Improving access to antenatal care for Aboriginal women in South Australia: evidence from a population-based study

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Abstract

Introduction: Aboriginal and Torres Strait Islander women are two to three times more likely to experience adverse maternal and perinatal outcomes than non-Aboriginal women in Australia. Persisting health inequalities are at least in part explained by late and/or inadequate access to antenatal care.

Methods: This study draws on data collected in a population-based study of 344 women giving birth to an Aboriginal infant between July 2011 and June 2013 in South Australia to investigate factors associated with engagement in antenatal care.

Results: 79.8% of mothers accessed antenatal care in the first trimester of pregnancy, and 90% attended five or more antenatal visits. Compared to women attending mainstream regional services, women attending regional Aboriginal Family Birthing Program services were more likely to access antenatal care in the first trimester (Adj OR 2.5, 1.0-6.3) and markedly more likely to attend a minimum of five visits (Adj OR 4.3, 1.2-15.1). Women attending metropolitan Aboriginal Family Birthing Program services were also more likely to attend a minimum of five visits (Adj OR 12.2, 1.8-80.8) compared to women attending mainstream regional services. Women who smoked in pregnancy were less likely to attend a visit in the first trimester and had fewer visits.

Conclusions: Scaling up of Aboriginal Family Birthing Program Services in urban and regional areas of South Australia has increased access to antenatal care for Aboriginal families. The involvement of Aboriginal Maternal Infant Care workers, provision of transport for women to get to services, and outreach have been critical to the success of this program.

Key words: Aboriginal maternal and child health, health inequalities, prenatal care

Introduction

Despite long standing recognition of intergenerational patterns of health inequalities affecting Aboriginal and Torres Strait Islander people, health policy responses have so far failed to improve maternal and child outcomes. The multiple and cumulative impacts of extreme social adversity are evident in high rates of neonatal death, preterm birth, and small for gestational age infants. [1-6] These inequalities are at least in part attributable to late and/or inadequate access to antenatal care.[4,7-8] Australian age-standardised data indicate a substantial gap between the percentage of Aboriginal mothers and non-Aboriginal mothers accessing timely antenatal care.[4] In South Australia, routine data show a 25-30% difference in the proportion of Aboriginal and non-Aboriginal women attending at least one antenatal visit before 14 weeks.[6,9-12] In 2012, 49% of Aboriginal mothers are recorded as attending at least one antenatal visit in the first trimester compared with 79% of non-Aboriginal mothers.[6] In the same year, South Australian data indicate 67% of Aboriginal mothers attended seven or more visits, compared with 92% of non-Aboriginal mothers.[6]

The 2009 National Indigenous Reform Agreement committed all Australian jurisdictions to working towards: (i) increasing the proportion of mothers receiving antenatal care in the first trimester of pregnancy, and (ii) increasing the proportion of mothers attending five or more antenatal care visits.[13] There is a strong rationale for focusing on access to antenatal care in the first trimester related to the importance of early identification of potentially modifiable risk factors for poor maternal and child health outcomes.[14,15] There is less agreement regarding the optimum number of pregnancy visits.[14-18] Australian guidelines recommend ten visits for a first pregnancy with no complications, and seven visits for subsequent uncomplicated pregnancies.[14] Hence, the Council of Australian Governments (COAG) target of five or more visits reflects a minimum standard, especially given the higher rates of pre-existing medical conditions, complex social health issues and pregnancy complications experienced by Aboriginal women.[19,20]

Individual jurisdictions have adopted different approaches to addressing these targets, mostly without rigorous evaluation. A recent review of studies evaluating Aboriginal and Torres Strait Islander maternal and child health programs concluded that the methodological quality of most studies limited conclusions, and noted that only two studies had collected the views of women themselves.[21]

In South Australia, the state government has supported implementation of a new model of maternity care for Aboriginal families building on the success of two small scale regional programs.[22] Core elements of these regional services are: the creation of a new Aboriginal Maternal Infant Care worker position in a leadership role within maternity services; partnerships and skill exchange between Aboriginal Maternal Infant Care workers and midwives working in the program; on-the-job training and a new formal education pathway for Aboriginal Maternal Infant Care workers; mechanisms for community consultation and

ongoing community engagement in establishment and development of local programs; and a commitment to continuity of caregiver. One of the main factors that led to establishment of these regional programs was recognition that many Aboriginal women living in the local area were not accessing antenatal care until very late in pregnancy or not at all. An evaluation in 2005 found that only 17% of Aboriginal women living in this regional area had antenatal care in the first trimester of pregnancy.[23]

We conducted a population-based study investigating the views and experiences of mothers having an Aboriginal baby in South Australia (2011-2013). The study – called the Aboriginal Families Study – was designed to compare the experiences of women attending standard (or mainstream) care with those of women attending Aboriginal Family Birthing Program services in urban and regional South Australia. In a previous paper we reported women's views and experiences of different models of antenatal care showing that women attending the Aboriginal Family Birthing Program services were more likely to report positive experiences of care.[24] The primary aims of this paper are: 1) to assess the extent to which mothers of Aboriginal babies accessed timely antenatal care (defined as attending at least one antenatal visit before 14 weeks' gestation), and attended five or more antenatal visits over the course of pregnancy (i.e. the minimum standard for number of antenatal visits as defined in the COAG targets); and 2) to investigate factors associated with early and ongoing engagement with antenatal care, including model of care.

Methods

The study was conducted as a partnership between academic researchers and the Aboriginal Health Council of South Australia (AHCSA). An Aboriginal Advisory Group – under the auspices of the AHCSA – guided the development and conduct of the study. The study protocol was developed after consultation with Aboriginal communities in urban, regional and remote areas of South Australia that confirmed support for the study. Further details regarding the community consultation, and the development and pre-testing of the study questionnaire are outlined in a previous paper.[25]

Women were eligible to take part if they gave birth to an Aboriginal and/or Torres Strait Islander baby in South Australia between July 2011 and June 2013, and were aged 14 years or older at the time their baby was born. A team of 12 Aboriginal research interviewers recruited women via public hospitals, community-based agencies, and via interviewers' own community networks. Where possible interviews were arranged when their baby was around six months old matching the approach taken in four population-based surveys of women giving birth in South Australia and Victoria.[26]

Questionnaire

Women were invited to complete a structured interview with an Aboriginal interviewer or to self-complete the questionnaire if preferred. The 44-page questionnaire (available via study website[27]) asked about

women's views and experiences of using hospital and community based health services during pregnancy, including: at what gestation women first sought pregnancy care; how often they saw health professionals for check-ups in pregnancy; and reasons for seeking or not seeking antenatal care early in pregnancy. Information was also collected on: maternal medical conditions; reproductive characteristics; stressful life events and social health issues experienced in pregnancy (e.g. death of a family member, housing problems); maternal smoking; and socio-demographic characteristics. We categorised women who reported serious medical conditions (e.g. diabetes, hypertension, antepartum bleeding, anaemia,) and/or prior reproductive complications (e.g. prior stillbirth, prior pre-term birth) as being at 'higher risk' of complications in the current pregnancy. Ascertainment of stressful events and social health issues in pregnancy was based on a study measure developed drawing on feedback from consultations with communities about what it would be important for us to ask about, and responses from women to pre-testing of the questionnaire.[25]

Women were categorised as attending one of six main models of antenatal care based on: where pregnancy care took place (i.e. hospital, health service, home), health professionals providing care, the hospital where women gave birth, and health insurance status (Medicare only/private health insurance). The Aboriginal Family Birthing Program services in urban and regional areas are the only services that offer Aboriginal women the opportunity to receive antenatal care with an Aboriginal Maternal Infant Care worker. There are a small number of Aboriginal Health Services in South Australia that also provide care for Aboriginal women during pregnancy, usually involving GP shared care with a local public hospital. Other public sector models of care (involving minimal or no out of pocket charges for women with a health care concession card) include: public antenatal clinic care (where all pregnancy check-ups are at a public hospital, and women generally see different health professionals at each visit), midwifery group practice (where women generally see the same midwife at each visit), shared care between a public hospital and a community based GP/local doctor, and public GP care (where all visits are provided by a community based GP). Private care is provided by specialist obstetricians, mostly practising in the metropolitan area. For the purpose of analysis, we grouped together public clinic care, shared care and public GP care as 'mainstream public care' and distinguished between services located in urban and regional areas. Women who commenced care in regional services and were subsequently transferred to metropolitan services, were categorised according to the model of care and location in which the majority of their antenatal care was provided. The Australian Geographical Classification System was used to classify women as living in urban, regional or remote areas of South Australia.[28]

Analysis

All analyses were undertaken in STATA version 13.[29] Univariable logistic regression was used to examine associations between model of antenatal care, maternal socio-demographic and obstetric characteristics,

and exposure to stressful events and social health issues in pregnancy, and (i) timeliness of access to antenatal care and (ii) number of antenatal visits. Multivariable logistic regression models were developed to obtain adjusted estimates of the association between model of antenatal care and both timeliness of antenatal care and number of visits. Women attending mainstream regional services were selected as the reference group for analyses given that a greater proportion of women lived in rural areas of South Australia. Multivariable models controlled for socio-demographic and obstetric factors associated with use of antenatal care in univariable analyses.

Ethics approval was obtained from: the Aboriginal Human Research Ethics Committee of South Australia the South Australian Department of Health; Women's and Children's Health Network, Adelaide; the Lyell McEwin Hospital, Adelaide; and the Royal Children's Hospital, Melbourne.

Results

418 women expressed interest in participation and provided contact details to the research team. Of these, 83% completed the questionnaire. Four women were excluded: one because all her antenatal care was outside South Australia, and three because they had incomplete consent forms. The final sample included 344 women, the majority of whom were Aboriginal (91%). We estimate that approximately a quarter of all Aboriginal women who gave birth in South Australia during the study period participated in the study.

The average age of the index child at the time women completed the questionnaire was seven months (SD 3, range 1-17 months). The mean age of women in the study was 26 years (SD 6, range 15-44 years). Sixteen percent were aged 15-19, and 41% 20-24 years, consistent with the age distribution for births to Aboriginal women in routinely collected data for South Australia.[6] Forty-two percent were primiparous. Approximately 39% lived in an urban area, 36% in a regional area and 25% in a remote area in South Australia, reflecting over-representation of women living in remote areas in our sample. Most women had a health care card (87.1%) providing subsidised access to medical services and pharmaceuticals. Just over half (51%) received antenatal care via an Aboriginal Family Birthing Program service, a third (33%) attended mainstream public care, 7% attended an Aboriginal Health Service, 6% attended a midwifery group practice and five women (1%) attended a private specialist obstetrician. Six women (2%) did not receive any antenatal care and are not included in further analyses. Further details about participant characteristics are available in a previous paper.[24]

The proportion of women having a visit in the first trimester, and proportion receiving a minimum of five antenatal visits in pregnancy are shown in Table 1 stratified by social characteristics and model of antenatal care. Excluding women with missing data, 79.8% of women attended their first visit before 14 weeks gestation, 18% had their first visit between 14-26 weeks, 2% had their first visit after 26 weeks gestation.

Compared with women attending regional mainstream services, women who attended regional Aboriginal Family Birthing Program services were twice as likely to have had their first visit in the first trimester. Women who had their own car, and those with post-secondary education were also more likely to have received care in the first trimester. Conversely, women aged 15-19 and women who smoked cigarettes in pregnancy were less likely to have accessed antenatal care early in pregnancy. Number of children, risk of pregnancy complications, and stressful events and social health issues did not appear to influence the timing of the first antenatal visit.

Reasons women gave for the timing of their first antenatal visit are summarised in Table 2. The most common reasons were: to confirm the pregnancy and gestation, recognising signs of pregnancy, and/or to get started with pregnancy care. Of the 61 women who did not attend a pregnancy visit in the first trimester, a third said that they went as soon as they recognised they were pregnant. Other reasons for 'not going sooner' were: not being able to get an earlier appointment (7 women), moving around/being away from home (6 women), lack of transport/cost (2 women), and feeling 'scared', 'uncertain', 'shame' or 'in denial' about the pregnancy (7 women).

Over 90% of women attended five or more antenatal visits. There were small differences (bordering on statistical significance) comparing results for women attending mainstream services with those attending Aboriginal Family Birthing Program services, indicating that women attending Aboriginal Family Birthing Program services are more likely to receive a minimum of five antenatal visits. Other factors positively associated with attending a minimum of five visits were: being at higher risk of complications in pregnancy, and primiparous. Women who reported smoking were less likely to attend a minimum of five visits. Restricting analyses to women who gave birth after 32 weeks' gestation did not alter these findings (results not shown).

Table 3 reports separate multivariable analyses examining the association between model of antenatal care (variable of main interest) and (i) timing of first antenatal visit (<14 weeks, ≥14 weeks), and (ii) number of antenatal visits (≥5 visits/<5 visits) (main outcome variables), adjusting for potential confounding associated with maternal social and obstetric characteristics. Parity was not included in the model due to substantial overlap with maternal age. The findings show that compared to women attending mainstream regional services for pregnancy care, women attending regional Aboriginal Family Birthing Program services were twice as likely to attend their first pregnancy check-up in the first trimester after adjusting for potential confounders. Small differences with regard to the timing of the first visit were apparent comparing other models of care, but none reaching statistical significance. Stronger effects were apparent for women attending regional and metropolitan Aboriginal Family Birthing Program services compared to mainstream regional services, with regard to the number of visits. The adjusted odds of attending a

minimum of five visits were four times higher for women attending regional Aboriginal Family Birthing Program services, and 12 times higher for women attending metropolitan Aboriginal Family Birthing Program services, after accounting for other factors in the model.

Importantly, the adjusted odds of attending antenatal care in the first trimester for women who smoked in pregnancy were half that of women not smoking in pregnancy. The same pattern applied to analyses examining associations with the total number of visits. The multivariable analysis of data on number of antenatal visits shows that younger women (under 20 years) are more likely to attend a minimum of five visits than older women (≥30 years). Women who had access to a car to get to appointments were also more likely to attend a minimum of five visits.

Table 4 reports feedback about experiences of using Aboriginal Family Birthing Program services compared with other models of care. Since most women saw a range of health professionals, results are reported distinguishing between care provided by Aboriginal Maternal Infant Care workers, midwives and doctors. In this table we combined data for women attending regional and urban services in order to simplify comparisons. Almost all women who attended an Aboriginal Family Birthing Program service saw an Aboriginal Maternal Infant Care worker. In other models of care women only occasionally saw Aboriginal health workers, probably when they attended a health service for non-pregnancy related illnesses. A high proportion of women attending Aboriginal Family Birthing Program services and Aboriginal Health Services used transport arranged by services to attend appointments: 68% and 57% respectively, compared with around 23% of women attending mainstream services. One in four women attending Aboriginal Family Birthing Program services had a home visit, compared with fewer than 2% of women attending mainstream public services. Two-thirds of women attending Aboriginal Family Birthing Program Services said midwives and Aboriginal Maternal Infant Care Workers 'always' supported them with things happening in their lives. In mainstream services, fewer than ten women saw an Aboriginal Health Worker during pregnancy, and only 41% said midwives 'always' supported them with things happening in their lives.

Discussion

Health equity has been defined as the absence of systematic disparities in health (or its social determinants) between more and less advantaged groups.[30,31] In the Australian context, the greatest health inequalities are experienced by Aboriginal and Torres Strait Islander people, who have poorer health and poorer access to health care at every stage of the life cycle.[32,33] Health services have a responsibility to make systematic and sustained efforts to overcome barriers to access and utilisation of health services that perpetuate inequalities in health outcomes.[34] Our findings suggest that some progress towards achieving Australian government targets for overcoming health inequalities is being made in South Australia.

Eighty percent of mothers of Aboriginal babies who recalled the timing of their first antenatal visit had a check-up in the first trimester and over 90% attended a minimum of five visits, much higher percentages than suggested by routinely collected data.[6] This provides clear evidence that the strategy of implementing culturally responsive services involving partnerships between Aboriginal Maternal Infant Care workers and midwives is working to increase access to antenatal care for Aboriginal families. Women attending Aboriginal Family Birthing Program services were both more likely to access antenatal care in the first trimester and to attend a minimum of five antenatal visits compared to women attending mainstream services. In addition, the findings highlight a range of factors that potentially influence women's access to care. These include attributes of women themselves (e.g. maternal age, education) and attributes of services (e.g. provision of transport or home visits, involvement of Aboriginal workers). Younger women aged 15-19 were the least likely to have accessed antenatal care in the first trimester. There may be a range of issues here, including 'shame', fear and uncertainty about the pregnancy or what is involved in antenatal care. Women who had no post-secondary qualifications and women who were smoking during pregnancy were also less likely to access care in the first trimester. Other studies have also found that maternal smoking is associated with late attendance at antenatal care.[35-37] These findings beg the question of how approachable and welcoming services are to younger women, women who are smoking in pregnancy, and women who may have limited education and/or health literacy. Our findings illustrate that services can and are doing things to address these barriers. Aboriginal Family Birthing Program services were much more likely to offer women transport or home visits. Women attending Aboriginal Family Birthing Program services and Aboriginal Health Services also reported more positive experiences of interactions with health professionals, and more commonly reported receiving support with social issues suggesting that care was better tailored to their needs.

Adjusted analyses showed that being young and/or a smoker outweighed the influence of maternal education on timely access to care. This suggests that the social stigma of being a smoker or 'shame' associated with a first pregnancy may be inhibiting women from seeking care. While younger women once connected to services generally remained engaged over the course of pregnancy, smoking was a barrier to both timely access and ongoing engagement with services. This is particularly concerning given the greater likelihood of women who are smoking having an adverse pregnancy outcome.[38]

Strengths and limitations

Major strengths of the study include: the strong community, research and policy partnerships underpinning the study, time taken to consult with Aboriginal communities, and the achievement of a sample that is largely representative in relation to maternal age. Given the study's observational design and the timing of data collection, it is important to acknowledge the potential for recall bias, and the likelihood of

unmeasured confounding. That is, we may not have measured all factors that influence women's access to care, and there may be other factors that explain some of the observed associations. However, the steps taken to consult with Aboriginal communities, involve members of the Aboriginal Advisory Group in design of the study, and pre-testing of the questionnaire with Aboriginal women living in urban and remote communities in South Australia ensured that a range of important maternal characteristics and potential barriers and facilitators of women's access to care were able to be considered. While the design of the study does not permit causal inference, it does appear that the steps taken in South Australia to provide alternatives to mainstream health services are making a difference to how Aboriginal women and families engage with care in pregnancy.

Implications for policy and practice

Only a small number of studies have examined factors associated with late and/or inadequate use of antenatal care in high-income countries.[39] The authors of a systematic review published in 2011 found only eight studies of high methodological quality, none of which reported data disaggregated in a way that separately identified Indigenous populations.[40] Several barriers to Aboriginal women's utilisation of antenatal care identified in our study were also identified in this review. These include: smoking in pregnancy, low maternal age, low education, higher parity, and late recognition of pregnancy. The authors of this review concluded that more research was needed to examine system-specific factors (e.g. organisation of health care, payment arrangements) that may independently influence utilisation of antenatal care, or modify the effects of other social determinants.

Our study provides the first population-based data for an Australian state level jurisdiction reporting on a range of individual and systems level factors influencing Aboriginal women's utilisation and engagement with antenatal care. The findings have important implications for the future planning of strategies to promote timely access and ongoing engagement with antenatal care. On average, pregnancy and childbirth occur at a much earlier age for Aboriginal women in Australia than for non-Aboriginal women, with the consequence that antenatal care may be the first experience many young women have of health care as a 'young adult'. Antenatal care is an important 'window of opportunity' for getting it right, so that young women and their partners are well supported in pregnancy, and not dissuaded from engaging in future preventive health care for themselves and their children by care that is fragmented, culturally insensitive and sub-optimal.

Providing equitable access to antenatal care for Aboriginal women and families requires continuing efforts to overcome barriers operating at a systems level, and barriers that may exist for individuals, families and communities.[37] Examples of systems level barriers are lack of transport to get to services, blockages in systems that lead to appointments not being available, social distance between health professionals and

clients, and the capacity of caregivers to work in ways that support and engage Aboriginal families. Factors operating for individuals, families and communities include: the extent to which people know what options are available in local communities, see benefits in accessing services, and feel empowered to negotiate with caregivers to obtain the care they need.

Conclusions

The findings show that scaling up of Aboriginal Family Birthing Program Services in urban and regional areas of South Australia has increased access to antenatal care for Aboriginal families. Community consultation and engagement in the establishment of local programs, the involvement of Aboriginal Maternal Infant Care workers, provision of transport for women to get to services, and outreach have been critical to the success of this program. Continued scaling up of the program is likely to translate into better maternal and child health outcomes for Aboriginal families over time.

(3886 words)

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Table 1. Antenatal care use by model of care and maternal social and obstetric characteristics, South Australia, 2011-2013#

	First visit < 14 weeks' gestation			Minimum of 5 visits		
	n	%	OR (95% CI)	n	%	OR (95% CI)
Model of antenatal care						
Mainstream regional	29/41	(70.7)	1.0 (reference)	35/42	(83.3)	1.0 (reference)
Mainstream metropolitan	50/62	(80.6)	1.7 (0.7-4.3)	56/63	(88.9)	1.6 (0.5-5.0)
AFBP regional service	97/115	(84.3)	2.2 (1.0-5.2)	107/118	(90.7)	1.9 (0.7-5.4)
AFBP metropolitan service	33/44	(75.0)	1.2 (0.5-3.2)	40/42	(95.2)	4.0 (0.8-20.5)
Aboriginal health service	13/17	(76.5)	1.3 (0.4-5.0)	20/22	(90.9)	2.0 (0.4-10.6)
Midwifery group practice	14/18	(77.8)	1.4 (0.4-5.3)	17/18	(94.4)	3.4 (0.4-29.9)
Private care	5/5	(100)	-	5/5	(100)	-
Mothers age when baby born						
15-19 years	32/47	(68.1)	0.3 (0.1-0.8)*	47/49	(95.9)	3.4 (0.7-17.4)
20-24 years	97/125	(77.6)	0.5 (0.2-1.2)	111/124	(89.5)	1.2 (0.5-3.3)
25-29 years	66/78	(84.6)	0.7 (0.3-2.0)	74/82	(90.2)	1.3 (0.5-4.0)
30+ years	46/52	(88.5)	1.0 (reference)	48/55	(87.3)	1.0 (reference)
Maternal education						
Year 12 or less	105/141	(74.5)	1.0 (reference)	132/149	(88.6)	1.0 (reference)
Post-secondary education	136/161	(84.5)	1.9 (1.1-3.3)*	148/161	(91.9)	1.5 (0.7-3.1)
Number of children						
One	102/126	(81.0)	1.0 (reference)	121/127	(95.3)	1.0 (reference)
2-3	89/115	(77.4)	0.8 (0.4-1.5)	103/118	(87.3)	0.3 (0.1-0.9)*
4-10	50/61	(82.0)	1.1 (0.5-2.4)	56/65	(86.2)	0.3 (0.1-0.9)*
Risk of complications						

Lower risk	113/144	(78.5)	1.0 (reference)	122/144	(84.7)	1.0 (reference)
Higher risk	128/158	(81.0)	1.2 (0.7-2.1)	158/166	(95.2)	3.6 (1.5-8.3)**
Smoking in pregnancy						
No	134/157	(85.4)	1.0 (reference)	148/155	(95.5)	1.0 (reference)
Yes	102/140	(72.9)	0.5 (0.3-0.8)**	127/150	(84.7)	0.3 (0.1-0.6)**
Stressful events & social health issues in pregnancy						
None	30/38	(78.9)	1.0 (reference)	34/37	(91.9)	1.0 (reference)
1-2 issues	74/90	(82.2)	1.2 (0.5-3.2)	85/93	(91.4)	0.9 (0.2-3.7)
3-11 issues	137/174	(78.7)	1.0 (0.4-2.3)	161/180	(89.4)	0.7 (0.2-2.7)
Place of residence						
Major City	100/121	(82.6)	1.0 (reference)	112/121	(92.6)	1.0 (reference)
Regional	82/105	(78.1)	0.7 (0.4-1.4)	99/113	(87.6)	0.6 (0.2-1.4)
Remote	59/76	(77.6)	0.7 (0.4-1.5)	69/76	(90.8)	0.8 (0.3-2.2)
Access to car						
No	91/128	(71.1)	1.0	116/133	(87.2)	1.0 (reference)
Yes	148/172	(86.0)	2.5 (1.4-4.5)**	163/175	(93.1)	2.0 (0.9-4.3)
Total	241/302	(79.8)		280/310	(90.3)	

* p<0.05, ** p<0.01

denominators vary as a result of missing values

Table 2. Reasons women gave for timing of first antenatal visit, South Australia, 2011-2013

	Total n (%)	**First visit <14 weeks** n (%)	**First visit ≥14 weeks** n (%)
Confirm pregnancy or number of weeks pregnant	89 (32.2)	80 (36.4)	9 (16.1)
Went when recognised signs of pregnancy (e.g. morning sickness, missed period)	83 (30.1)	62 (28.2)	21 (37.5)
To have a check-up/begin antenatal care	74 (26.8)	63 (28.6)	11 (19.6)
Encouraged to go by family, friend or health professional	11 (4.0)	5 (2.3)	6 (10.7)
Went as soon as appointment available/I was able attend	11 (4.0)	9 (4.1)	2 (3.6)
At doctors/hospital for another reason and found out I was pregnant	11 (4.0)	6 (2.7)	5 (8.9)

Previous/current pregnancy complications	6 (2.2)	4 (1.8)	2 (3.6)
It felt like the right time	14 (5.1)	13 (5.9)	1 (1.8)
Worried, anxious or uncertain about pregnancy	8 (2.9)	6 (2.7)	2 (3.6)
No reason given	26 (8.6)	21 (8.7)	5 (8.2)
Total	302 (100.0)	241 (100.0)	61 (100.0)

Table 3. Adjusted odds ratios for antenatal care use in different models of care accounting for maternal social and obstetric characteristics, South Australia, 2011-2013

	First visit <14 weeks' gestation Adjusted OR (95% CI)	Minimum of 5 visits Adjusted OR (95% CI)
Model of antenatal care		
Mainstream regional	1.0 (reference)	1.0 (reference)
Mainstream metropolitan	1.8 (0.7-4.9)	2.2 (0.6-8.0)
AFBP regional service	2.5 (1.0-6.3)*	4.3 (1.2-15.1)*
AFBP metropolitan service	1.4 (0.5-3.9)	12.2 (1.8-80.8)**
Aboriginal health service	1.6 (0.4-6.3)	3.3 (0.5-20.7)
Midwifery group practice	1.1 (0.3-4.2)	2.6 (0.3-26.3)
Mother's age when baby born		
15-19 years	0.4 (0.1-1.4)	12.5 (1.9-82.1)**
20-24 years	0.5 (0.2-1.5)	2.3 (0.7-7.2)
25-29 years	0.8 (0.3-2.3)	2.4 (0.7-8.2)
30+ years	1.0 (reference)	1.0 (reference)
Maternal education		
Year 12 or less	1.0 (reference)	1.0 (reference)
Post-secondary education	1.5 (0.8-2.9)	0.9 (0.4-2.2)
Smoking cigarettes in pregnancy		
No	1.0 (reference)	1.0 (reference)
Yes	0.5 (02-0.8)	0.3 (0.1-0.7)**
Risk of complications		

Lower risk	Not included	1.0 (reference)
Higher risk		4.5 (1.7-11.4)
Access to car		
No	1.0 (reference)	1.0 (reference)
Yes	1.7 (0.8-3.3)	2.9 (1.1-7.9)*
Total		299
	291	

* p<0.05, **p<0.01 AFBP = Aboriginal Family Birthing Program

Table 4. Women's experiences of care during pregnancy in different models of care, South Australia, 2011-2013

	Mainstream public services	Aboriginal Family Birthing Program	Aboriginal Health Service	Midwifery Group Practice
	n (%)	n (%)	n (%)	n (%)
Service arranged transport to get to pregnancy visits	26 (22.6)	118 (68.2)	13 (56.5)	2 (10.5)
Service provided home visits	2 (1.7)	41 (23.4)	2 (8.7)	10 (52.6)
Always used words you could understand				
Aboriginal Health Worker/AMIC Worker	6 (75.0)	135 (79.4)	6 (66.7)	0 (0.0)
Midwives	58 (63.0)	125 (73.5)	18 (81.8)	16 (84.2)
Doctors	61 (58.7)	103 (65.6)	15 (71.4)	9 (81.8)
Always remembered you between visits				
Aboriginal Health Worker/AMIC Worker	4 (57.1)	138 (81.7)	4 (44.4)	0 (0.0)
Midwives	41 (45.6)	135 (79.4)	15 (68.2)	15 (78.9)
Doctors	51 (50.0)	104 (66.7)	13 (61.9)	8 (72.7)
Always did things to help you to get ready for having baby				
Aboriginal Health Worker/AMIC Worker	2 (28.6)	124 (73.8)	4 (44.4)	0 (0.0)

Midwives	48 (53.9)	130 (76.5)	18 (81.8)	16 (84.2)
Doctors	49 (47.6)	94 (60.3)	14 (66.7)	6 (54.5)
Always supported you with things happening in your life				
Aboriginal Health Worker/AMIC Worker	2 (28.6)	109 (64.9)	3 (33.3)	0 (0.0)
Midwives	37 (41.1)	110 (64.3)	16 (72.7)	11 (57.9)
Doctors	39 (37.9)	74 (47.7)	14 (66.7)	4 (36.4)
Total	115 (100.0)	176 (100.0)	23 (100.0)	19 (100.0)

AMIC Worker = Aboriginal Maternal Infant Care Worker