

# Tobacco smoking in pregnancy

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**Smoking in pregnancy is an important and modifiable risk factor for poor pregnancy and infant outcomes.**

**Smoking cessation in the first trimester increases birth weight and decreases the risk of premature birth.**

Nearly one in five women in Australia smoke tobacco during pregnancy. The smoking rate in pregnant women varies between states and territories from 13% in NSW and ACT to 27% in Tasmania and 29% in the Northern Territory.<sup>1</sup> There is a strong association between social inequality and smoking during pregnancy.<sup>2</sup> More than 40% of teenagers report smoking during pregnancy and over half of Indigenous pregnant women smoke.<sup>1</sup> Smoking rates during pregnancy are increased in women who are multiparous, are born in Australia, have a lower socio-demographic status, have unbooked confinements and have a lack of antenatal care in their first trimester.<sup>3</sup>

Although the overall prevalence of smoking among women is falling, smoking in young pregnant women

appears to be increasing.<sup>4</sup> The likelihood of a woman smoking during and after pregnancy is associated with regular exposure to other people smoking around her.<sup>5</sup>

## Effects of smoking in pregnancy

Harmful effects on the fetus caused by smoking in pregnancy were first reported in 1935.<sup>3</sup> A cigarette produces over 4000 chemicals, including nicotine, carbon monoxide, tar, benzene, cyanide, aluminium, dichlorodiphenyltrichloroethane/dieldrin, ammonia, arsenic, formaldehyde, hydrogen, carbon dioxide, chloroform, vinyl chloride, cadmium and lead.<sup>4,6</sup> At least 43 of the chemicals produced are known carcinogens.<sup>4</sup>

Smoking affects the fetus directly and indirectly. Nicotine and cotinine cross the placenta rapidly and the fetus is exposed to 15% higher concentrations of nicotine than the mother.<sup>6,7</sup> Placental vasoconstriction and abnormal umbilical artery flow induced by nicotine lead to fetal hypoxia and malnutrition.<sup>6</sup> Animal models suggest that nicotine is also a teratogen that can affect the central nervous system, causing mitotic arrest, cell death and decreased central nervous system cell numbers. Nicotine can also affect development of the neurotransmitter systems.<sup>6</sup>

Smoking in pregnancy has been associated with a wide range of adverse effects

including pregnancy complications, adverse perinatal outcomes, birth defects, and adverse infant and child outcomes, such as respiratory illness and long-term behavioural and psychiatric problems (Table).<sup>2,4-6,8,9</sup> There is consistent evidence for associations between smoking during pregnancy and low birth weight, hypoxia, placental compromise, stillbirth, Sudden Infant Death Syndrome, spontaneous abortion, cleft palate and preterm birth.<sup>9</sup>

Smoking in pregnancy results in smaller lung volumes and hyperreactive airways in infants. There is also an increased risk of lower respiratory tract infections in infants exposed antenatally and this risk continues postnatally if children are exposed to passive smoking. When examining the postnatal effects of smoking in pregnancy, however, it is sometimes difficult to separate the effects of smoking in pregnancy from environmental and genetic factors.<sup>9</sup>

The risk of spontaneous abortion is increased by 20 to 80%,<sup>4,6</sup> and the mortality rate is 71% higher for infants of smokers than for infants of nonsmokers.<sup>6</sup> Babies born to women who smoke during pregnancy weigh on average 200 g less than nonexposed babies.<sup>4</sup> Growth restriction is dose dependent,<sup>4,6</sup> and the greatest risk results from smoking in the second and third trimesters.<sup>4</sup> The risk of low birth weight is increased when the father



PHOTOLIBRARY

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## Table. Effects of smoking in pregnancy

### Pregnancy complications

Infertility  
Spontaneous abortion  
Ectopic pregnancy  
Placenta praevia  
Placental abruption  
Funisitis  
Chorioamnionitis  
Premature rupture of membranes

### Perinatal outcomes

Low birth weight  
Small head circumference  
Premature birth particularly before 32 weeks' gestation  
Stillbirth  
Increased perinatal mortality

### Birth defects

Cleft lip and/or palate  
Craniosynostosis  
Club foot

### Respiratory effects

Sudden Infant Death Syndrome  
Smaller lung volume  
Postnatal respiratory infection  
Wheeze  
Asthma  
Otitis media

### Behavioural and psychiatric effects

Decreased cognitive abilities/lower IQ  
Impaired learning and memory  
Mood disorders  
Conduct disorder  
Attention deficit disorder  
Hyperactivity  
Infantile colic  
Alcohol and other substance abuse

### Other postnatal effects

Childhood obesity  
Diabetes  
Increased risk of smoking in offspring

smokes as well.<sup>6</sup> Low birth weight may lead to subsequent growth delay.<sup>3</sup> Moreover, considering the fetal origins hypothesis, low birth weight is a risk factor for chronic disease in later life, including obesity, heart disease and diabetes.<sup>8</sup>

Smoking in pregnancy may also have intergenerational effects. Children exposed to smoking *in utero* have an increased risk of smoking themselves.<sup>6</sup> After adjusting for potential confounders, female offspring exposed to smoking *in utero* have higher rates of smoking in later life, possibly due to a predisposition to nicotine dependence.<sup>3</sup>

### Smoking cessation in pregnancy

Between 20 and 40% of women who smoke are reported to quit smoking during pregnancy,<sup>6</sup> although the rate may be as low as 4%.<sup>3</sup> In an Australian study, women who were born in Asia, are primiparous, attended antenatal care early in pregnancy and have no obstetric complications were more likely to quit smoking during pregnancy.<sup>3</sup> Spontaneous quitters are most likely to be successful,<sup>4</sup> however, there is a high relapse rate associated with quitting in pregnancy and up to 80% of women recommence smoking by one year postpartum.<sup>4</sup>

Women who quit in the first three to four months of pregnancy have infants of similar birth weights to women who have never smoked.<sup>4,8</sup> The strength of nicotine addiction is such that 70% of women who smoked in pregnancy and had a baby with an adverse outcome also smoked in their next pregnancy.<sup>4</sup> However, wanting to have a healthy baby is a powerful motivator for some women to quit smoking.<sup>4</sup>

### Smoking cessation interventions

Behavioural and pharmacological interventions have been used to promote smoking cessation in pregnancy. Behavioural interventions include multimedia education campaigns, telephone quit lines, financial incentives and personal feedback.<sup>2,4</sup> Pharmacological interventions

include nicotine replacement therapy (NRT) and bupropion.<sup>2,4</sup>

Overall, women who receive a smoking cessation intervention are significantly less likely to smoke in late pregnancy, have premature births or have babies with low birth weights.<sup>2</sup> Higher intensity interventions with additional forms of support such as follow up and reminders, home visits or pharmacological therapy are more likely to be successful than low intensity interventions.<sup>2</sup> Interventions based on cognitive behavioural strategies, pharmacotherapy or rewards are most successful in reducing smoking rates in women during late pregnancy.<sup>2</sup>

Barriers to success in achieving smoking cessation include women's concerns about personal weight gain and increased fetal size, with its associated risk of increased difficulty during labour and delivery. Other barriers include clinicians' lack of time to counsel the pregnant woman who smokes, attitudes to smoking, perceptions of the effectiveness of interventions, and perceived lack of skills, training and high-quality programs that are acceptable to women and clinicians.

Concerns about the safety of NRT have led to a reluctance by both pregnant women and clinicians to use NRT. Adverse fetal outcomes following NRT in pregnancy vary between studies; however, pooled birth outcome data are not significantly different in women who do and do not use NRT during pregnancy. Intermittent NRT is recommended in pregnant women who smoke to reduce the total nicotine dose.<sup>2</sup>

### Role of GPs

Any effort to decrease smoking rates in women during pregnancy should be part of integrated care to promote a healthy pregnancy, because risk factors for poor pregnancy (e.g. alcohol consumption and smoking) and child outcomes often coexist.<sup>10</sup> Primary care interventions to promote a health pregnancy include provision of adequate and timely antenatal

care, appropriate maternal nutrition, folate supplementation and efforts to reduce the use of alcohol and illicit drugs in pregnancy.

GPs play a vital role in helping women who are pregnant or considering pregnancy to minimise the risks of smoking to their offspring (see the box on this page). Resources to assist GPs to promote smoking cessation in pregnancy include the Smoking and Pregnancy Lifescript<sup>11</sup> and the *Smoking Cessation Guidelines for Australian General Practice*.<sup>12</sup>

## Conclusion

Smoking in pregnancy is an important and modifiable risk factor for poor pregnancy and infant outcomes. Smoking cessation in the first trimester increases birth weight and decreases the risk of premature birth. Any smoking cessation intervention increases the likelihood of women quitting during pregnancy, but higher intensity interventions are more likely to be successful. There is a high relapse rate associated with quitting during pregnancy, with most women returning to smoking by one year postpartum.

GPs are ideally placed to assist pregnant women to quit smoking, and resources are available to support GPs and their patients. Strategies to reduce smoking rates in pregnant women should always be implemented as part of an integrated approach to promote healthy pregnancies. **MT**

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## Smoking in pregnancy: the GP's role

### Ask

- Ask about the woman's smoking status, including exposure to environmental tobacco smoke

### Assess

- Assess the woman's interest and confidence in quitting
- Assess the probability that the woman is nicotine dependent

### Advise

- Provide advice tailored to the woman's current smoking status

#### Pregnant women who are current smokers

- Explore the motivation and confidence in quitting, barriers to quitting and coping strategies
- Provide clear nonjudgemental advice on how to quit and convey the benefits of quitting
- Provide practical advice – for example, delaying or substitution strategies

#### Pregnant women who are ex-smokers or recent quitters

- Re-affirm their decision to quit
- Review their smoking status at each visit
- Advise on Quitline support for relapse prevention

### Assist

- Provide assistance based on the woman's readiness to change, and motivators and barriers to quitting

### Arrange

- Refer the woman to Quitline or other appropriate community services
- Arrange a review appointment and discuss smoking at all subsequent antenatal visits
- Consider use of nicotine replacement therapy, preferably intermittent therapy, for woman who are unable to quit on their own or who are unsuccessful after two weeks of trying to quit.<sup>11,12</sup>

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**COMPETING INTERESTS:** None