

# The burden of adverse obstetric and perinatal outcomes from maternal smoking in an Australian cohort

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## Introduction

**Background:** Maternal smoking is a major risk factor for adverse pregnancy outcomes, including ectopic pregnancy, preterm birth, perinatal mortality and low birthweight. In the United States it is estimated that 5–7% of preterm-related infant deaths are attributable to prenatal smoking.

Evaluation of the perinatal morbidity of prenatal smoking in an Australian cohort will provide clinicians data for an evidence based approach when counseling women about the importance of smoking cessation and appraising the odds of adverse neonatal outcomes.

## Objectives

1. To evaluate the obstetric and perinatal outcomes in women who smoked during pregnancy from a large cohort of women at an Australian perinatal centre

## Methods

**Design:** This was a retrospective cohort study of women who smoked during pregnancy and birthed at a major perinatal centre in Australia between January 2000 and April 2017. The study cohort was statistically compared to a cohort of women who did not smoke in pregnancy.

**Statistical Analysis:** Perinatal outcomes were adjusted for demographic variables and then stratified against the smoking status of the mothers. A t-test or Wilcoxon rank-sum was used to compare smoking status to other variables. Categorical variables were assessed using Person  $\chi^2$  and Fischer's exact test. Multiple regression analysis was used to generate adjusted odds ratios (aOR) controlling for variables identified as significant on initial univariate analysis. P-values <0.05 were considered significant.

## Results

**Table 1.** Maternal demographics stratified by maternal smoking status

| Maternal Demographics     | Non-Smokers (n=119396) | Smokers (n=20477) | p-value |
|---------------------------|------------------------|-------------------|---------|
| Age (years)*              | 31.4                   | 28.9              | <0.001  |
| BMI (kg/m <sup>2</sup> )* | 22.8                   | 23.4              | <0.001  |
| Ethnicity <sup>§</sup>    |                        |                   |         |
| Cauc                      | 74.7                   | 80.8%             | <0.001  |
| ATSI                      | 1.1%                   | 6.9%              | <0.001  |
| Asian                     | 15.0%                  | 3.4%              | <0.001  |
| Other                     | 9.3%                   | 8.9%              | 0.07    |
| Nulliparous <sup>§</sup>  | 46.1%                  | 45.3%             | 0.03    |
| Diabetes <sup>§</sup>     | 5.8%                   | 5.0%              | <0.001  |
| Hypertension <sup>§</sup> | 4.7%                   | 5.8%              | <0.001  |
| SEIFA score               | 1,054                  | 1,042             | <0.001  |

Mothers who smoked were more likely to be:

1. Younger
2. Higher BMI
3. Caucasian, Aboriginal or Torres Strait ethnicity
4. Hypertensive
5. Lower in socioeconomic status

**Table 2.** Odds Ratio comparison of obstetric outcomes in smokers and non-smokers

| Outcomes                                  | Unadjusted Odds Ratio | Adjusted Odds Ratio | p-value |
|---|-----------------------|---------------------|---------|
| Gestation (weeks) <sup>§</sup>            | -0.18                 | -----               | <0.001  |
| Birth <37 (weeks) <sup>§</sup>            | 1.49                  | 1.38                | <0.001  |
| Birth <32 (weeks) <sup>§</sup>            | 1.82                  | 1.53                | <0.001  |
| Birth <28 (weeks) <sup>§</sup>            | 1.72                  | 1.41                | <0.001  |
| BW (grams)*                               | -106                  | -----               | <0.001  |
| BW <5 <sup>th</sup> centile <sup>§</sup>  | 1.84                  | 2.00                | <0.001  |
| BW <10 <sup>th</sup> centile <sup>§</sup> | 1.59                  | 1.76                | <0.001  |
| Mode of Delivery <sup>§</sup>             |                       |                     |         |
| SVD                                       | 1.19                  | 1.08                | <0.001  |
| Instrument                                | 0.78                  | 0.88                | <0.001  |
| Elec CS                                   | 0.75                  | 0.86                | <0.001  |
| Emerg CS                                  | 1.09                  | 1.11                | <0.001  |
| CS (NRFS)                                 | 1.24                  | 1.16                | <0.001  |
| NICU <sup>§</sup>                         | 1.70 (                | 1.34                | <0.001  |
| Resp Distress <sup>§</sup>                | 1.10                  | 1.12                | <0.001  |
| APGAR<7 @ 5min <sup>§</sup>               | 1.42                  | 1.13                | <0.001  |
| APGAR<5 @ 5min <sup>§</sup>               | 1.49                  | 1.14                | <0.001  |
| APGAR<3 @ 5min <sup>§</sup>               | 1.47                  | 0.96                | <0.001  |
| Severe Acidosis                           | 1.16                  | 1.41                | <0.001  |
| Stillbirth <sup>§</sup>                   | 1.32                  | 0.91                | 0.01    |
| Neonatal Death <sup>§</sup>               | 1.83                  | 1.12                | <0.001  |
| Perinatal Death <sup>§</sup>              | 1.50                  | 0.98                | <0.001  |
| Composite <sup>§</sup>                    | 1.59                  | 1.35                | <0.001  |

Mothers who smoked were more likely to have:

1. Infants with lower birthweight
2. Premature births
3. Spontaneous vaginal deliveries
4. Emergency caesarean sections
5. Poorer neonatal outcomes
  1. Defined by NICU admission, respiratory distress, severe acidosis, low Apgar scores, neonatal death and stillbirth.

## Conclusion

Women who smoke in pregnancy have worse obstetric, fetal and perinatal outcomes compared to controls and should be managed as high risk.

## References

1. The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General. Retrieved 1 Apr. 2018 from US Department of Health and Human Services [www.surgeongeneral.gov/library/reports/50-years-of-progress](http://www.surgeongeneral.gov/library/reports/50-years-of-progress).
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