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Environmental tobacco smoke exposure among infants, children and young people: now is no time to relax

The detrimental effects of Environmental Tobacco Smoke (ETS - also referred to as passive or secondhand smoke) exposure begin *in utero* as the placenta offers no barrier to ETS exposure. Maternal smoking during pregnancy increases a child's risk for reduced lung function, wheezing, and asthma even in the absence of post-natal ETS exposure. Of course, many children exposed to tobacco *in utero* are also exposed postnatally. Compared to children raised in smoke-free environments, ETS exposed children have a higher risk of sudden infant death syndrome, respiratory infection, ear infection, asthma, meningitis, and reduced lung growth. Adding to this body of evidence, the meta-analysis in this edition found that children exposed to ETS had increased risk of respiratory adverse events during the perianaesthetic period of surgery.¹

The harms of ETS exposure follow a child into adulthood. Even when children do not adopt parental smoking habits and assume a smoke-free lifestyle in adulthood, they are still more likely to experience persistent respiratory symptoms into adulthood.² Beyond those risks, children with at least one smoking parent are about 60% more likely to take up smoking in adulthood themselves and the risk of uptake is much higher if both parents smoke³, compounding the risks of childhood ETS exposure with personal smoking in adulthood.

In 2016, the U.K. and U.S. have smoking bans in most public indoor spaces. In the U.S., smoking bans are increasingly extending outdoors, covering university campuses and around the entrances to office buildings, restaurants, and hospitals. More recently, in the U.K. legislation has been enacted banning smoking in cars carrying under-18 year olds with similar bans in parts of the U.S., Australia, and Canada. Also in the U.K. there is increasing support for extending smoke-free legislation to public places visited by children and young people; on 30th August 2016, every playground in the city of Cardiff, Wales became officially smoke-free.

While many low- and middle-income countries also have smoke-free legislation, there is less political will to enforce it. Thus, as high-income countries have continued to pass smoke-free legislation and limit advertising, tobacco companies have shifted their marketing and product to low- and middle-income countries where, according to the WHO, almost 80% of the world's 1 billion smokers live.

However, even in countries with strong and well-enforced smoke-free legislation, infants, children, and young people continue to be exposed to ETS. ETS exposure varies widely by country and has a strong socioeconomic gradient, with lower socioeconomic status children having the highest ETS exposure.⁴ The primary source of ETS exposure in children is parental smoking in the home.³ Exposure to

ETS in the home is estimated at about 2 million children in the U.K. and 40% of children worldwide.⁵ As a population, children appear to be most susceptible to tobacco smoke. Their lungs are not fully developed and relative to their body size, children have higher respiration and metabolism. Children are also more likely to stay in close proximity to smoking caregivers and spend more time indoors.

Opponents of smoking bans in public places predicted that it would displace smoking into the home. However, the opposite has been shown to be true. Smoke-free legislation is associated with an increase in smoke-free homes^{4 5} and children inarguably benefit, especially when they are strictly enforced. However, even when children live in a home with a strict household smoking ban, their exposure to toxins from ETS is still 5 to 10 times higher than children from non-smoking households.⁵ Exposure to residual tobacco – also known as thirdhand smoke – may in part explain the increased cotinine levels.

Residual tobacco sticks to walls, surfaces, upholstery, or air vents and can remain in dust. Residual tobacco can also be on the smoker him/herself in hair, clothes, and on hands. Unlike passive smoking with inhalation as a sole pathway for exposure, residual tobacco can be inhaled, ingested, or absorbed dermally. This puts very small children at high risk of exposure because of hand-to-mouth behaviour and their regular proximity to the ground.

For these reasons we propose the following steps to combat ETS exposure in children:

1) Comprehensive tobacco control policies are needed internationally. As advertising has become more restrictive and sales have decreased in high-income countries, tobacco companies have shifted their product to countries with poorly-enforced anti-tobacco legislation. Children in low- and middle-income countries are therefore at particular risk.

2) Reduce the prevalence of smoking among pregnant women and parents. Smoking prevalence remains relatively high among young adults and pregnant women, especially in low income groups. Investment in effective smoking prevention, especially in more disadvantaged areas, continues to be required, as does the development of effective interventions to promote and maintain smoking cessation during the ‘teachable moments’ of pregnancy, child illness or surgery.¹

3) Increase the number of homes that are smoke-free. Encourage parents who smoke to instigate strict smoking bans in their homes, recognising that domestic living circumstances and relationships may make this more difficult for those in more disadvantaged areas. Banning smoking in detached homes (even when children reside there) is controversial, however there is increasing support for smoking bans in multi-unit and rented housing. In 2007 the city of Belmont, California banned smoking everywhere in the city except single-family detached homes and many cities in the state followed suit.

4) **Explore e-cigarettes as a harm reduction tool for parents.** E-cigarettes deliver nicotine in a vapour rather than in smoke. While recognising evidence of the impacts of nicotine on fetal and child brain and lung development,⁶ there is general agreement that e-cigarettes are significantly safer than tobacco products, for both active and passive smokers.⁷ Although there are concerns that the potential harms of e-cigarettes are not fully understood,⁷ it has been suggested that they should be 'promoted' as a smoking cessation tool by the public health community.⁸ Whether or not the smoker achieves or maintains cessation, use of e-cigarettes could contribute to a reduction in children's exposure to ETS.

5) **Explore the risks posed to children by residual tobacco exposure.** Residual tobacco exposure is less understood and acknowledged than ETS, but there is a growing body of evidence that it is harmful. Legislation to reduce residual tobacco exposure in children could be modeled on previous environmental toxins like lead or asbestos.

Smoking prevalence and associated ETS risk have declined in many countries, due to comprehensive tobacco control measures taken to counter the global tobacco epidemic, including those set out in the 2003 WHO Framework Convention on Tobacco Control (FCTC) treaty.

Despite positive health outcomes experienced in many countries due to reductions in smoking prevalence and associated ETS exposure, many children still suffer the consequences of exposure to ETS. Children in low- and middle-income countries as well as those of lower socioeconomic status in high-income countries are at particular risk. While the steps outlined here would make a significant contribution towards combatting ETS exposure in children, a bigger step would be for more countries to fully implement the WHO FCTC and adopt the tobacco endgame concept, with its vision of future tobacco-free generations.

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