



# AIR POLLUTION AND CHILD HEALTH

## Prescribing clean air

SUMMARY



World Health  
Organization



# AIR POLLUTION AND CHILD HEALTH

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## Prescribing clean air

### S U M M A R Y

WHO/CED/PHE/18.01

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# PREFACE

This report summarizes the latest scientific knowledge on the links between exposure to air pollution and adverse health effects in children. It is intended to inform and motivate individual and collective action by health care professionals to prevent damage to children's health from exposure to air pollution. Air pollution is a major environmental health threat. Exposure to fine particles in both the ambient environment and in the household causes about seven million premature deaths each year (1,2). Ambient air pollution alone imposes enormous costs on the global economy, amounting to more than US\$ 5 trillion in total welfare losses in 2013 (3).

The evidence is clear: air pollution has a devastating impact on children's health.

This public health crisis is receiving more attention, but one critical aspect is often overlooked: how air pollution affects children in uniquely damaging ways. Recent data released by the World Health Organization (WHO) show that air pollution has a vast and terrible impact on child health and survival. Globally, 93% of all children live in environments with air pollution levels above the WHO guidelines (see the full report, *Air pollution and child health: prescribing clean air* (4)). More than one in every four deaths of children under 5 years of age is directly or indirectly related to environmental risks (5). Both ambient air pollution and household air pollution contribute to respiratory tract infections that resulted in 543 000 deaths in children under the age of 5 years in 2016 (1).

Although air pollution is a global problem, the burden of disease attributable to particulate matter in air is heaviest in low- and middle-income countries (LMICs), particularly in the WHO African, South-East Asia, Eastern Mediterranean and Western Pacific regions (1,6). LMICs in these regions – especially the African Region – have the highest levels of exposure to household air pollution due to the widespread use of polluting fuels and technologies for basic daily needs, such as cooking, heating and lighting (7). Poverty is correlated with high exposure to environmental health risks. Poverty can also compound the damaging health effects of air pollution, by limiting access to information, treatment and other health care resources.

The enormous toll of disease and death revealed by these new data should result in an urgent call to action for the global community – and especially for those in the health sector. Strong action to reduce exposure to air pollution offers an unparalleled opportunity to protect the health of children everywhere. Health professionals have a central role to play in this effort. Health effects experienced early in life can increase a child's future risk of disease and lead to lifelong consequences. A child who is exposed to unsafe levels of pollution early in life can thus suffer a "life sentence" of illness. Health professionals are well positioned to communicate with families, communities and decision-makers about these and other serious risks of exposure to air pollution.

The Sustainable Development Goals (SDGs) recognize the importance of social and environmental factors as determinants of health. All the SDGs are clearly linked to health-related targets, reflecting the growing awareness that health, environmental and poverty alleviation are interconnected – that ensuring healthy lives for all (SDG 3) and making cities inclusive, safe, resilient and sustainable (SDG 11) require universal access to energy (SDG 7) and hinge upon combatting climate change (SDG 13). The launch of the 2030 Agenda for Sustainable Development offers an unparalleled opportunity to increase action to address the environmental hazards that undermine children’s health. Implementing evidence-based policies and health practices to protect children from air pollution will, in turn, be essential to realizing the Sustainable Development Agenda: reducing children’s exposure can have enormous benefits due to avoided disease, reduced mortality and improved well-being. Reducing air pollution can also improve health and well-being by slowing climate change. It is estimated that, by 2030, climate change will be responsible for 250 000 deaths each year (8). As many of the same pollutants that threaten health, such as black carbon and ozone (O<sub>3</sub>), are also important agents of atmospheric warming, interventions that reduce their emissions are likely to result in benefits for both children’s health and the climate.

We must seize this opportunity to create healthy, sustainable environments for our children. Everyone has a role to play, at every level: individuals, families, paediatricians, family doctors, nurses, obstetricians and gynaecologists, primary health care providers and other community workers, communities, medical students, national governments and international agencies. Their efforts should be guided by the best available evidence on the health effects of air pollution on children and on effective interventions to counter them. This document is designed to support this effort. It reports the latest scientific knowledge on the health effects of air pollution in children. The breadth and depth of the evidence make clear that air pollution is a formidable disruptor of children’s health – one that deserves far greater attention from both policy-makers and health professionals. As children experience the consequences of air pollution in special, specific ways, they deserve to be assessed in a special way. This publication provides practical, reliable information for health professionals, paediatricians and other clinicians in all countries. It will be a useful reference for action: a compendium of the accumulating evidence on the links between air pollution and children’s health and a source of guidance for health care providers in their clinical practice and in their collective communication of risks and solutions to the public and to policy-makers.

Children are society’s future. But they are also its most vulnerable members. The immense threat posed to their health by air pollution demands that health professionals respond with focused, urgent action. Although more rigorous research into how air pollution affects children’s health will continue to be valuable, there is already ample evidence to justify strong, swift action to prevent the damage it clearly produces. Health professionals must come together to address this threat as a priority, through collective, coordinated efforts. For the millions of children exposed to polluted air every day, there is little time to waste and so much to be gained.



A handwritten signature in black ink, which appears to read 'Tedros Adhanom Ghebreyesus'.

**Dr Tedros Adhanom Ghebreyesus**  
Director-General  
World Health Organization



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# CHILDREN'S EXPOSURE TO AIR POLLUTION

Exposure to air pollution is an overlooked health emergency for children around the world. While such exposure is a persistent problem in some high-income countries (HICs) – especially in low-income communities within those countries – the vast majority of child deaths from exposure to particulate matter air pollution occur in LMICs.

Children are exposed to air pollution both outdoors and indoors. Ambient air pollution is derived mainly from fossil fuel combustion, industrial processes, waste incineration, agricultural practices and natural processes such as wildfires, dust storms and volcanic eruptions. The main sources of air pollution may vary from urban to rural areas, but no area is, strictly speaking, safer. Ambient air pollution was responsible for 4.2 million premature deaths in 2016; of these, almost 300 000 were children under the age of 5 years (1).

The risks associated with breathing household air pollution can be just as great. Breathing clean air at home is essential for children’s healthy development, but widespread dependence on solid fuels and kerosene for cooking, heating and lighting results in far too many children living in heavily polluted home environments. About three billion people worldwide still depend on polluting fuels and devices for cooking and heating (7). Women and children in LMICs spend much of their time around the hearth, exposed to smoke from cooking fires, resulting in indoor concentrations of some pollutants that are five or six times the levels in ambient air. The widespread lack of access to clean household energy has tragic consequences on a vast scale: household air pollution was responsible for 3.8 million premature deaths in 2016, including over 400 000 deaths of children under the age of 5 years (9).

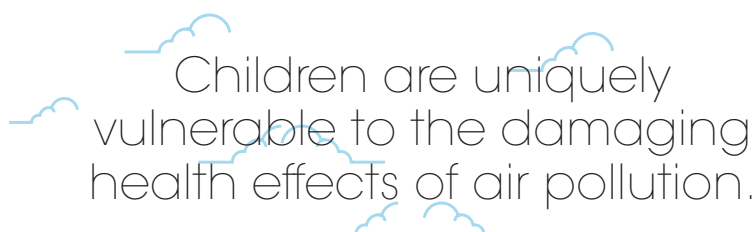
## 1.1 Exposure to ambient air pollution

The proportions of children exposed to levels of fine particulate matter (PM<sub>2.5</sub>) higher than the WHO air quality guidelines (Fig. 1) are as follows:

- 93% of all children, and about 630 million children under 5 years, in the world;
- in LMICs, 98% of all children under 5 years;
- in HICs, 52% of 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.

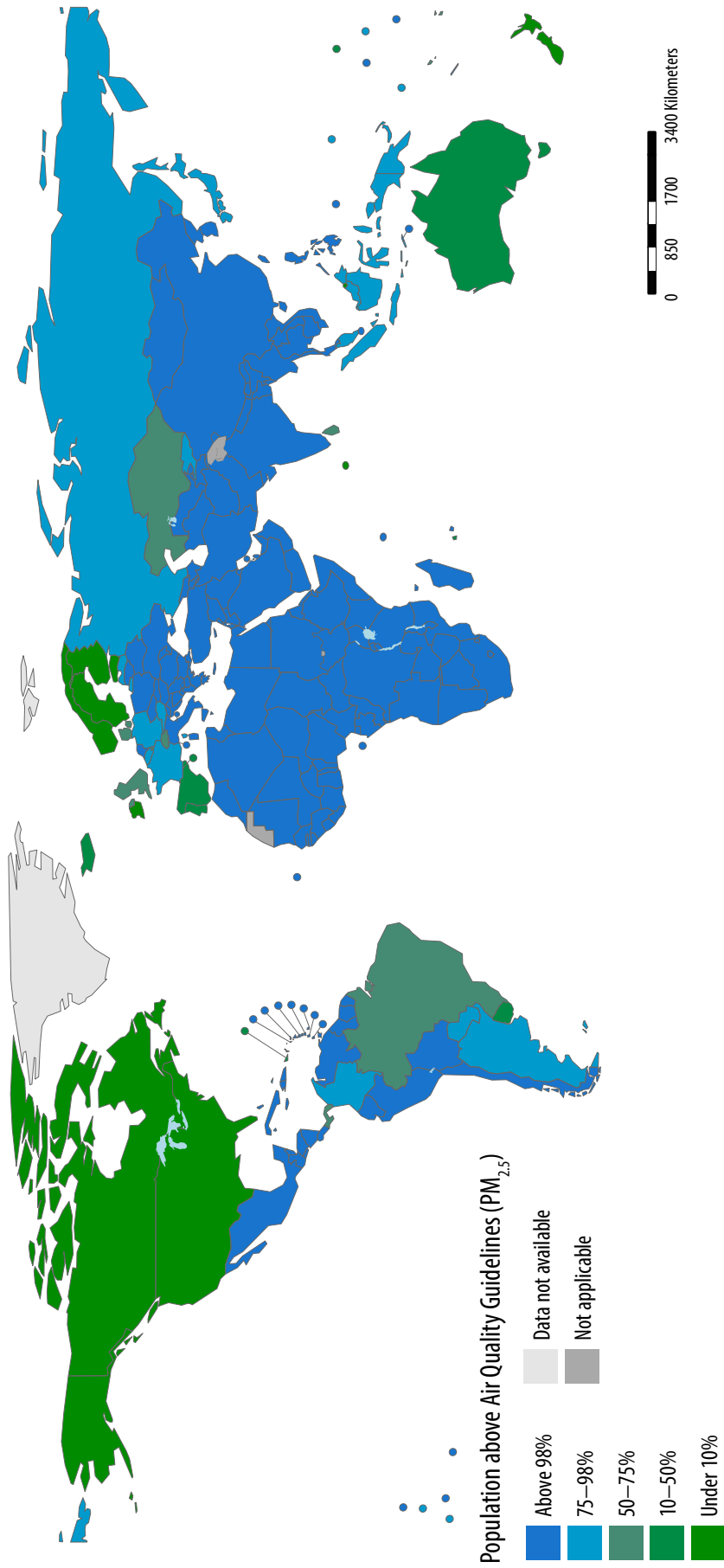
## 1.2 Exposure to household air pollution

In 2016, 41% of the world’s population was exposed to household air pollution from cooking with polluting fuels and technologies. The use of polluting fuels and technologies for cooking is almost exclusively a problem in LMICs, affecting 83% of the population in the African Region, 59% in the South-East Asia Region and 42% in the Western Pacific Region. The Eastern Mediterranean Region follows, with 31% of its population relying primarily on polluting fuels and devices, while the proportions in the Region of the Americas and the European Region are 13% and 6%, respectively (4).



Children are uniquely vulnerable to the damaging health effects of air pollution.

**Fig. 1. Proportions of children under 5 years living in areas in which the WHO air quality guidelines ( $PM_{2.5}$ ) are exceeded, by country, 2016**



Source: (10).



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## 2 CHILDREN'S VULNERABILITY AND SUSCEPTIBILITY TO AIR POLLUTION

Air pollution is a global public health crisis. Exposure to pollutants in the air threatens the health of people of all ages, in every part of the world, in both urban and rural areas, but it affects the most vulnerable among us – children – in unique ways. Children are at greater risk than adults from the many adverse health effects of air pollution, owing to a combination of behavioural, environmental and physiological factors. Children are especially vulnerable during fetal development and in their earliest years, while their lungs, organs and brains are still maturing. They breathe faster than adults, taking in more air and, with it, more pollutants. Children live closer to the ground, where some pollutants reach peak concentrations. They may spend much time outside, playing and engaging in physical activity in potentially polluted air. Newborn and infant children, meanwhile, spend most of their time indoors, where they are more susceptible to household air pollution, as they are near their mothers while the latter cook with polluting fuels and devices.

Children have a longer life expectancy than adults, so latent disease mechanisms have more time to emerge and affect their health. Their bodies, and especially their lungs, are rapidly developing and therefore more vulnerable to inflammation and other damage caused by pollutants. In the womb, they are vulnerable to their mothers' exposure to pollutants. Exposure before conception can also impose latent risks on the fetus. Even after birth, they often remain powerless to change their environment: the very youngest cannot simply get up and walk out of a smoke-filled room. The consequences of their exposure – through inhalation, ingestion or in utero – can lead to illness and other health burdens that last a lifetime. But children depend entirely on us – adults – to protect them from the threat of unsafe air.






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# 3 CHILDREN'S BURDEN OF DISEASE RELATED TO AIR POLLUTION

Tables 1 and 2 show the joint burden of disease from ambient and household air pollution.




- Globally in 2016, one in every eight deaths was attributable to the joint effects of ambient and household air pollution – a total of 7 million deaths.
- Some 543 000 deaths in children under 5 years and 52 000 deaths in children aged 5–15 years were attributed to the joint effects of ambient and household air pollution in 2016.
- Together, household air pollution from cooking and ambient air pollution cause more than 50% of acute lower respiratory tract infection (ALRI) in children under 5 years in LMICs.
- Of the total number of deaths attributable to the joint effects of household and ambient air pollution worldwide in 2016, 9% were in children.

**Table 1. Death rate per 100 000 children attributable to the joint effects of household and ambient air pollution in 2016, by WHO region and income level**

WHO region	 Income level	 Children < 5 years	 Children 5–14 years
African	LMIC	184.1	12.9
	HIC	4.3	1.4
Americas	LMIC	14.2	0.7
	HIC	0.3	0.0
South-East Asia	LMIC	75.0	2.5
European	LMIC	8.8	0.6
	HIC	0.3	0.0
Eastern Mediterranean	LMIC	98.6	3.6
	HIC	5.3	0.4
Western Pacific	LMIC	20.5	1.0
	HIC	0.3	0.0
All	LMIC	88.7	4.5
	HIC	0.6	0.1
<b>World</b>		<b>80.5</b>	<b>4.1</b>

LMIC, low- and middle-income country; HIC, high-income country.

**Table 2. Population attributable fractions of child mortality due to ALRI as a joint effect of household and ambient air pollution, 2016, by WHO region and income level**

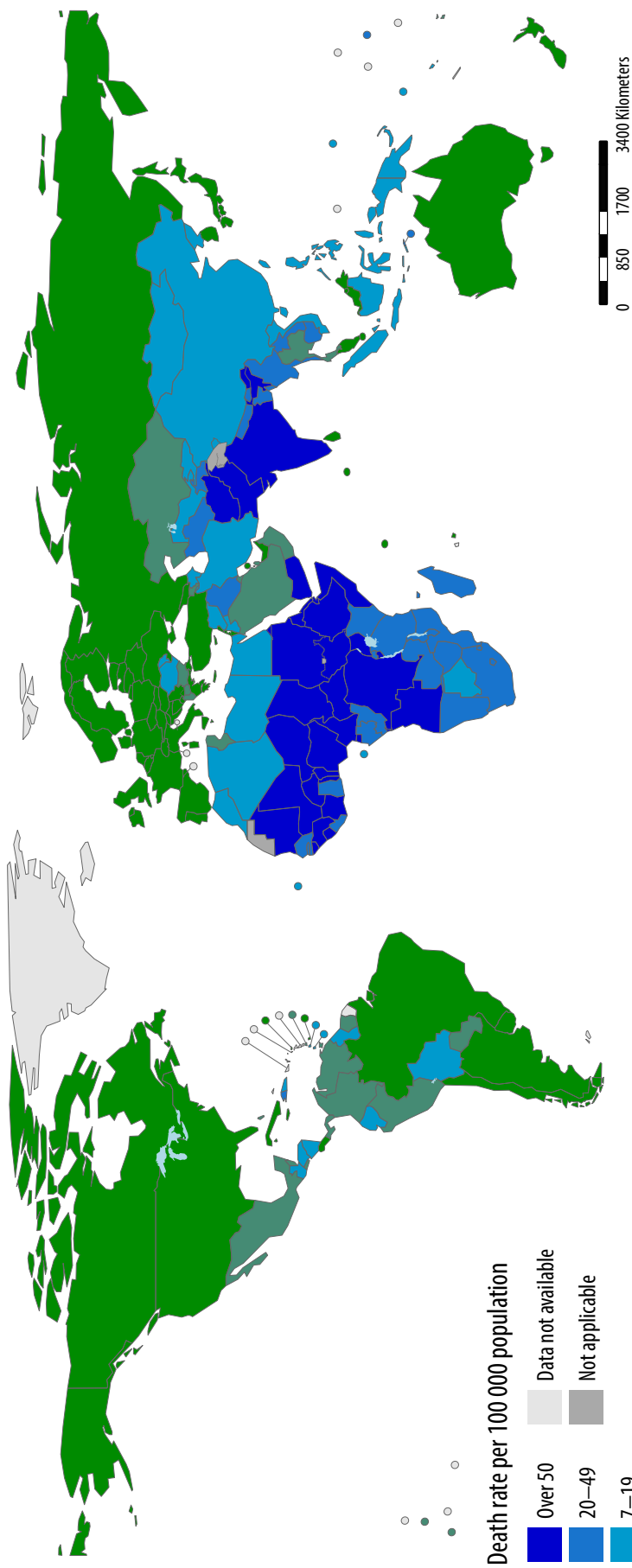
WHO region	 Income level	 Children < 5 years	 Children 5–14 years
African	LMIC	66	66
	HIC	25	24
Americas	LMIC	34	34
	HIC	8	7
South-East Asia	LMIC	63	62
European	LMIC	27	27
	HIC	13	14
Eastern Mediterranean	LMIC	58	55
	HIC	40	40
Western Pacific	LMIC	53	52
	HIC	12	11
All	LMIC	62	62
	HIC	18	15
<b>World</b>		<b>62</b>	<b>62</b>

ALRI, acute lower respiratory tract infection; LMIC, low- and middle-income country; HIC, high-income country.



**Burden of disease due to ambient air pollution.** In 2016, ambient air pollution was responsible for approximately 261 000 deaths from ALRI and almost 24 million disability-adjusted life-years among children under 5 years. The numbers of deaths from ALRI due to ambient air pollution in children under the age of 5 years are shown in Fig. 2. The numbers of disability-adjusted life-years due to ambient air pollution in children under 5 years and children aged 5–14 years are shown in the full report (4).

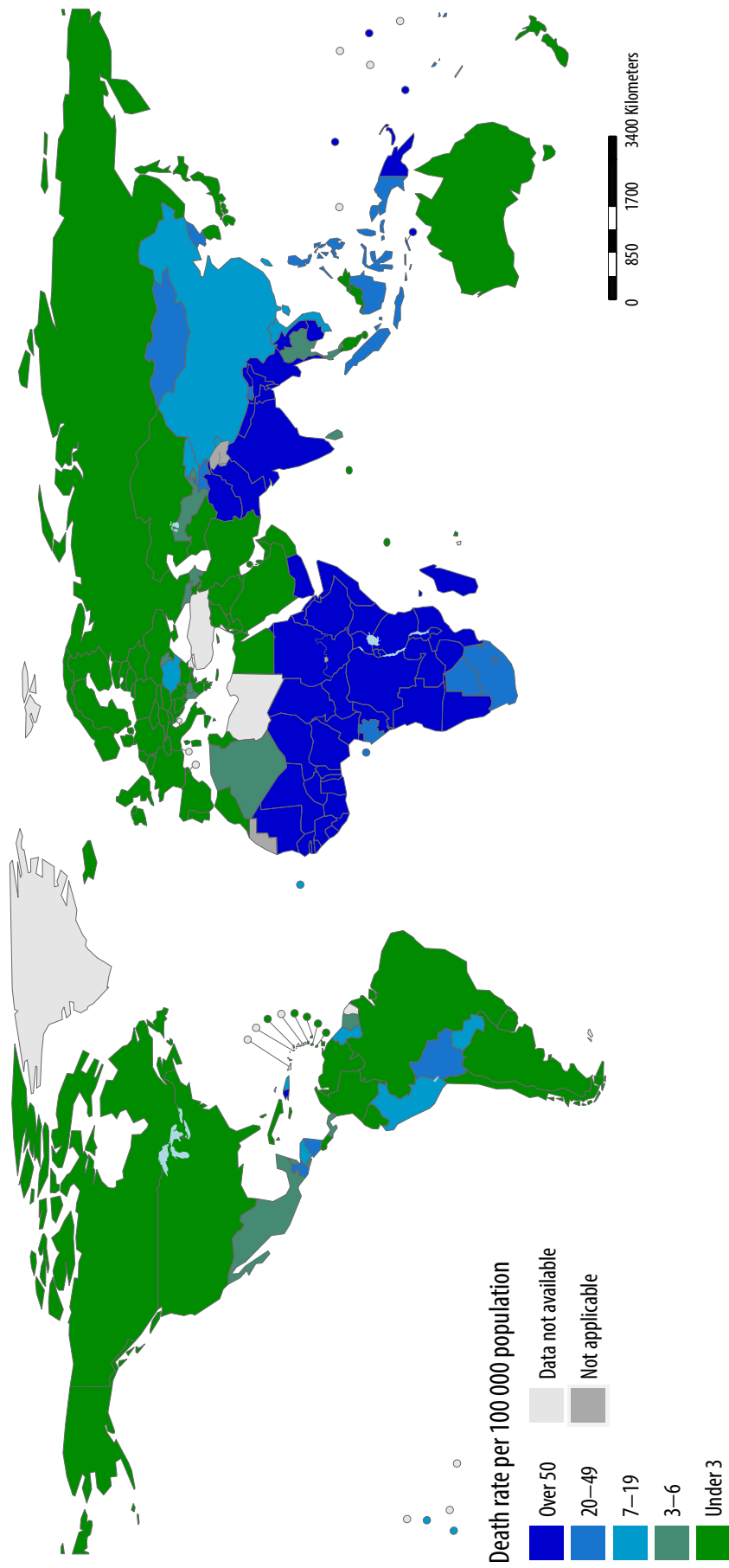
**Fig. 2. Death rate per 100 000 population from ALRI due to ambient air pollution in children under 5 years, 2016**



ALRI, acute lower respiratory tract infection.  
Source: (4).

**Burden of disease due to household air pollution.** In 2016, household air pollution was responsible for approximately 403 000 deaths from ALRI and 37 million disability-adjusted life-years among children under 5 years (Fig. 3).

**Fig. 3. Death rate per 100 000 population from ALRI due to household air pollution in children under 5 years, 2016**

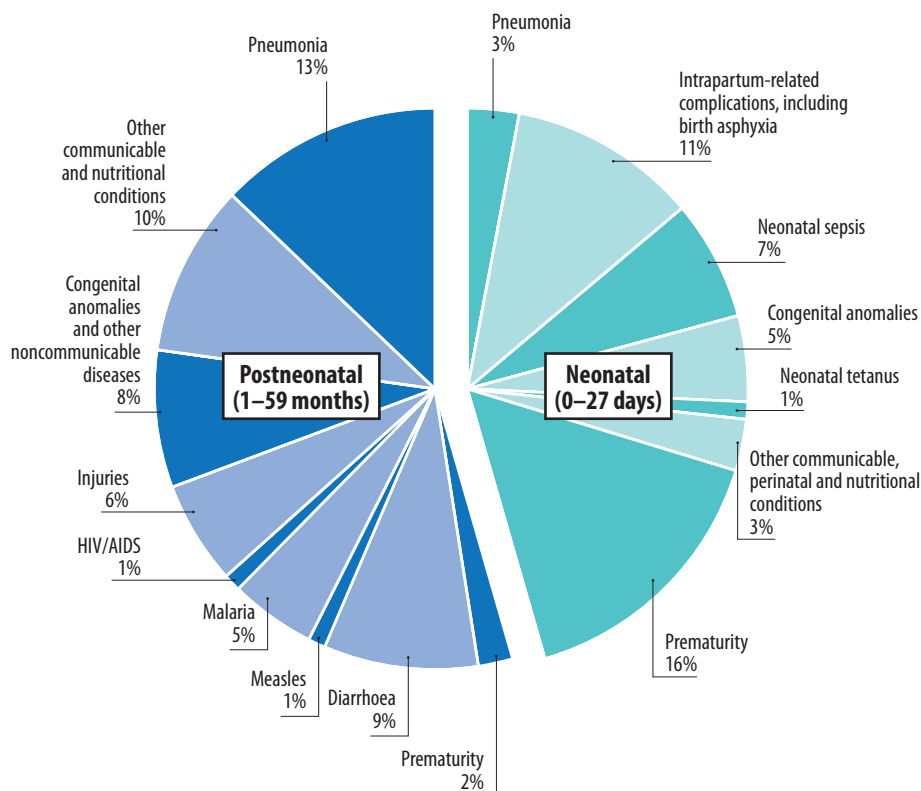


ALRI, acute lower respiratory tract infection.  
Source: (4).

These tragically high tolls are for just one disease, ALRI. The total burden of mortality and morbidity among children due to exposure to ambient and household air pollution is much greater. Evidence of the many different adverse health effects of exposure to air pollution is discussed below.

Exposure to air pollution contributes to more than half of all deaths from ALRI in children under 5 years in LMICs, making it one of the leading killers of children worldwide. The five leading causes of death in children under 5 years globally are prematurity, acute respiratory infection, intrapartum-related complications (including birth asphyxia), other group 1 conditions and congenital anomalies (11). Premature birth is the only factor that kills more children under the age of 5 years globally than acute respiratory infection (Fig. 4). In the African Region, acute respiratory infection is the leading cause of death of children under 5 years of age.

**Fig. 4. Causes of deaths among children under 5 years, 2016**



Source: (11).



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# 4 SOURCES OF AIR POLLUTION

## 4.1 Ambient air pollution: children's health toll, sources and solutions

Ambient air pollution caused about 4.2 million premature deaths in 2016 (12). It is estimated that, in 2016, 286 000 children under 15 years of age died from exposure to unhealthy levels of ambient air pollution (4).

Ambient air is polluted from many sources, both anthropogenic and natural, which differ in urban and rural areas. In urban settings, the main sources are fossil fuel combustion for energy production, transport, residential cooking, heating and waste incineration. Rural communities in LMICs are exposed to pollution emitted primarily from household burning of kerosene, biomass and coal for cooking, heating and lighting, from agricultural waste incineration and from certain agro-forestry activities (13). These processes produce complex mixtures of pollutants that can interact chemically. They typically include carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), lead, arsenic, mercury, sulfur dioxide (SO<sub>2</sub>), polycyclic aromatic hydrocarbons (PAHs) and particulate matter (PM). The last affects more people than any other air pollutant, and it is commonly used as a proxy indicator of air pollution more broadly.

Addressing ambient air pollution is a high priority for governments and multilateral agencies around the world. Many proven solutions are available to reduce emissions of dangerous pollutants, including cleaner transport, cleaner cooking and heating fuels and technologies, energy-efficient housing and urban planning, low- or zero-emission power generation, cleaner, safer industrial technologies and better municipal waste management (14). The WHO air quality guidelines (14) provide recommended thresholds and limits for key ambient air pollutants that must be met in order to protect health; an updated version will be published in 2020.

## 4.2 Household air pollution: children's health toll, sources and solutions

Household air pollution is produced mainly by the incomplete combustion of polluting fuels and technologies for cooking, heating and lighting (7,13). In 2016, WHO estimated that about three billion people – 41% of the world's population – used polluting cooking sources, most of them in LMICs (7). This number has remained largely unchanged for the past three decades. The damage to health caused by such widespread dependence on polluting energy sources is severe and extensive: in 2016, household air pollution from solid fuel and kerosene use resulted in an estimated 3.8 million premature deaths. This toll is equivalent to 6.7% of global mortality, greater than that from malaria, tuberculosis and HIV/AIDS combined. Of these deaths, 403 000 were among children under the age of 5 (9). Household air pollution is also an important source of ambient air pollution, as residential cooking contributes as much as 12% of global PM<sub>2.5</sub> to ambient air (13).

In many parts of the world, children are especially vulnerable to household air pollution because they spend a great deal of time in the home and with their mothers as the latter tend the hearth. Smoke emitted from burning biomass, coal, charcoal and kerosene to meet the basic needs of cooking, heating and lighting is the primary contributor to household air pollution (7). Burning these fuels in inefficient devices produces complex mixtures of contaminants. In dwellings with poor ventilation, emissions of fine particulate matter and other pollutants from stoves can reach 100 times the maximum exposure level recommended by WHO (13).

In 2014 WHO issued *Guidelines for indoor air quality: household fuel combustion* (15), the first guidelines to define fuels and technologies for cooking, heating and lighting that are clean for health at the point of use, including electricity, liquefied petroleum gas, biogas, ethanol and solar stoves, as well as some high-performing biomass stoves. The guidelines discourage household use of kerosene and unprocessed coal because of the serious associated health hazards. Unfortunately, kerosene is still used for lighting by many of the about one billion people who lack access to electricity. Achieving universal access to clean, safe household energy is a high priority on the global sustainable development agenda, reflected in SDG 7: "ensure access to affordable, reliable, sustainable and modern energy for all".

## 4.3 Other indoor sources

Many other indoor air pollutants that are risks to health are beyond the scope of this report. These include volatile organic compounds from household products and building supplies, asbestos, pesticides, mercury (e.g. from broken thermometers), radon and biological pollutants. Tobacco smoke is another significant source of indoor air pollution and a health risk for children; the health effects of tobacco smoke have been reviewed extensively in other WHO documents.

## 4.4 Social determinants of children's health

Poverty is strongly correlated with exposure to air pollution. Children in LMICs and in low-income communities within HICs disproportionately suffer the effects of air pollution. Poverty causes people to rely on polluting energy sources for their basic needs and compounds the health risks associated with their use. Poverty also limits people's capacity to improve the environment in which they raise their children. Air pollution is often a chronic problem in poor-quality housing and temporary settlements. The exposure of people living in refugee camps can be particularly high, as they are forced to scavenge for nearby wood and other fuels or to rely on kerosene stoves for heating and cooking.

Women and girls are the primary users and procurers of household energy around the world. Dependence on the energy sources that produce the most household air pollution (e.g. wood and other solid fuels) used in inefficient stoves also poses other important health and safety risks. In many LMICs, children have the daily or weekly task of fuel collection, often walking long distances with heavy loads of wood and other fuels. A WHO analysis of survey data from 16 African countries in 2016 found that girls in households that used polluting fuels and technologies spent about 18 hours each week collecting wood or water, whereas girls in households in which clean fuels and technologies were used primarily spent 5 hours each week in those tasks (13). This work robs children of time spent for playing and studying. It also leads to musculoskeletal disorders and can expose children, particularly girls, to higher risk of violence as they venture far from their household (13, 16).



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# 5

## EFFECTS OF AIR POLLUTION ON CHILDREN'S HEALTH

There is compelling evidence that exposure to air pollution damages the health of children in numerous ways. The evidence summarized in this report is based on a scoping review of relevant studies published within the past 10 years and input from dozens of experts around the world. Please see the full report for detailed chapters on the relationship between exposure to ambient and household air pollution, and these important health effects (4).

### **Adverse birth outcomes**

Numerous studies have shown a significant association between exposure to ambient air pollution and adverse birth outcomes, especially exposure to PM, SO<sub>2</sub>, NO<sub>x</sub>, O<sub>3</sub> and CO. There is strong evidence that exposure to ambient PM is associated with low birth weight. There is also growing evidence that maternal exposure, especially to fine PM, increases the risk of preterm birth. There is emerging evidence for associations between exposure to air pollution and other outcomes, such as stillbirth and infants born small for gestational age.

### **Infant mortality**

There is compelling evidence of an association between air pollution and infant mortality. Most studies to date have focused on acute exposure and ambient air pollution. As pollution levels increase, so too does the risk of infant mortality, particularly from exposure to PM and toxic gases.

### **Neurodevelopment**

A growing body of research suggests that both prenatal and postnatal exposure to air pollution can negatively influence neurodevelopment, lead to lower cognitive test outcomes and influence the development of behavioural disorders such as autism spectrum disorders and attention deficit hyperactivity disorder. There is strong evidence that exposure to ambient air pollution can negatively affect children's mental and motor development.

## Childhood obesity

A limited number of studies have identified a potential association between exposure to ambient air pollution and certain adverse metabolic outcomes in children. The findings include positive associations between exposure to air pollution in utero and postnatal weight gain or attained body-mass index for age, and an association has been reported between traffic-related air pollution and insulin resistance in children.

## Lung function

There is robust evidence that exposure to air pollution damages children's lung function and impedes their lung function growth, even at lower levels of exposure. Studies have found compelling evidence that prenatal exposure to air pollution is associated with impairment of lung development and lung function in childhood. Conversely, there is evidence that children experience better lung function growth in areas in which ambient air quality has improved.

## ALRI, including pneumonia

Numerous studies offer compelling evidence that exposure to ambient and household air pollution increases the risk of ALRI in children. There is robust evidence that exposure to air pollutants such as PM<sub>2.5</sub>, NO<sub>2</sub> and O<sub>3</sub> is associated with pneumonia and other respiratory infections in young children. Growing evidence suggests that PM has an especially strong effect.

## Asthma

There is substantial evidence that exposure to ambient air pollution increases the risk of children for developing asthma and that breathing pollutants exacerbates childhood asthma as well. While relevant there are fewer studies on household air pollution, there is suggestive evidence that exposure to household air pollution from use of polluting household fuels and technologies is associated with the development and exacerbation of asthma in children.

## Otitis media

There is clear, consistent evidence of an association between ambient air pollution exposure and the occurrence of otitis media in children. Although relatively few studies have examined the association between non-tobacco smoke household air pollution and otitis media, there is suggestive evidence that combustion-derived household air pollution may increase the risk of otitis media.

## Childhood cancers

There is substantial evidence that exposure to traffic-related air pollution is associated with an increased risk of childhood leukaemia. Several studies have found associations between prenatal exposure to ambient air pollution and higher risks for retinoblastomas and leukaemia in children. While relatively few studies have focused on household air pollution and cancer risk in children, household air pollution is strongly associated with several types of cancer in adults and typically contains many substances classified as carcinogens.

## Relation between early exposure and later health outcomes

Children exposed to air pollution prenatally and in early life are more likely to experience adverse health outcomes as they mature and through adulthood. Exposure to air pollution early in life can impair lung development, reduce lung function and increase the risk of chronic lung disease in adulthood. Evidence suggests that prenatal exposure to air pollution can predispose individuals to cardiovascular disease later in life.

Altogether, there is clear, compelling evidence of significant associations between exposure to air pollution and a range of adverse health outcomes. The evidence suggests that the early years, starting in pregnancy, are the best time to invest in a child's health, through action to improve their environment and reduce their exposure to pollutants. This window of time offers a great opportunity: precisely because children are most vulnerable and sensitive to environmental influences in their earliest years, action taken during this critical phase can yield immense health benefits.



# 6

## RECOMMENDED ACTIONS FOR HEALTH PROFESSIONALS

The scientific evidence outlined above suggests many clear, concrete steps that can be taken now to reduce the exposure of pregnant women, children and adolescents to air pollution. Health professionals are trusted sources of information and guidance. They play an important role not only in treating ill health caused by air pollution but also in educating families and patients about risks and solutions and communicating with the broader public and decision-makers (Fig. 5). The role of health professionals in the management of childhood exposure to air pollution through improved methods of care and prevention and collective action must be amplified. Health professionals can provide evidence to shape public health policy and advocate for effective policies to reduce children's exposure to air pollution. The broader health sector must become more engaged in preparing a comprehensive approach to addressing this crisis.



**Fig. 5. Critical role of health professionals**



### **Be informed**

All health professionals should consider air pollution a major risk factor for their patients and understand the sources of environmental exposure in the communities they serve. They should be informed about existing and emerging evidence on the ways in which air pollution may affect children's health.



### **Recognize exposure and related health conditions**

Health professionals have an important role in identifying causative risk factors in order to prevent disease. A health care provider can identify air pollution-related risk factors by asking pertinent questions about the child's or pregnant mother's environment.



### **Research, publish and disseminate knowledge**

Health professionals can conduct research on the effects of air pollution on children's health and publish the results of studies of the causes, mechanisms and effects of environmental exposure of children, as well as on potential treatment, prevention and management. They can use this evidence to inform social and behaviour change communication strategies.



### **Prescribe solutions, and educate families and communities**

Health professionals can "prescribe" solutions to air pollution-related problems, such as switching to clean household fuels and devices. In contexts in which there are significant barriers to adopting clean household energy, health care professionals can recommend "transitional" solutions that offer some incremental health benefit, and they can provide resources and information on relevant government and non-profit programmes to help reduce exposure.



### **Educate colleagues and students**

By training others in the health and education fields, health professionals can increase the reach of their messages on the health risks of air pollution and strategies to reduce exposure. Health professionals can engage their colleagues in their workplace, local health care centres, at conferences and in professional associations. They can support the inclusion of children's environmental health in curricula in post-secondary institutions and particularly in medical, nursing and midwifery schools.



### **Advocate solutions to other sectors, policy- and decision-makers**

Health professionals are well positioned to share their knowledge with decision-makers, including members of local governments and schools boards, and with other community leaders. Health professionals can accurately convey the health burden of air pollution to decision-makers, conduct health-based assessments, support improved standards and policies to reduce harmful exposure, advocate for monitoring and emphasize the need to protect children at risk.



# 7 COLLECTIVE ACTION FOR EQUITY AND ACCESS

Low-income families have limited options to improve the air quality in their homes. Because of market and other forces beyond their control, clean fuels and technologies may not be affordable, available or accessible. Outside the household, individuals and families have even less control over what is emitted into the air that surrounds them. Individual protective measures such as use of clean stoves for cooking may mitigate household air pollution and improve the health of the whole family; however, reducing ambient air pollution requires wider action, as individual protective measures are not only insufficient, but are neither sustainable nor equitable. To reduce and prevent exposure to both household air pollution and ambient air pollution, public policy is essential.

Air pollutants do not recognize political borders but travel wherever the wind and prevailing weather patterns take them. Therefore, regional and international cooperative approaches are necessary to achieve meaningful reductions in children's exposure. Approaches to preventing exposure must be complementary and mutually reinforcing, on every scale: houses, clinics, health care institutions, municipalities, national governments and the global community. Health care professionals can push together for strong action from decision-makers to protect the most vulnerable, voiceless citizens: children who have little or no control over the air they breathe. Individual efforts can add up to collective action that changes minds, changes policies and changes the quality of the air around us. Such actions would go far towards ensuring that children can breathe freely, without the terrible burdens imposed by air pollution.

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# ANNEX: GLOSSARY

## **Child**

WHO defines a “child” as a person under 19 years of age, an “adolescent” as a person aged 10–19 years, an “infant” as a person aged 0–11 months and a “newborn” as a person aged 0–28 days. References to “child mortality” usually pertain to children aged 0–59 months.

## **Outdoor air pollution**

Refers to the presence in the air of one or more substances at a concentration or, for a duration, above their natural levels, with the potential to produce an adverse effect.

## **Indoor air pollution**

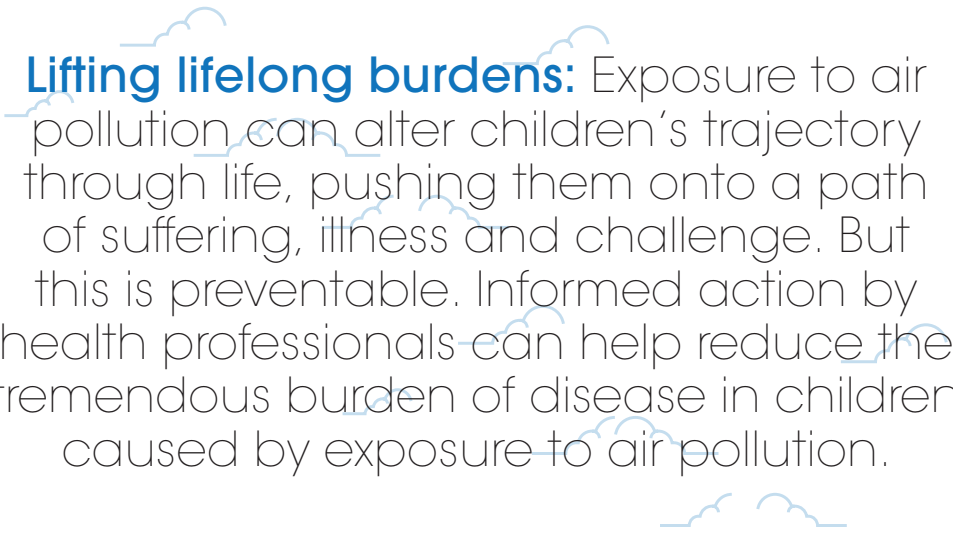
Defined as air quality within and around buildings and structures, especially as it relates to the health and comfort of building occupants (17).

## **Ambient air pollution**

Refers to air pollution in the ambient environment, that is, in outdoor air, but able to enter homes.

## **Household air pollution**

Air pollution generated by household fuel combustion, leading to indoor air pollution and contributing to ambient air pollution.



**Lifting lifelong burdens:** Exposure to air pollution can alter children's trajectory through life, pushing them onto a path of suffering, illness and challenge. But this is preventable. Informed action by health professionals can help reduce the tremendous burden of disease in children caused by exposure to air pollution.







AIR POLLUTION AND CHILD  
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