How do pregnancy outcomes differ in teenage mothers? A Western Australian study

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ABSTRACT

Objectives: To determine whether teenage pregnancy and Indigenous status are associated with increased risk of adverse pregnancy outcomes.

Design, setting and participants: A cross-sectional descriptive analysis of nulliparous women with singleton pregnancies who delivered at the sole tertiary obstetric hospital in Western Australia between June 2004 and September 2006, using data obtained from computerised midwifery records.

Main outcome measures: Maternal risk factors, pregnancy characteristics, and obstetric and perinatal outcomes for teenage and adult pregnancies.

Results: Of the 4896 births reviewed, 560 (11%) were to teenage mothers. Teenagers were more likely to be Indigenous and to experience maternal risk factors such as anaemia and smoking. Indigenous women were more likely than non-Indigenous women to be smokers, with young Indigenous teenagers (aged 12–16 years) being most likely to smoke (odds ratio [OR], 6.29; 95% CI, 3.99–9.92). Perinatal outcomes for teenage and adult births were similar, while adjustment for smoking and Indigenous status changed the observed association for the Indigenous population of preterm delivery < 37 weeks' gestation (OR, 1.31; 95% CI, 1.01–1.71), admission to special care nursery (OR, 1.41; 95% CI, 1.10–1.81) and low birthweight (OR, 1.43; 95% CI, 1.10–1.87). However, older teenagers (aged 17–18 years) were the group at highest risk of stillbirth (OR, 1.99; 95% CI, 1.03–3.76).

Conclusions: These results improve our understanding of the obstetric and medical issues associated with teenage pregnancy and birth in WA and how we might tailor our approach to care. Indigenous teenagers need special attention, and there is significant scope for public health interventions around anaemia and smoking in this population.

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Although the birth rate among Australian teenagers aged 15–19 years has fallen in recent decades to a low of 15.4 per 1000 in 2006,[1] Australia continues to have a teenage birth rate several times higher than rates in comparable countries.[2,3] Improved access to contraception and abortion may underlie the falling teenage birth rate.[4] However, there is increasing evidence that some groups of Australian teenagers are not experiencing this decline, especially those living in rural[5] and socially disadvantaged[6] areas, and Indigenous teenagers,[7,8] who in 2006 had a fertility rate of 69 per 1000[1] — more than five times that of non-Indigenous women.

Although others have assessed the effects of teenage pregnancy on obstetric risk factors and pregnancy outcomes for whole populations within the public health care system in Australia,[5,7,8] no such exploration has occurred in Western Australia. Published data relating to Indigenous teenage pregnancy are also now quite old,[7,8] with limited research on maternal risk factors and birth outcomes in this cohort in an urban setting. Stillbirth rates in WA have been investigated,[9] with the conclusion that higher rates in teenagers may be fully explained by sociodemographic factors.

Being a teenage mother is a precursor to poor medical, educational and psychosocial outcomes.[3,10] Although most studies report that teenagers' babies are at greater risk of preterm birth, low birthweight[11] and neonatal death,[12] some studies find no such association, especially if high-quality antenatal care is provided.[13] It has also been suggested that adverse perinatal outcomes are associated with ethnicity[7,8] and are independently associated with younger,[11] socially disadvantaged[6] mothers who smoke.[14,15]

We aimed to assess the effect of teenage pregnancy on obstetric risk factors and adverse birth outcomes in an urban tertiary maternity hospital in WA. We hypothesised that poor pregnancy outcomes in teenagers could largely be explained by smoking and Indigenous status.

METHODS

We conducted a retrospective hospital-based study using computerised perinatal data collected by the Obstetrics and Gynaecology Clinical Care Unit at King Edward Memorial Hospital (KEMH) in Perth. Maternal age was defined as the age of the mother in completed years at the time of conception. Only nulliparous women were included, to remove confounding caused by parity. The total population of 4896 nulliparous women with singleton pregnancies who delivered from 22 weeks' gestation between June 2004 and September 2006 were evaluated. As the sole tertiary maternity hospital in WA, KEMH has a high rate of preterm delivery. The study was approved by the KEMH Ethics Committee.

Antenatal risk factors included socioeconomic status (calculated using the Index of Relative Socio-Economic Disadvantage from the Australian Bureau of Statistics Socio-Economic Indexes For Areas [SEIFA], with the lowest quartile representing the most disadvantaged group),[16] ethnicity, anaemia (haemoglobin level < 110 g/L), urinary tract infection, pregnancy-induced hypertension (daily repeated blood pressure readings over several hours exceeding 140/90 mmHg), and smoking during pregnancy (ever having smoked while pregnant). Delivery data included analgesia use and caesarean section. Perinatal outcomes included preterm birth (before 37 weeks' gestation), Apgar score, resuscitation, admission to special care, birthweight, low birthweight (< 2500 g), and stillbirth.

Statistical analysis

Medians and interquartile ranges were used to summarise continuous data. Frequency distributions were used to summarise categorical data. Univariate comparisons between adult and teenage women were performed using Mann–Whitney tests and χ^2 tests, as appropriate. Multivariable comparisons of binary outcomes were performed using logistic regression, with odds ratios (ORs) and 95% confidence intervals used to summarise the effect sizes. *P* values < 0.05 were considered statistically signifi-

1 Distribution of maternal risk factors, pregnancy characteristics and outcomes in adult and teenage women, and in young teenagers (aged 12–16 years) and older teenagers (aged 17–18 years)

Risk factor	All teenagers (*n* = 560)	Adults (*n* = 4336)	*P*	Teenagers 12–16 years (*n* = 183)	Teenagers 17–18 years (*n* = 377)	*P*
Ethnicity			< 0.001			0.008
White	307 (55%)	3187 (74%)		83 (45%)	224 (59%)	
Indigenous	185 (33%)	171 (4%)		77 (42%)	108 (29%)	
Other*	46 (8%)	690 (16%)		14 (8%)	32 (8%)	
Low socioeconomic status	127 (23%)	598 (14%)	< 0.001	42 (23%)	85 (22%)	0.915
Smoking during pregnancy	177 (32%)	608 (14%)	< 0.001	67 (37%)	110 (29%)	0.076
Anaemia	77 (14%)	270 (6%)	< 0.001	31 (17%)	46 (12%)	0.127
Urinary tract infection	41 (7%)	136 (3%)	< 0.001	8 (4%)	33 (9%)	0.062
Pregnancy-induced hypertension	59 (10%)	308 (7%)	0.004	17 (9%)	42 (11%)	0.503
Analgesia†						
Narcotic	224 (40%)	1188 (27%)	< 0.001	77 (42%)	147 (39%)	0.485
Nitrous oxide	256 (46%)	1606 (37%)	< 0.001	85 (46%)	171 (45%)	0.808
Epidural/spinal	326 (58%)	2926 (68%)	< 0.001	92 (50%)	234 (62%)	0.008
Caesarean section	94 (17%)	1417 (33%)	< 0.001	18 (10%)	76 (20%)	0.002
Gestation < 37 weeks	144 (26%)	997 (23%)	0.152	43 (23%)	101 (27%)	0.403
Apgar score < 7 at 5 min	22 (4%)	144 (3%)	0.042	6 (3%)	16 (4%)	0.618
Resuscitation	287 (51%)	2101 (48%)	0.213	83 (45%)	204 (54%)	0.052
Special care admission	169 (30%)	1192 (27%)	0.182	50 (27%)	119 (32%)	0.305
Birthweight < 2500 g	133 (24%)	842 (19%)	0.016	41 (22%)	92 (24%)	0.602
Birthweight, median (IQR)	3120 (2550–3550)	3205 (2675–3590)	0.028	3117 (2571–3502)	3125 (2535–3607)	0.679
Stillbirth	18 (3%)	76 (2%)	0.014	6 (3%)	12 (3%)	0.910

IQR = interquartile range. Figures expressed as number (%) unless otherwise specified. Percentages may not add up to 100% due to missing values for some variables.
* African, Asian, Maori, Polynesian and Indian. † More than one type of analgesia could be used. ◆

cant. SPSS statistical software (version 15; SPSS Inc, Chicago, Ill, USA) was used for data analysis.

RESULTS

Of the total study population of 4896 pregnant women, 560 (11%) were teenagers. Teenagers' ages ranged from 12 to 18 years, with a median age of 17 years. Of these, 183 were young teenagers (aged 12–16 years) and 377 were older teenagers (aged 17–18 years).

Compared with adults, teenagers were more likely to be Indigenous and less likely to be white ($P < 0.001$), were more likely to smoke ($P < 0.001$) and came from more socioeconomically disadvantaged backgrounds ($P < 0.001$) (Box 1). Antenatally, teenagers experienced anaemia ($P < 0.001$), urinary tract infection ($P < 0.001$) and pregnancy-induced hypertension ($P = 0.004$) more often than adults. Teenagers were less likely to deliver by caesarean section ($P < 0.001$), and their babies were at increased risk of having low Apgar scores ($P = 0.042$), low birthweight ($P = 0.016$), lower median birthweight at term (3120 g v 3205 g; $P = 0.028$), and stillbirth ($P = 0.014$). Compared with older teenagers, young teenagers were more likely to be Indigenous and less likely to be white ($P = 0.008$) (Box 1).

Compared with non-Indigenous adults, all Indigenous women were more likely to smoke (Box 2). Young Indigenous teenagers were the most likely to smoke (OR, 6.29; 95% CI, 3.99–9.92), followed by Indigenous adults (OR, 5.19; 95% CI, 3.78–7.11) and older Indigenous teenagers (OR, 4.00; 95% CI, 2.68–5.93).

Compared with non-Indigenous teenagers, Indigenous teenagers were more likely to smoke ($P = 0.001$), have anaemia ($P < 0.001$) and experience pregnancy-induced hypertension ($P = 0.034$) (Box 3). Their babies experienced similar birth outcomes to those of non-Indigenous teenagers,

2 Frequencies and odds ratios for the likelihood of smoking during pregnancy in Indigenous adults and Indigenous and non-Indigenous teenagers

Maternal age group	No. (%) of smokers	Odds ratio (95% CI)	*P*
Non-Indigenous adults*	534 (13%)	1.00	< 0.001
Indigenous adults	74 (43%)	5.19 (3.78–7.11)	
Non-Indigenous 12–16 years	30 (28%)	2.68 (1.74–4.13)	
Indigenous 12–16 years	37 (48%)	6.29 (3.99–9.92)	
Non-Indigenous 17–18 years	70 (26%)	2.39 (1.79–3.19)	
Indigenous 17–18 years	40 (37%)	4.00 (2.68–5.93)	

* Referent group. ◆

3 Differences between Indigenous and non-Indigenous teenagers*

	Indigenous ($n = 185$)	Non-Indigenous ($n = 353$)	P
Low socioeconomic status	42 (23%)	78 (22%)	0.872
Smoking during pregnancy	77 (42%)	100 (28%)	0.001
Anaemia	43 (23%)	30 (8%)	< 0.001
Urinary tract infection	13 (7%)	26 (7%)	0.886
Pregnancy-induced hypertension	26 (14%)	29 (8%)	0.034
Caesarean section	36 (19%)	56 (16%)	0.293
Gestation < 37 weeks	55 (30%)	84 (24%)	0.135
Apgar score < 7 at 5 min	9 (5%)	11 (3%)	0.322
Resuscitation	88 (48%)	188 (53%)	0.210
Special care admission	65 (35%)	99 (28%)	0.090
Birthweight < 2500 g	53 (29%)	76 (21%)	0.066
Birthweight, median (IQR)	2965 (2430–3440)	3220 (2722–3642)	< 0.001
Stillbirth	6 (3%)	12 (3%)	0.924

IQR = interquartile range. Figures expressed as number (%) unless otherwise specified. Percentages may not add up to 100% due to missing values for some variables. * Ethnicity of 22 teenagers not known. ◆

with the exception of lower median birthweight (2965 g v 3220 g; $P < 0.001$).

Compared with adult women, young teenage (OR, 1.61; 95% CI, 1.02–2.54) and Indigenous women (OR, 4.46; 95% CI, 3.23–6.15) were at increased risk of anaemia, while Indigenous women (OR, 1.70; 95% CI, 1.16–2.48) and older teenagers (OR, 1.48; 95% CI, 1.03–2.11) experienced pregnancy-induced hypertension more often (Box 4). Only older teenagers were more likely than adults to experience urinary tract infection (OR, 2.61; 95% CI, 1.71–3.98). Babies of Indigenous mothers were more likely to require admission to special care (OR, 1.30; 95% CI, 1.00–1.67) and experience low birthweight (OR, 1.32; 95% CI, 0.99–1.75), and were slightly more likely to be born preterm (OR, 1.31; 95% CI, 1.01–1.71). However, older teenagers were the group at highest risk of stillbirth (OR, 1.99; 95% CI, 1.03–3.76).

DISCUSSION

Overall, we found that maternal risk factors were more common in teenagers than adults. This was particularly true for low socioeconomic status, smoking during pregnancy, anaemia, urinary tract infection and pregnancy-induced hypertension. Simultaneous evaluation of the effects of maternal age, Indigenous status and smoking showed that preterm delivery, low birthweight and special care admission were related to mothers being Indigenous, without the effect of age. Compared with adults, teenagers had an increased risk of stillbirth. After adjusting for low socioeconomic status, ethnicity and smoking, this association was specific to older teenage mothers.

Our finding that maternal risk factors were more common in teenagers than adults is consistent with other studies.[7,8] Two of these risk factors, anaemia and smoking, are modifiable antenatally. A high proportion (32%) of pregnant teenagers, especially Indigenous teenagers, smoked. Smoking during pregnancy is associated with low birthweight[14,15] and preterm delivery.[17] Although antenatal smoking cessation programs do reduce smoking,[17] it has also been found that the pregnant women least likely to quit smoking are teenagers and Indigenous women, especially if they are socioeconomically disadvantaged.[18] Smoking in these populations remains a significant public health issue; tobacco use has been found to be a leading cause of premature morbidity and mortality in Indigenous women.[19]

Other studies have also reported a higher incidence of anaemia in pregnant teenagers,[13,20] suggesting poor nutrition could be a contributing cause.[7,13] Anaemia in pregnancy is common and associated with low birthweight, preterm delivery[21] and a decrease in maternal tolerance to haemorrhage. Daily oral iron–folic acid supplementation is the initial treatment recommended to pregnant teenagers attending KEMH as it improves haematological response.[22] However, the direct link between iron–folic acid supplementation and an improvement in health outcomes for women and their babies has not been proven, as there are a paucity of well designed trials[22,23] addressing this question.

Stillbirth in older teenagers was the only increased adverse pregnancy outcome found in teenagers after controlling for confounding factors. Stillbirth has previously been linked to maternal age, with the youngest mothers having the highest risk,[11] a higher incidence of preterm delivery[24] compared with adults, and low socioeconomic status.[9] After controlling for the effects of young maternal age, preterm delivery and socioeconomic status, we found no evidence that stillbirth in our population of teenagers was linked to these risk factors (Box 4). However, the limitation of using SEIFA codes alone to assess social deprivation should not be overlooked,[9] because lack of additional data (such as marriage status and educational attainment) prevented exhaustive investigation of the effects of social deprivation on stillbirth.

Although the health of Indigenous women and their infants is improving,[25] our study clearly illustrates that pregnant Indigenous women are disadvantaged compared with non-Indigenous women. Consistent with other studies,[1,8] Indigenous status was more common in teenagers giving birth than in adults giving birth, perhaps reflecting an overall younger age of first birth among Indigenous women. Although Indigenous teenagers smoked, had anaemia and experienced pregnancy-induced hypertension more often than their non-Indigenous counterparts, we found little evidence of adverse perinatal outcomes in this group. Previous research has suggested that adverse perinatal outcomes for Indigenous teenagers may be related to rural residence,[8] with teenagers from urban areas having better perinatal outcomes than their rural counterparts.[5] As most teenagers in our study were from an urban setting, we hypothesise that better access to maternity care was a contributing factor.

This is the first analysis of its kind of teenage births in WA. As smoking and nutritional status remain among the few modifiable factors in pregnancy, teenagers and Indigenous women need special attention in terms of innovative, culturally appropriate system-wide services targeted at addressing these important health issues in pregnancy.

4 Pregnancy outcomes for young and older teenage mothers compared with adults, adjusting for simultaneous effects of Indigenous status

	Adjusted*		Multivariable†	
Outcome	Odds ratio (95% CI)	*P*	Odds ratio (95% CI)	*P*
Anaemia‡				
Teenagers 12–16 years	1.61 (1.02–2.54)	0.039		
Teenagers 17–18 years	1.31 (0.91–1.89)	0.148		
Indigenous	4.46 (3.23–6.15)	< 0.001		
Pregnancy-induced hypertension‡				
Teenagers 12–16 years	1.14 (0.66–1.97)	0.632		
Teenagers 17–18 years	1.48 (1.03–2.11)	0.036		
Indigenous	1.70 (1.16–2.48)	0.006		
Urinary tract infection‡				
Teenagers 12–16 years	1.15 (0.54–2.49)	0.705		
Teenagers 17–18 years	2.61 (1.71–3.98)	< 0.001		
Indigenous	1.30 (0.78–2.15)	0.311		
Caesarean section				
Teenagers 12–16 years	0.22 (0.13–0.37)	< 0.001	0.21 (0.12–0.35)	< 0.001
Teenagers 17–18 years	0.52 (0.40–0.68)	< 0.001	0.48 (0.36–0.63)	< 0.001
Indigenous	1.12 (0.85–1.47)	0.413	1.05 (0.80–1.39)	0.726
Gestation < 37 weeks				
Teenagers 12–16 years	0.89 (0.62–1.29)	0.555	0.85 (0.58–1.23)	0.406
Teenagers 17–18 years	1.12 (0.87–1.44)	0.374	1.02 (0.78–1.33)	0.884
Indigenous	1.31 (1.01–1.71)	0.042	1.17 (0.89–1.55)	0.268
Special care admission				
Teenagers 12–16 years	0.82 (0.58–1.17)	0.281	0.79 (0.55–1.13)	0.199
Teenagers 17–18 years	1.08 (0.85–1.37)	0.525	1.00 (0.78–1.28)	0.980
Indigenous	1.41 (1.10–1.81)	0.007	1.30 (1.00–1.67)	0.051
Birthweight < 2500 g				
Teenagers 12–16 years	0.96 (0.66–1.40)	0.853	0.94 (0.63–1.39)	0.749
Teenagers 17–18 years	1.16 (0.90–1.51)	0.253	1.08 (0.82–1.42)	0.574
Indigenous	1.43 (1.10–1.87)	0.008	1.32 (0.99–1.75)	0.056
Stillbirth				
Teenagers 12–16 years	2.06 (0.84–5.03)	0.113	2.06 (0.84–5.03)	0.113
Teenagers 17–18 years	1.99 (1.03–3.76)	0.040	1.99 (1.03–3.76)	0.040
Indigenous	0.06 (0.28–1.53)	0.326	0.06 (0.28–1.53)	0.326

* Adjusted for maternal age (12–16 years, 17–18 years and adults > 19 years), smoking during pregnancy and Indigenous status. † Adjusted for maternal age (12–16 years, 17–18 years and adults > 19 years), smoking during pregnancy, Indigenous status, low socioeconomic status and statistically significant (‡) factors. Outcomes not affected by maternal age, Indigenous status and smoking during pregnancy (Apgar score < 7 at 5 min postpartum and resuscitation at birth) are not shown. ◆

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COMPETING INTERESTS

None identified.

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