterectomy
		I have found out that I cannot have children	My partner has had a vasectomy
		I have found out that my partner cannot have children	I have found out that I cannot have children
		Other	I have found out that my partner cannot have children

\* Current pregnancy is measured with a separate question at all surveys



**Table B-2 Response options relating to methods of contraception**

Survey 1	Survey 2	Survey 3	Survey 4
Oral contraceptive pill	I use the oral contraceptive pill for contraception	I use the oral contraceptive pill	I use the oral contraceptive pill
Using the oral contraceptive pill for reasons other than contraception	I use the oral contraceptive pill for other reasons	Using the oral contraceptive pill for reasons other than contraception	
Condoms	I use condoms for contraception	I use condoms	I use condoms
Using condoms for STD/HIV prevention	I use condoms (or other barrier methods) for prevention of infection	Using condoms (or other barrier methods) for prevention of infection	
		I use an implant*	I use an implant*
		I use emergency contraception**	I use emergency contraception**
			I use the withdrawal method
Other	Other	I use another method of contraception	I use another method of contraception

\* Implants were made available in Australia in 2001

\*\* Emergency contraception was not included as a method of contraception in analyses

In Survey 1, women were asked two questions about contraception use. In the first, women could only select one response from 'don't need to use any (e.g. pregnant or no sex)'; 'choose not to use any (e.g. want to be pregnant)'; 'oral contraceptive pill'; 'condoms'; 'other'. A separate question asked women about use of the oral contraceptive pill for 'reasons other than contraception', and condoms for 'STD/HIV prevention'. Women could answer 'yes' to both of these. In contrast to Survey 1, Survey 2 included only one question with all the options listed in Tables B-1 and B-2 (except whether they were currently pregnant) with women directed to select as many response as applied to them.

In Survey 3 women were asked to indicate which form(s) of contraception they were currently using. Women who indicated that they did not use contraception were asked to indicate the best reason for non-use from a list of options. They were asked: 'Which of these best describes why you are not using contraception now' with women being asked to mark one response from the list of options described in Table B-1 (starting from 'I am pregnant now/have recently had a baby'). As in the first two surveys, Survey 3 also included a question about other reasons for using the contraceptive pill and use of barrier methods for the prevention of infection. The question wording differs slightly, but the responses are comparable with Surveys 1 and 2.

In Survey 4 women were also asked about forms of contraception used now, and all women (not just non-users as in Survey 3) were asked about a range of situations that may explain their non-use. All women, regardless of whether they used contraception were asked to answer this question, and unlike the question in Survey 3, they were able to select multiple responses.

## Classification of contraception use

Categories of contraception use were defined using the questions about contraception in combination with the question about whether the woman was currently pregnant at the time of the survey. Women were classified as either a user or a non-user of contraception at each survey. Women may have been defined as non-users because they were currently pregnant, trying to conceive, or for some other reason (for example, having no male sexual partners or being unable to conceive).

Five categories of contraception users were defined based on methods of use: contraceptive pill only, condoms only, pill and condoms, other method/s, implant only (Table B-3). The category 'implant only' is only defined for the latter two surveys, as implants (in particular Implanon), were only approved for use in Australia in 2001, between Surveys 2 and 3 of the 1973-78 cohort. It is important to note that the 'other method/s' category includes both women using another single method and those using a combination of methods. This includes methods of varying effectiveness being used on their own or in combination. These decisions about the exclusive categories were made in line with the way the questions were asked at each survey and also reflect the frequency of responses, as will be described later in this section. In deriving these categories, emergency contraception was not considered as a method of contraception.

**Table B-3 Definitions of categories of contraception use**

	Survey 1	Survey 2	Survey 3	Survey 4
<b>Non-users</b>				
Pregnant	Answers yes to being pregnant			
Trying to conceive	Answers yes to choose not to use contraception		Answers yes to trying to become pregnant	
Other non-user	All other non-users of contraception			
<b>Users</b>				
Oral contraceptive pill only	Answers yes to using the pill for contraception and/or other reasons			Only answers yes to pill
Condoms only	Answers yes to using condoms for contraception or infection prevention			Only answers yes to condoms
Oral contraceptive pill and condoms	Answers yes to pill and condoms for any reasons			Answers yes to pill and condoms
Implant only	N/A		Only answers yes to implant	
Other combination	All other combinations			

These categories rely on some assumptions in order to make them as comparable as possible across surveys. The main assumptions were: a) that a woman who reported that she was currently pregnant at the time of the survey was automatically classified as a non-user; b) that only women who did not indicate they were using contraception could be defined as 'trying to conceive' or 'other non-user'; and c) that unless there was complete missing data on the relevant questions, missing values were assumed to be 'no' responses. The reason for the second assumption arises because of the format of the Survey 3 questions, where only women who indicate that they do not use contraception answer the question about reasons for non-use. Some of the options may also apply to contraception users (e.g. 'I have no male sexual partners now'). Thus, there may be women in both the non-user and user categories who, for example, may not have any male sexual partners.

Another important note relates to the question about the use of the oral contraceptive pill for reasons other than contraception, and the use of barrier methods for STI prevention. This question appeared in the first three surveys, but not in Survey 4. Women who indicated at the first three surveys that they were using the oral contraceptive pill for reasons other than contraception and/or that they were using condoms for STI prevention were classified as contraception users (either single or multiple methods, depending on responses to other questions). The rationale for this was that regardless of the method chosen, a woman would receive contraceptive protection from it, whether or not contraception was the primary reason for its use.

## Measurement of reproductive events

### *Questions about reproductive events*

At each survey, women were asked to indicate the number of times they had experienced various reproductive events. The types of events and response options are summarised in Table B-4. There were minor differences in the questions across surveys. Survey 1 did not distinguish between full-term and premature births, and did not include still births. Survey 4 was more detailed in the types of events, separating terminations for medical reasons from those for other reasons, and including ectopic pregnancy for the first time.

**Table B-4 Survey questions relating to reproductive events**

	Survey 1	Survey 2	Survey 3	Survey 4
Reproductive events	Birth	Live birth	Live birth	Live birth
		Live premature birth	Live premature birth	Live premature birth
		Still birth	Still birth	Still birth
	Miscarriage	Miscarriage	Miscarriage	Miscarriage
	Termination	Termination	Termination	Termination for medical reasons Termination for other reasons Ectopic pregnancy
Response options	Never	1	None	None
	Once	2	1	1
	Twice	3	2	2
	3 times	4	3	3
	4 or more time	5 or more	4	4
	Don't want to answer		5 or more	5 or more

## Recoding reproductive events data

The categories of reproductive events were collapsed so that at Surveys 2, 3 and 4, births included live births and live premature births; miscarriages included still birth (as both are spontaneous pregnancy losses); and at Survey 4, ectopic pregnancy was included in the termination category (both are induced losses following medical intervention). Women's responses across surveys were analysed for logical consistency. Due to the longitudinal

nature of the data, missing data and inconsistencies within these categories were recoded. The major assumptions underlying the recoding were:

- The total number of events (in any category) could not decrease – it was assumed that an event, once reported, had indeed occurred.
- If all parts of the question were missing, all events were set to 'missing'.
- If an event was missing at Survey 1, and the number of that event at Survey 2 was 0, then the number of events at Survey 1 was set to 0.
- If there is a change, we do not know the timing of the event, so the recoded variable may underestimate the true number of events. For example, if the number of events reported across three consecutive surveys is 2, then missing, then 4, the missing value could be 2, 3, or 4. The method used here is to carry the value of 2 across surveys, with the risk of underestimating the total number of events at that time.

## Appendix C: Supplementary table for Section 5 - Fertility and infertility

The following section and table are supplementary to Figure 5-1 and Figure 5-2 in Section 5.3.

### Reproductive patterns

Births and miscarriages (including stillbirth) across four surveys were summarised by 25 patterns. Subsequent births or miscarriages for an individual woman were not counted in the patterns. To ensure logically consistent patterns some data were recoded, e.g., it was assumed that a birth or miscarriage once reported had indeed occurred. Any inconsistencies were detected, recoded and included in the patterns. The proportion of young women who reported a first miscarriage was compared with women of the same age who reported a first birth (and no miscarriage) at the same survey.

Table C-1 shows the reproductive patterns of only those Survey 4 participants who ever reported having a first birth and/or miscarriage (including stillbirth). The patterns represent births and miscarriages over ten years up to Survey 4 when the women were aged 28-33 years. Women reporting birth only or miscarriage at Survey 1 were grouped under the Survey 1 section of the table. Women who had their first birth or miscarriage between 2003 and 2006 are grouped under the section of the table relating to Survey 4. Women who reported termination only at Survey 4 were included in the 'no birth or miscarriage' group. This data is shown in Figure 5-1 and Figure 5-2.

**Table C-1 Reproductive patterns of first birth and first miscarriage as reported at Surveys 1, 2, 3 and 4 of the 1973-1978 cohort**

<b>1<sup>st</sup> Miscarriage or 1<sup>st</sup> Birth (no miscarriage) Survey 1</b>	<b>Cohort in 1996 N=676</b>	<b>Aged 18-19 n=119</b>	<b>Aged 20-21 n=304</b>	<b>Aged 22-23 n=253</b>	<b>p value</b>
1 <sup>st</sup> Miscarriage Survey 1	50	10	14	5	<b>0.006 *</b>
1 <sup>st</sup> Birth Survey 1 and 1 <sup>st</sup> Miscarriage Survey 1	114	12	12	22	0.1
1 <sup>st</sup> Miscarriage Survey 1 and 1 <sup>st</sup> Birth Survey 2	55	7	7	8	0.9
1 <sup>st</sup> Miscarriage Survey 1 and 1 <sup>st</sup> Birth Survey 3	37	13	6	2	<b>&lt;0.001 *</b>
1 <sup>st</sup> Miscarriage Survey 1 and 1 <sup>st</sup> Birth Survey 4	32	9	5	4	0.1
1 <sup>st</sup> Birth Survey 1	388	49	56	59	Reference

<b>1st Miscarriage or 1st Birth (no miscarriage) Survey 2</b>	<b>Cohort in 2000 N=873</b>	<b>Aged 22-23 n=247</b>	<b>Aged 24-25 n=344</b>	<b>Aged 26-27 n=282</b>	<b>p value</b>
		%	%	%	
1st Miscarriage Survey 2	62	15	7	3	<0.001 *
1 <sup>st</sup> Birth Survey 2 and 1 <sup>st</sup> Miscarriage Survey 2	114	11	12	13	0.9
1 <sup>st</sup> Birth Survey 1 and 1 <sup>st</sup> Miscarriage Survey 2	47	4	5	8	0.2
1 <sup>st</sup> Miscarriage Survey 2 and 1 <sup>st</sup> Birth Survey 3	74	9	8	8	0.6
1 <sup>st</sup> Miscarriage Survey 2 and 1 <sup>st</sup> Birth Survey 4	35	5	5	4	0.8
1 <sup>st</sup> Birth Survey 2	541	56	63	64	Reference
<b>1st Miscarriage or 1st Birth (no miscarriage) Survey 3</b>	<b>Cohort in 2003 N=1227</b>	<b>Aged 25-26 n=363</b>	<b>Aged 27-28 n=533</b>	<b>Aged 29-30 n=331</b>	<b>p value</b>
		%	%	%	
1 <sup>st</sup> Miscarriage Survey 3	70	6	5	6	0.8
1 <sup>st</sup> Birth Survey 3 and 1 <sup>st</sup> Miscarriage Survey 3	129	11	12	8	0.3
1 <sup>st</sup> Birth Survey 1 and 1 <sup>st</sup> Miscarriage Survey 3	40	2	2	4	0.2
1 <sup>st</sup> Birth Survey 2 and 1 <sup>st</sup> Miscarriage Survey 3	73	5	5	6	0.8
1 <sup>st</sup> Miscarriage Survey 3 and 1 <sup>st</sup> Birth Survey 4	97	7	9	10	0.5
1 <sup>st</sup> Birth Survey 3	818	69	67	66	Reference
<b>1st Miscarriage or 1st Birth (no miscarriage) Survey 4</b>	<b>Cohort in 2006 N=2059</b>	<b>Aged 28-29 n=723</b>	<b>Aged 30-31 n=870</b>	<b>Aged 32-33 n=466</b>	<b>p value</b>
		%	%	%	
1 <sup>st</sup> Miscarriage Survey 4	180	10	9	8	0.6
1 <sup>st</sup> Birth Survey 4 and 1 <sup>st</sup> Miscarriage Survey 4	257	14	13	10	0.4
1 <sup>st</sup> Birth Survey 1 and 1 <sup>st</sup> Miscarriage Survey 4	45	(<1)	1	4	<b>&lt;0.001 *</b>
1 <sup>st</sup> Birth Survey 2 and 1 <sup>st</sup> Miscarriage Survey 4	53	1	2	4	<b>0.005 *</b>
1 <sup>st</sup> Birth Survey 3 and 1 <sup>st</sup> Miscarriage Survey 4	102	5	5	6	0.4
1 <sup>st</sup> Birth Survey 4	1422	70	70	68	Reference
<b>Total 1st Miscarriage or 1st Birth</b>	<b>4835</b>	<b>29 %</b>	<b>43 %</b>	<b>28 %</b>	

*p values shown in bold are significant by chi square analysis at  $p < 0.05$ . \* Age distribution for first miscarriage differs significantly from the age distribution for first birth and no miscarriage (the reference category). Termination and ectopic pregnancy were excluded from the patterns.*

## Appendix D: Comparison of consenters and non-consenters to Medicare and PBS linkage

Research based on linked records has the potential to make a major contribution to the understanding of the factors influencing health and wellbeing and will become increasingly important in the evaluation of health services. The ALSWH provides the opportunity to link survey data and Medicare data for large numbers of women. This section reports the results of several postal requests for consent to record linkage and the socio-demographic characteristics of the women in the 1973-1978 cohort who consented to linkage as of 2005.

### Consent to data access

Women were asked to provide consent to access to Medicare data in 1996, after completing Survey 1. This consent was not enduring and needed to be re-obtained for 2000 onwards. This new consent also included access to Pharmaceutical Benefits Scheme data and other health service records. A summary of the number of consenting women each year since 1996 is shown Table D-1.

**Table D-1 Number of ALSWH participants who consented to data linkage 1995-2005 (new consent period began in 2002)**

	Original consent period			New consent period		
	1995-1996	1997-1999	2000-2001	2002-2003	2004	2005
1973-1978 cohort	5260	6219	6203	4356	4357	4349

There was an accumulation of consent during the period 1996-2001, but a reduction in the overall number of consents during the second consent period. Some of this effect was due to attrition, but the majority was due to lack of contact with the participant regarding provision of consent to access Medicare data. Responses to Survey 2 in 2000 and Survey 3 in 2003 indicate that three to four thousand women could not be contacted at one of these surveys. The request for renewed consent resulted in new consents from a further 2000 women, but fewer renewals of consent. There are small differences in the number of consenters at each data extraction period due to withdrawals or deaths.

The demographic characteristics of consenters and non-consenters in the 1973-1978 cohort at the time of completing Survey 4 (2006) are shown in Table D.2. There was a very small and barely significant difference ( $p = 0.056$ ) between consenters and non-consenters according to area of residence<sup>6</sup>. Women who gave consent to linkage tended to be better educated and were more likely to be able to manage on their available income (Table D-2). These findings provide evidence of a socio-economic bias among the consenters. Among the 1973-1978 cohort, consenters were more likely to say their health was excellent, very good or good than non-consenters, although there was no difference between the consenters and non-consenters with regard to the number GP consultations undertaken.

<sup>6</sup> Area of residence is based on ARIA+ scores. ARIA+ scores for the 1973-1978 cohort for Survey 4 are not yet available, so scores from Survey 3 were used.

**Table D-2 Demographic characteristics of consenters and non-consenters in the 1973-1978 cohort at Survey 4 (2006)**

	Consent		<i>p</i>
	Yes %	No %	
Consented	43	57	
School Education only	18	25	<0.0001
Self-rated health			
Excellent/very good/good	70	62	<0.0001
Fair/poor	30	38	
Diabetes	2	2	0.7
BMI			
Underweight	4	4	
Acceptable	58	57	0.1
Overweight	23	22	
Obese	15	17	
Self-reported number of GP visits			
None	5	5	
1-4	64	65	0.5
5 or more	31	30	
Able to manage on income	61	59	0.006
Area			0.056
Major City	56	55	
Inner regional	26	28	
Outer Regional	15	14	
Remote	3	3	

Source: *Use and costs of medications and other health care resources: Findings from the Australian Longitudinal Study on Women's Health*. Report prepared for the Australian Government Department of Health and Ageing, Canberra, 2008.





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