Royal College of Obstetricians & Gynaecologists

UK Government consultation on environmental targets: target proposals for air quality

RCOG response
June 2022

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 also supports recommendations set out in their response to this consultation.

We disagree with the level of ambition proposed for a PM2.5 concentration target.

The RCOG recommends that the PM2.5 concentration target of 10 micrograms per cubic metre (the WHO interim target) is set to be met across England by 2030 – ten years earlier than is currently proposed – given the connection between PM2.5 exposure during pregnancy and adverse maternal and perinatal health outcomes.

Our concerns, and the vital evidence not considered in the setting of the proposed targets, is set out below.

1) The proposed target does not take account of the unique impact of air pollution exposure during pregnancy

The consultation document and detailed evidence report for this target takes note of some vulnerable groups particularly impacted by poor air quality. However, there appears to have been no consideration of the unique impact air pollution exposure has during pregnancy and beyond, both on the health of the pregnant woman, on fetal development, and on the future health of her baby after birth.

Similarly, the accompanying Impact Assessment does not consider the particular vulnerabilities to fine particulate pollution evidenced during fetal development, as well as the health impacts of pollution exposure during pregnancy and the potential lifelong impacts that may follow.

As air pollution exposure in pregnancy is linked to many poor pregnancy outcomes, this is a vast oversight which disregards both the health of pregnant women and that of future generations.

2) Exposure to PM2.5 during pregnancy – what evidence should have been considered?

There is consistent evidence that exposure to particulate matter during pregnancy increases the risk of poor pregnancy outcomes including stillbirth, low birth weight and preterm birth.[i]

It has long been accepted that in utero exposures to harmful toxins influence fetal programming and leads to disease in adult life. Fetal development is a critical window of exposure to environmental pollutants – which can have long-term impacts on future health – due to the rapid cell division which takes place during this period.[i] Air pollution particles have been shown to reach the fetal side of the placenta,[ii] the critical organ that regulates the fetal environment.[iii]

Prenatal air pollution exposure has been shown to adversely alter the expression of fetal genes in a process called epigenetics, effectively preventing the fetal genes from functioning properly. Moreover, air pollutants including PM2.5 generate molecules called reactive oxygen species which damage the rapidly replicating fetal DNA, proteins and lipids, and activate inflammatory cells.[iv] This is known as oxidative stress, and leads to cell and tissue damage. This then results in a susceptibility to a range of chronic conditions in child and adult life.

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.[v] Evidence also suggests that the risk of fetal growth restriction increases as maternal exposure to particulate matter increases.[vi] Road traffic air pollution in London (with its high urban and traffic density) has been suggested to adversely affect fetal growth.[vii]

Globally, numerous studies, including systematic reviews with meta-analysis, have demonstrated a link between pre-pregnancy and prenatal exposure to air pollutants, and lower fertility and live birth rates, as well as adverse pregnancy outcomes including higher rates of miscarriage, stillbirth, preterm birth and low birthweight.[viii] A recent meta-analysis has reported a link between prenatal exposure to PM2.5 and autistic spectrum disorder in children.[ix]

The *Lancet Miscarriage Matters* series concluded that exposure to air pollution increases miscarriage risk and that therefore air pollution constitutes a "modifiable risk factor" for miscarriage.[x]

Pregnant women are especially vulnerable to PM2.5 exposure because the physiological changes of pregnancy entail a 40 percent increase in both the volume of air (containing the PM2.5) breathed in and out and her circulating blood volume. In addition, the well understood adverse cardiovascular risks of air pollution also extend into maternal health

outcomes. For example, exposure to air pollutants including particulate matter, ozone and nitrogen dioxide have been linked to an increased risk of pre-eclampsia, a serious cardiovascular condition of pregnancy that needs immediate treatment.[xi]

There is limited evidence-based, effective advice healthcare professionals can give to help pregnant women protect themselves and their baby from air pollution, including PM2.5. Unless more ambitious action is taken at a national level, air pollution will remain an unavoidable reality for pregnant women and those working in maternity care.

3) Air pollution is a health equity issue and a modifiable determinant of health

The consultation documents recognise that people living in areas of higher deprivation often have higher exposure to PM2.5, and that those living in city centres, and near busy roads are most exposed to dangerous levels of air pollution. Research shows that low socioeconomic and ethnic minority groups are much more likely to live in heavily polluted urban areas and so suffer the highest adverse health outcomes described above.[xii]

The UK Government's Department of Health and Social Care (DHSC) has stated ambitions to address ethnic and socioeconomic disparities in maternity care and halve rates of stillbirths, neonatal and maternal deaths by 2025.[xiii] In light of the impacts of PM2.5 on maternal and perinatal health, and the known disparities in exposure, making a commitment to meet the interim WHO target for PM2.5 by 2030 is one key opportunity DEFRA and DHSC to work together to reduce the persistent racial, ethnic and socioeconomic inequalities found in maternal and perinatal health in the UK.

The need for the cross-departmental working within the UK Government in order to improve women's health is set out in the DHSC's Vision for the Women's Health Strategy for England, which references an ambition to ensure that disparities between groups of women are considered as part of the wider levelling-up agenda, including through working with other government departments.[xiv]

4) RCOG recommendations

The RCOG recommends that the PM2.5 concentration target of 10 micrograms per cubic metre is set to be met across England by 2030 – ten years earlier than proposed – given the connection between PM2.5 exposure during pregnancy and adverse maternal and perinatal health outcomes. 2040 is 18 years away, meaning that under the proposed target another generation of children are set to grow up breathing harmful levels of PM2.5.

The impact of PM2.5 on maternal and perinatal health outcomes must be explicitly referenced when justifying the final target set.

The Clean Air Fund and Imperial College London 'Pathway to Healthy Air in the UK' report clearly demonstrates that a PM2.5 target of 10 micrograms per cubic metre can be met by 2030 if current and proposed policies are fully implemented.[xv] The same research

highlighted clear economic and health co-benefits of meeting this target by 2030 compared to no change from UK levels in 2018, including around 20 fewer infant deaths per year, and children across the UK suffering an average of 388,000 fewer days of asthma symptoms per year.

We are disappointed that this consultation on environmental targets does not include targets for reducing the amount of other components of air pollution which have adverse impacts on maternal and perinatal outcomes, including ozone, nitrogen dioxide and sulphur dioxide. We would also like to see urgent consideration given to setting stronger targets informed by the updated WHO guidelines published in September 2021.

We disagree with the level of ambition proposed for a population exposure reduction target.

The particular impact of air pollution on health in pregnancy and childhood, as discussed above, must be considered when setting final population exposure reduction targets.

In 2019, more than 250,000 children in the UK were born in areas where levels of PM2.5 exceeded the interim WHO target, and 71 maternity units, where an estimated 183,979 babies are born each year (29 percent of all newborns) are located in areas which exceed the interim WHO target.[xvi] This suggests that much more ambitious action, and a specific consideration given to reducing exposure in maternity care settings, is required.

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[v] 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)
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[viii] Climate change, women's health, and the role of obstetricians and gynecologists in leadership; RCOG, Outdoor air pollution and pregnancy in the UK (2021)
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[xiv] DHSC, Our Vision for the Women's Health Strategy for England (2021)
[xv] Clean Air Fund, The Pathway to Healthy Air in the UK (2022)
[xvi] Asthma + Lung UK, One baby born breathing toxic air every two minutes in the UK (2021)