

RCOG Position Statement: Outdoor air pollution and pregnancy in the UK

June 2021

This Royal College of Obstetricians & Gynaecologists (RCOG) position statement marks Clean Air Day 2021.

Key points:

- There is a growing evidence base linking maternal exposure to air pollution and adverse pregnancy outcomes.
- There has been a long-term decrease in UK emissions of air pollutants,¹ however pollution has not dropped fast enough and levels, particularly of particulate matter, have plateaued in the last decade.
- We are calling on the UK Government to take ambitious action on air pollution to safeguard the health of pregnant women and their babies, and of future generations. Most urgently, this must include a legally binding commitment to achieve World Health Organization (WHO) guideline limits on particulate matter by 2030 at the latest.
- Exposure to some level of air pollution is unavoidable in day-to-day life, and there is limited evidence-based, effective advice healthcare professionals can give to help pregnant women fully protect themselves and their baby. Government investment in air pollution monitoring and research is therefore essential.

Introduction

Outdoor air pollution is a major public health concern in the UK. The Royal College of Physicians (RCP) and Royal College of Paediatrics and Child Health (RCPCH) estimate that the annual mortality burden in the UK from exposure to outdoor air pollution is equivalent to around 40,000 deaths, and has an annual social cost of £22.6 billion.²

Research shows that air pollution can impact health throughout the life course, and has been linked to cancer, asthma, stroke and heart disease, diabetes, obesity, and changes linked to dementia.³

At least one in three babies are growing up in areas of the UK with unsafe levels of particulate matter, the most dangerous pollutant for our health.⁴ The WHO estimates that over 70 percent of towns and cities in the UK have unsafe levels of fine particulate matter (PM_{2.5}).⁵

People from socially and economically disadvantaged backgrounds are more likely to be exposed to high levels of air pollution and are more at risk of negative health effects.⁶ Research has identified racial and ethnic inequities in exposure, for example in London, schools with the highest percentage of non-white pupils have been found to have average levels of nitrogen oxides (NOx) that were 28 percent higher than schools with the lowest proportion of non-white students.⁷

¹ DEFRA, [Emissions of air pollutants in the UK – Summary](#) (2021)

² Royal College of Physicians and Royal College of Paediatrics and Child Health, [Every breath we take](#) (2016)

³ Royal College of Physicians and Royal College of Paediatrics and Child Health, [Every breath we take](#) (2016)

⁴ UNICEF, [A breath of toxic air: UK children in danger](#) (2018)

⁵ UNICEF, [A breath of toxic air: UK children in danger](#) (2018)

⁶ UK Health Alliance on Climate Change, [Moving beyond the air quality crisis](#) (2018)

⁷ London Assembly, [Clearing the air: pollution in London](#) (2021)

Air pollution exposure during pregnancy

Rapid cell division occurs during fetal development and is therefore a critical window of exposure to adverse environmental pollutants.⁸ There is a growing body of evidence that links maternal exposure to air pollution and adverse pregnancy outcomes. Air pollution particles have been shown to reach the fetal side of the placenta⁹ and there is consistent evidence that exposure to air pollution such as particulate matter and ozone (O₃) during pregnancy increases the risk of low birth weight and preterm birth.¹⁰

In the UK, research has identified links between prenatal, early-life and childhood exposure to road traffic particulate matter and later “small but significant” reductions in lung function during childhood.¹¹ Evidence also suggests that the risk of term low birth weight increases as maternal exposure to particulate matter increases.¹² Road traffic air pollution in London (with its high urban and air polluting traffic density) has been suggested to adversely affect fetal growth.¹³ A recent meta-analysis has reported a link between prenatal exposure to PM_{2.5} and autistic spectrum in children.¹⁴

There is increasing international evidence to link air pollution and reduced fertility, both in the general population and among women accessing fertility services. For example, nitrogen dioxide, particulate matter and ozone have been associated with miscarriage and reduced live birth rate.¹⁵ Research has also demonstrated a proximity effect for prenatal pollutant exposures – the retirement of coal and oil power plants in North America, which emit air pollutants including particulate matter and nitrogen oxides, have been associated with significant reductions in preterm birth in women living within a 10 km radius.¹⁶

The well understood adverse cardiovascular risks of air pollution also extend into a woman’s reproductive life: exposure to air pollutants including particulate matter, ozone and nitrogen dioxide increase the risk of pre-eclampsia.¹⁷

Key UK pollutants and sources

In the UK, particulate matter and nitrogen oxides are two pollutants which pose the greatest threat to population health:

Particulate matter (PM) are tiny particles suspended in the air, and may be referred to by their diameter. PM_{2.5}, thought to be the air pollutant which has the greatest impact on health,¹⁸ can enter the lungs and be transported around the body, entering the heart, brain and other organs. The WHO recognises a close,

⁸ The fetal origin of adult disease hypothesis ([Barker, Lancet 1986](#)); Royal College of Physicians and Royal College of Paediatrics and Child Health, [Every breath we take](#) (2016)

⁹ Bové, H et al., [Ambient black carbon particles reach the fetal side of human placenta](#). *Nat Commun* (2019)

¹⁰ Bekkar, B. et al., [Association of Air Pollution and Heat Exposure With Preterm Birth, Low Birth Weight, and Stillbirth in the US: A Systematic Review](#) *JAMA Netw Open* (2020) and Chen, J. et al., [Effects of air pollution on all cause neonatal and post-neonatal mortality: population-based study](#) *Sci Total Environ* (2021)

¹¹ Hansell, A. et al., [Prenatal, early-life and childhood exposure to air pollution and lung function in the UK Avon Longitudinal Study of Parents and Children \(ALSPAC\) cohort](#) *European Respiratory Journal* (2019)

¹² Chen, Y et al., [Trimester effects of source-specific PM10 on birth weight outcomes in the Avon Longitudinal Study of Parents and Children \(ALSPAC\)](#) *Environ Health* (2021)

¹³ Smith, R. B et al., [Impact of London's road traffic air and noise pollution on birth weight: retrospective population based cohort study](#) *BMJ* (2017)

¹⁴ Chun H et al. [Maternal exposure to air pollution and risk of autism in children: A systematic review and meta-analysis](#) *Environ Pollut* (2019)

¹⁵ Conforti, A. et al., [Air pollution and female fertility: a systematic review of literature](#) *Reprod Biol Endocrinol* (2018)

¹⁶ Casey, J.A et al. [Retirements of Coal and Oil Power Plants in California: Association With Reduced Preterm Birth Among Populations Nearby](#) *American Journal of Epidemiology* (2018)

¹⁷ Pedersen M. et al., [Ambient air pollution and pregnancy-induced hypertensive disorders: a systematic review and meta-analysis](#) *Hypertension* (2014)

¹⁸ UK Health Alliance on Climate Change, [Moving beyond the air quality crisis](#) (2018)

quantitative relationship between exposure to high concentrations of particulate matter and increased mortality and morbidity, both daily and over time.¹⁹

In the UK, around half of all PM pollution is caused by human activity.²⁰ Of anthropogenic emissions of PM_{2.5} in 2019, domestic combustion (mostly burning wood in closed stoves and open fires) accounted for 43 percent, industrial combustion and processes accounted for 33 percent of emissions²¹ and road transport accounted for 12 percent,²² but a greater proportion of roadside pollution. Over 60 percent of particulate matter from road transport comes from brake wear, tyre wear and road surface wear, and this is expected to become more dominant in the future.²³

Emissions of PM_{2.5} from domestic wood burning more than doubled between 2003 and 2019. Since the late 2000s, significant decreases in emissions from some sectors have been largely offset due to increases in emissions from wood burning in a domestic setting and by solid fuel burning by industry.²⁴

Nitrogen oxides (NOx) are gases that are mostly formed when fossil fuels such as petrol are burned, and include nitrogen dioxide (NO₂). Short term NO₂ exposure can cause sore eyes and inflammation of airways, and long term exposure contributes to cardiorespiratory disease such as stroke and chronic obstructive pulmonary disease. NOx are a major problem in cities, with 80 percent of roadside NOx emissions coming from road transport.²⁵

RCOG recommendations

1. Legally enforced air quality standards that at least meet WHO recommended limits

The UK Government must show strong international leadership and adopt legal limits on particulate matter which at least meet WHO guidelines,²⁶ to be met by 2030 at the latest.

UK Government performance against these targets must be scrutinised by a truly independent Office of Environmental Protection (OEP), which has adequate power and resources to enforce limits. The OEP should also be responsible for enforcing limits on NOx and other pollutants.

This commitment must be coupled with robust plans to ensure that targets are met, legal exposure limits are decreased over time, and new targets are rapidly considered in the face of new evidence, for example on currently unregulated pollutants such as ultrafine particles.

As part of the UK's efforts to reach WHO recommended limits of particulate pollution, we welcome stronger controls on household wood burning, and action to raise awareness of the contribution of burning to health harms from air pollution, particularly within smoke control areas (SCAs).

2. Curb transport emissions through Clean Air Zones and other initiatives

Reducing traffic in the most polluted areas must be a priority, and we welcome the expansion of Clean Air Zones, which have been demonstrated to be highly effective interventions. In London, roadside nitrogen dioxide (NO₂) pollution was reduced by 36 percent in the Ultra Low Emission Zone between February 2017 to September 2019.²⁷

¹⁹ WHO, [Ambient \(outdoor\) air pollution](#)

²⁰ DEFRA, [National Statistics: Emissions of air pollutants in the UK – Particulate matter \(PM10 and PM2.5\)](#) (2021)

²¹ Ibid.

²² Ibid.

²³ DEFRA, [Non-Exhaust Emissions from Road Traffic](#) (2019)

²⁴ DEFRA, [National Statistics: Emissions of air pollutants in the UK – Particulate matter \(PM10 and PM2.5\)](#) (2021)

²⁵ UK Health Alliance on Climate Change, [Moving beyond the air quality crisis](#) (2018)

²⁶ WHO, [Ambient \(outdoor\) air pollution fact sheet](#) (2018)

²⁷ Mayor of London, [ULEZ reduces 13,500 cars daily & cuts toxic air pollution by a third](#) (2019)

Local and regional authorities must have the power to charge vehicles and the funding to ensure effective implementation. When pollution levels exceed limits, local authorities must have the power to close or divert roads, especially near schools.²⁸ We also support the creation of a strategy to support the introduction of School Streets in all appropriate locations.

The UK should work with international partners to research and develop new standards for tyres and brakes, as major contributors to particulate matter.

3. Ambitious and equitable investment to support and promote active, green and shared travel

A reduction in road transport of all kinds is needed to minimise air pollution and associated negative health impact. Across and between towns and cities, there need to be high quality shared transport options and safe, protected spaces for cycling and walking, which are inclusive of non-commuter journeys, to enable everyone to choose to travel actively or take shared transport if they wish.

The UK Government should commit to dramatically extending the Cycling and Walking Investment Strategy, with binding targets. We welcome recent funding commitments to high-quality cycling and walking infrastructure across England. Women are significantly more likely to make multi-stop journeys and experience specific barriers to choosing to travel actively,²⁹ and must be represented equally in infrastructure planning processes and consultations at the local, regional and national level.

We also support increased investment in road safety campaigns which raise motorists' awareness of their responsibilities and Highway Code stipulations regarding vulnerable road users.

4. Action and research must focus on most vulnerable groups and the heavier toll on deprived communities

Adverse pregnancy outcomes related to air pollution are higher among low socioeconomic and ethnic minority groups.³⁰ Central and local governments must set out plans to progressively reduce the impact of air pollution on these clinically vulnerable populations, alongside plans to reduce air pollution impacts on the population in general.

Further investment in air pollution monitoring and research is essential, and must develop understanding of the relationship between health, socioeconomic position and air pollution. Key areas of future research necessary to understand the full health impact of air pollution include the effects of longer-term exposure, effects on the developing fetus, unequal impact among racialised groups, the health impacts of WHO limits and below, and impacts of existing interventions.

5. Investment in renewable energy generation as part of a green recovery from the pandemic

Investment in renewable energy generation and energy efficiency businesses must be part of a healthy and sustainable recovery from the pandemic.

The UK Government must finally phase out coal power by 2024 at the latest, coupled with a range of new incentives to homes and businesses to invest in renewable power and energy efficiency. We would also welcome a commitment to ending investment in all fossil fuel projects abroad, with no exceptions.

²⁸ Royal College of Physicians and Royal College of Paediatrics and Child Health, [Every breath we take](#) (2016)

²⁹ Sustrans, ["Are we nearly there yet?": Exploring gender and active travel](#) (2018)

³⁰ Gray, S.C., Edwards, S.E., Schultz, B.D. et al. [Assessing the impact of race, social factors and air pollution on birth outcomes: a population-based study](#). *Environ Health* (2014)

About the RCOG, and our commitments to the environment

The Royal College of Obstetricians and Gynaecologists (RCOG) is a professional membership organisation made up of over 16,000 members worldwide. We work to improve the health of women, by setting standards for clinical practice, providing doctors with training and lifelong learning, and advocating for women's health care.

The RCOG is a member of the UK Alliance on Climate Change, and supports recommendations set out in the paper [Moving beyond the air quality crisis](#) (2018), [Principles for a healthy and green recovery](#) (2020), and [Call for climate action](#) (2021)

Reducing the environmental impact of our work forms a key part of our 2020-25 strategy. This includes achieving a significantly reduced carbon footprint through our comprehensive digital transformation programme, eliminating single use plastic in our offices, and reviewing our Investment Strategy with a view to disinvesting in products with an adverse impact on the environment.