



Prevalence of health impacts related to exposure to poor air quality among children in LICs and LMICs – Summary¹

This summary is based on a rapid review that provided an assessment of the contemporary health impacts arising from household (indoor) and ambient (outdoor) air pollution exposure in low-income (LIC) and lower-middle-income countries (LMICs), with a specific focus on children aged under 5 years. The review synthesises findings of key systematic reviews, as well as international and national reports.

Air pollution is recognised as the largest global environmental risk to health, contributing to an estimated >7 million premature deaths worldwide each year (WHO, 2018b).² Globally, an estimated 93% of children live in environments where outdoor air pollution levels exceeds World Health Organization health-based air quality limit values, and more than one in four deaths of children aged under 5 years is directly or indirectly related to environmental risks (WHO, 2018b). The economic costs of these losses is also significant; the World Bank estimated that globally air pollution led to USD 5.1 trillion in welfare losses and USD 225 billion in lost labour income globally in 2013 (World Bank and IHME, 2016).

Ambient air pollution: Overall ambient air pollution was estimated in 2016 to be responsible for 4.2 million premature deaths worldwide, with 91% occurring in LMIC settings and the greatest burden in the South-East Asia and Western Pacific regions. Over half of these deaths (58%) were due to ischaemic heart disease (IHD) and strokes, while 18% of deaths were due to chronic obstructive pulmonary disease (COPD) and acute lower respiratory infections respectively, and 6% were due to lung cancer (WHO, 2018a).

Household air pollution: is estimated to cause 3.8 million premature deaths each year, of which it is estimated over one quarter are due to pneumonia (27%), 18% from strokes, 27% from IHD, 20% from COPD and 8% from lung cancer. These deaths include 45% of all those arising from pneumonia in those aged up to 5 years old (WHO, 2018b).

Overall, air pollution exposure contributed to 9% of deaths worldwide in 2017; a proportion which varies from 2% in many high-income countries to 15% across many countries, notably in South East Asia (WHO, 2018b). After standardisation for age profile differences, **the highest mortality burden arising from total ambient and household pollution is experienced within Africa and South-East Asia.**

¹ Bartington, S. & Avis, W. (2020). Prevalence of health impacts related to exposure to poor air quality in low and lower middle income countries. K4D Helpdesk Report 775. Brighton, UK: Institute of Development Studies. Retrieved from <https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/15689>

² Variations in figures of mortality associated with air pollution (indoor and outdoor) stem from differences in approaches to estimation of associated death and confidence intervals. There exists a broad consensus that cumulatively, air pollution kills over 7 million people annually.

The WHO estimates that urban air pollution levels increased by 8% from 2008-13, and 97% of cities in LICs and LMICs with over 100,000 inhabitants exceed WHO air quality guidelines, thereby contributing to global health inequity (WHO, 2018a). The United Nations (UN) Sustainable Development Goals (SDGs) also recognise the critical importance of environmental factors as determinants of health, including ensuring healthy lives for all (SDG3), making cities inclusive, safe, resilient and sustainable (SDG11), and enabling access to clean energy (SDG13) by 2030.

The proportions of children exposed to levels of fine particulate matter (PM_{2.5}) higher than the WHO air quality guidelines are as follows (WHO, 2018b):

- 93% of all children, and about 630 million children aged under 5 years worldwide;
- in high-income countries (HICs), 52% of children under 5 years;
- in LMICs, 98% of all children under 5 years;
- in the WHO African and Eastern Mediterranean regions, 100% of all children under 5 years;
- in LMICs in the South-East Asia Region, 99% of all children under 5 years;
- in LMICs in the Western Pacific Region, 98% of all children under 5 years; and
- in LMICs in the Region of the Americas, 87% of all children under 5 years.

There exists a significant difference in exposure to poor air quality of children in HICs versus LMICs with 52% of children under 5 years exposed to poor air quality in the former and 98% in the latter.

Air pollution is recognised to exert adverse acute and chronic health effects throughout the human life course, from before birth, through childhood, adulthood, and later life (RCP, 2016). Susceptible sub-groups include fetuses, young children (under 5 years), the elderly, persons with certain underlying diseases, groups exposed to other toxicants that interact with air pollutants, and those with low socioeconomic status (WHO Regional Office for Europe, 2004). Children are particularly susceptible to poor air quality; air pollutants inhaled during pregnancy can cross the placenta and affect the developing brain, and typical childhood activity patterns result in a higher duration of personal exposure to air pollution concentrated near ground level (UNICEF, 2017; RCP, 2016). The evidence suggests that the early years are also the best time to invest in a child's health, through action to improve their environment and reduce pollutant exposure.

Although overall levels of air pollution have declined in HICs over the past 25 years, they have continued to increase in LIC and LMIC settings, notably the African, South-East Asia, Eastern Mediterranean and Western Pacific regions (WHO, 2018a). These contexts present the dual contemporary public health challenge of exposure to hazardous levels of both ambient and household air pollution, as a consequence of rapid industrialisation, urbanisation, and ongoing reliance upon solid biomass fuels for basic domestic energy needs.

Quantifying the association between pollutant exposure and distribution of specific disease outcomes provides the best available information for policymakers and facilitates public communication concerning air pollution risks. However, there exists a paucity of high quality, large scale epidemiological studies conducted in LIC and LMIC contexts, resulting in gaps in our current knowledge (Gall, Carter, Earnest, & Stephens, 2013). Specific challenges include the availability of vital statistics, access to health information management systems, inconsistency in clinical coding practices, and limited public health research infrastructure.

Globally, using available health and demographic data sources it has been estimated that among children aged under 5 years in 2016, air pollution was responsible for 543,000 deaths, including 403,000 deaths from Acute Respiratory Lung Infections (ARLIs) and 37 million total Disability-Adjusted Life Years (DALYs) (WHO, 2018b). This reflects 9% of the total deaths arising from air pollution worldwide concentrated among LICs and LMICs in sub-Saharan Africa, South and South-East Asia, and the Western Pacific Regions.

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