Smoking - The Research

The relationship between smoking and infant mortality has been recognised for over half a century. Early research from the 1950s began exploring the effects of maternal smoking on birthweight and premature delivery. In the 1960s, a specific association between smoking and sudden infant death syndrome (SIDS) was identified[1]. Although SIDS deaths have declined markedly since the *Back to Sleep* campaign in the 1990s, smoking remains one of the strongest modifiable risk factors, and the proportion of SIDS cases involving parental smoking has increased[2]. Tackling smoke and nicotine exposure remains an important part of SIDS prevention.

Several large-scale reviews have demonstrated a consistent link between smoking exposure and SIDS. A 2013 meta-analysis including 35 case-control studies, with over 31,000 cases and nearly six million controls, found that both prenatal and postnatal maternal smoking doubled the risk of SIDS. This effect was observed internationally, including France, Sweden, the UK, Australia, and the United States[3]. The risk appears to increase with more cigarettes consumed[4]. Furthermore, a systematic review focusing on paternal smoking found that even when mothers did not smoke, paternal smoking increased SIDS risk by 1.5 times[5].

More recent UK data suggest that although national smoking rates in pregnancy have declined, exposure among SIDS infants remains disproportionately high. A 2020 comparison of SIDS cases with earlier case-control studies from 1993–1996 and 2003–2006 found that maternal smoking during pregnancy among SIDS cases had fallen from 65% to 52%. However, in the same period, the national prevalence of smoking during pregnancy declined from 16% to 10%, indicating that infants who die from SIDS continue to be far more likely to have been exposed to tobacco smoke[6].

To quantify an infant's exposure to smoking, an objective measure can be used. Urinary cotinine, a metabolite of nicotine, is a well-validated biomarker that reflects recent tobacco exposure. Studies have shown that cotinine levels are significantly higher in infants whose parents smoke[7,8]. The use of cotinine provides more accurate data for linking exposure levels to physiological outcomes and for evaluating the effectiveness of smoke-free interventions.

Public health initiatives promoting smoke-free environments have had measurable benefits. A U.S. study examining national data between 1995 and 2006 found that for every increase in the proportion of smoke-free homes, SIDS incidence declined by 0.4%, even after adjusting for infant sleep position [9]. Household bans on indoor smoking have also been associated with lower urinary cotinine in infants[10] and toddlers [11]. These findings show that smoke-free home policies reduce exposure and likely contribute to lowering SIDS risk at a population level.

Nicotine is known to pass into breastmilk, raising concerns that breastfeeding might increase infant exposure. However, an autopsy study found no significant difference in cotinine levels between breastfed and bottle-fed SIDS infants[12]. Breastfeeding has numerous other benefits to an infant's health, and this indicates that breastfeeding does not substantially increase exposure.

The biological mechanisms linking smoking exposure and SIDS are not fully understood, but several experimental studies offer insight. Animal models have shown that prenatal nicotine exposure alters brain receptors responsible for detecting low oxygen, potentially impairing arousal and respiratory control[13–18]. Similar findings have been observed in primate studies, where smoke-exposed rhesus monkey infants exhibited structural changes in brain pathways associated with cardiorespiratory regulation[19–21].

In human infants, smoke exposure has been linked to reduced arousability during sleep [13,15,16] and differences in cardiovascular control have been observed, including altered blood pressure and heart rate [22,23]. Autopsy studies have also identified receptor abnormalities in the brainstems of SIDS infants [24–28]. Collectively, these findings suggest that nicotine may disrupt normal autonomic and arousal responses, increasing vulnerability to sudden death during sleep.

Nicotine replacement therapy (NRT) is a tool for smoking cessation. Although its efficacy in achieving long-term abstinence is modest, a randomised control trial showed that NRT does not increase the risk of adverse infant outcomes compared with smoking[29,30]. It can therefore be used safely, though complete cessation of smoking and nicotine products provides the greatest health benefits.

Co-sleeping presents a particular danger when combined with smoking exposure. Studies from the UK, New Zealand, and Europe have shown that infants who are exposed to tobacco smoke and share a bed with a parent face a dramatically elevated SIDS risk—between 9- and 32-fold higher than infants not exposed to smoke(Blair et al., 2014; Carpenter et al., 2004; Mitchell et al., 2017). Safe sleep guidelines therefore strongly advise that parents who smoke, or whose infants were exposed to smoking in pregnancy, should not share a bed with their baby.

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Frequently asked questions

What does the research show?

Smoking is a well-known risk factor for SIDS. Even though SIDS rates have dropped in recent decades, smoking during pregnancy or after birth still greatly increases the risk. Big studies show that babies exposed to smoke, whether from mothers or fathers, are much more likely to die from SIDS, and the risk rises with heavier smoking.

In the UK, fewer pregnant women smoke overall, but babies who die from SIDS are still far more likely to have been exposed to nicotine. Researchers can measure this exposure using cotinine, a substance in the body that shows recent nicotine contact. Homes that ban indoor smoking have lower SIDS rates and children in these homes have lower cotinine levels. Although nicotine passes into breastmilk, breastfed and bottle-fed SIDS infants have similar cotinine levels. Nicotine replacement therapy is safer than smoking during pregnancy, though quitting entirely is best.

It is not definitively known why smoke-exposed babies are more vulnerable. However, studies suggest that nicotine can affect a baby's developing brain, making it harder for them to wake up or control their breathing and heart rate during sleep.

Importantly, bed-sharing between a parent a baby who has been exposed to smoke has a much higher risk of SIDS, and so it is important that these infants sleep in their own cot, on a firm flat surface.

How can I give up smoking?

You have the best chance of success if you have help from a professional stop smoking service. Speak to your midwife or health visitor or go directly to your local stop smoking service. They will have worked with many pregnant women and new parents and are there to help.

For advice and support visit the NHS website or:

in England, contact 0300 123 1044
in Scotland, contact 0800 84 84 84
in Wales, contact 0800 085 2219

Are vapes or e-cigarettes safer?

There is no research available on vaping and SIDS yet, though we are funding research to discover more. If you do choose to use a vape, keep your baby away from vapes and their vapour. Talk to your local stop smoking service for the most up-to-date advice. There is currently no research around bedsharing and vaping, so we suggest you don't share a bed with your baby if you vape.

Can you smoke whilst pregnant?

The short answer is no. If you are pregnant, one of the most protective things you can do for your baby is to stop smoking. If you smoke 1-9 cigarettes a day during pregnancy, the risk of SIDS is four times higher than for babies of people who didn't smoke at all during pregnancy. If your partner is pregnant, it's best if you stop too, as the risk of SIDS is higher in babies who were exposed to smoke during pregnancy.

Can I smoke after giving birth?

Babies who are exposed to smoke are at a higher risk of SIDS, so one of the most protective things you can do for your baby is to quit. You have the best chance of quitting if you get support, as there are expert services and products available to make it easier. If you smoke and you're having trouble quitting, don't smoke near your baby and keep them away from smoky areas. Don't share a bed with your baby if you or your partner smoke. Co-sleeping is much riskier for your baby if you or your partner smoke.

What is Nicotine Replacement Therapy and is it safe in pregnancy?

Nicotine Replacement Therapy (NRT) involves using products such as gum, patches or tablets to deliver a small amount of nicotine to your bloodstream. The idea is to ease your cravings by giving your body nicotine without the harmful by-products of smoking such as carbon monoxide and tar. Most pregnant women can use NRT safely but it's important to talk it through with your health professional first.

No one in my home smokes. Is my baby at higher risk of SIDS if they spend time with someone who smokes?

The risk of SIDS from very occasional exposure to a smoky environment is likely to be very low, but there isn't enough evidence for us to know the precise risk. Try to keep your baby smoke-free at all times to keep them as safe as possible.

Is it safe to breastfeed if I smoke?

Breastfeeding has many benefits and it's the best way to feed your baby, even if you smoke. The best option is still to quit smoking, as being around smoke increases the risk of SIDS. Quitting smoking is one of the best things you can do to protect your baby.

What is the key takeaway for families?

Research over many decades shows a clear link between smoking and SIDS, with both maternal and paternal smoking greatly increasing the risk. Quitting smoking and enforcing a smoke-free home reduces the risk of SIDS. Breastfeeding is still safe and recommended, even if you smoke or take nicotine replacement therapy. It is very important that babies who have been exposed to nicotine do not bed-share, as this has a high risk of SIDS.