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Air pollution is the largest environmental risk to public health and children are especially vulnerable

Camilla Kingdon *president*

I studied medicine at the University of Cape Town, graduating in 1989. Over six years as an undergraduate I was taught the science of medicine by teachers who were superb scientists and clinicians. I graduated with a keen sense of pathology, anatomy, microbiology and all the specialties. Unsurprisingly, I was acutely aware of how the politics of the day impacted on how I practised medicine in South Africa and from a very early undergraduate stage it didn't take a genius to realise that ethnicity had a direct impact on the pattern of diseases and patient outcomes. Yet we were not taught about the social determinants of health—I don't think the concept even existed then.

Don Berwick, Emeritus President of the Institute of Healthcare Improvement in the US, recently wrote: "It is not a smart investment for society to keep running healthcare as a repair shop without also moving upstream to the real generators of illness, injury, injustice, and disability." My specialty of paediatrics and child health works largely upstream as Berwick describes. We work at the sharp edge of the social determinants of health—whether that is poverty, inequality, or climate change.

As paediatricians we are well aware that air pollution is a critical issue for children across the planet. Certain parts of the world are disproportionately affected and so the burden of exposure is not shared evenly or fairly. Pollution from fine particulate matter, household burning of solid fuels, and ozone is responsible for millions of early deaths each year and an estimated 1 in 9 deaths worldwide, with the highest exposures occurring in Asia, Africa, and the Middle East.

In the UK, air pollution is the largest environmental risk to public health and children are especially vulnerable. Globally, more than 90% of children are exposed to ambient fine particulate matter (PM2.5) levels above the World Health Organisation's Global Air Quality Guidelines (originally set at 10mcg/m^3, but now more ambitiously set at 5mcg/m^3). Air pollution is linked to 16% of all deaths in children under five years.[1]

After birth, babies and children are much more vulnerable to air pollution than adults. Children breathe faster, so they inhale more airborne toxins in proportion to their weight, and their organs and immune systems are still developing—therefore toxin-induced damage is far more likely to have an impact. We know that children with asthma are much more likely to have recurrent exacerbations if they are exposed to the fine particulate matter in polluted indoor and outdoor air. Asthma is the most common long term condition among children and young people, with 1.1 million children currently receiving asthma treatment in the UK. It continues to be among the top 10 causes of emergency hospital admission for children and concerningly, the UK has the highest mortality rate in Europe for children and young people with the underlying cause of asthma.

We now know that air quality impacts a child's development. Poor air quality has a negative influence on memory in children and also hinders the ability to reason and problem solve, as measured by the Performance IQ score in a fascinating study looking at cognitive function in children in a number of cities in Africa.[2] Just last month, a study from King's College London found that exposure to PM2.5 particles during adolescence had a significant impact on systolic blood pressure, especially in girls, in a study of over 3000 teenagers living in London.

Our more deprived communities in the UK are typically exposed to higher levels of air pollution, and pregnancy outcomes related to air pollution are worse among low socioeconomic and ethnic minority groups. Likewise, emergency admissions for asthma are strongly associated with deprivation and poverty, and asthma outcomes are worse for children and young people living in the most deprived areas. So, poverty and air pollution are inexorably linked.

At the Royal College of Paediatrics and Child Health (RCPCH) we are clear that the impact of air pollution is a child rights issue. Children have the right to breathe clean air and yet 90% of the children on this planet do not. This year marked the 10-year anniversary of the death of 9-year old Ella Adoo-Kissi-Debrah. Ella was the first person in the UK to have air pollution listed as a cause of death. As a paediatrician, I don't believe any other child in the UK should be allowed to suffer in the way Ella did. I want to see Ella's Law passed and the Government to act to bring air quality in every community up to the minimum WHO standards and establish the right to breathe clean air as a basic human right. We've seen clean air schemes in London, Birmingham, Bristol and other cities, but we need to see further action across our country. This would be a monumental win in the battle against air pollution in the UK.

Air pollution is an emerging global emergency that threatens the health and productivity of people across the planet. It unfairly impacts those that have contributed the least to this crisis—particularly children. We must act proactively and collaboratively to tackle this.

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1 World Health Organization. More than 90% of the world's children breathe toxic air every day. https://www.who.int/news/item/29-10-2018-more-than-90-of-the-worlds-children-breathe-toxic-air-every-day

2 Chandra M, Rai CB, Kumari N, etal. Air Pollution and Cognitive Impairment across the Life Course in Humans: A Systematic Review with Specific Focus on Income Level of Study Area. *Int J Environ Res Public Health* 2022;19:. doi: 10.3390/ijerph19031405. pmid: 35162428