

Breathless beginnings: policies to protect children from air pollution in Europe and Central Asia

Overview

Air pollution is the leading environmental health risk for children in Europe and Central Asia. Young children, in particular, are at the greatest risk of air pollution-related death and disease.

Across 23 countries and territories in Europe and Central Asia, an estimated 6,441 children and teenagers died from causes attributable to air pollution in 2021. The vast majority – 85 per cent – died in their first year of life.¹ In fact, one in five of all infant deaths in the region were linked to air pollution.

Most of these deaths were attributable to ambient and household fine particulate matter air pollution (PM2.5). And all of these deaths were preventable.

Many more children across the region are suffering poor health and inhibited development from breathing polluted air. This includes non-fatal diseases, hospitalization and disability.

In 2021, the region lost more than 580,000 years of healthy life (DALYs) among children and teenagers as a result of premature death and disability caused by air pollution. Breathing polluted air causes more healthy years of life to be lost than any other single environmental factor, including high temperatures, unsafe water and poor sanitation.

The Disability Adjusted Life Year (DALY)

Mortality itself is not a complete indicator for the burden of a disease, because all of us will die at the end of our life span.

Disability-Adjusted Life Years (DALYs) measure the overall impact of diseases and injuries on people's lives, expressed as the number of years lost as a result of ill-health, disability or early death. It is calculated by combining the years of life lost because of premature mortality with the years lived with disability, taking into account the severity of the disability. Think of it as adding up all the years of life lost as a result of early death and all the years spent living with a disability or illness. For example, if a disease causes someone to die 10 years early and another person to live for 5 years with a severe illness, the total DALYs would be 15.

For more on DALYs, see: <u>https://www.who.int/data/</u>gho/indicator-metadata-registry/imr-details/158

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The damage caused by air pollution starts in the womb – and can last a lifetime

Exposure to PM2.5 air pollution is linked to higher rates of miscarriage, early foetal loss, pre-term delivery and low birthweight. By restricting the growth of a foetus, air pollution can significantly increase the risk of diseases² and developmental difficulties.

Air pollution particles travel across the placenta, meaning that a child's lungs, brains and other organs are exposed to the damaging effects of pollutants before birth. This impacts cognitive development and increases the lifetime risk of respiratory disease.³ Exposure to air pollution in the womb can also cause congenital heart defects, pneumonia in a child's first year of life, neuro-developmental disorders, stunting, the development of asthma, eczema and allergic disease, and high blood pressure.⁴

Air pollution puts pregnant mothers at a greater risk of gestational diabetes, pre-eclampsia, gestational hypertension, and postpartum depression.⁵ In the first week of life, children are particularly vulnerable to acute lower respiratory infection (pneumonia). Often fatal without rapid treatment, pneumonia is a major cause of infant mortality and disease burdens in the region (see Figure 1). Because children inhale more air per kilogram of body weight, they absorb more pollutants than adults. Children's nasal passages are less effective at filtering pollutants and children spend more time closer to the ground, so may breathe in more ground-level pollution.

Their early and frequent exposure to air pollution – when their brains, lungs and other organs are still developing – leads to a reduction and restructuring of their lungs and causes lifelong poor health and development outcomes. These include pneumonia, upper respiratory tract infections, ear infections, asthma, allergies and eczema.⁶

Fine air pollution particles <0.1µm can cross from the lungs to the bloodstream where they are transported to every organ in the body. These particles cross the blood-brain barrier and disrupt brain development just as children's brains are going through a period of rapid growth during the first years of life, which starts before birth. Exposure to fine air pollution particles at this time can hinder brain growth and result in poor cognitive development, which can affect children throughout their lives and reduce their ability to learn in schools.⁷

Figure 1 Impact of air pollution related diseases on children in 23 countries and territories



Source: Institute of Health Metrics and Evaluation, Global Burden of Disease 2021 (https://www.healthdata.org/research-analysis/gbd).



Air pollution (PM2.5 and PM10) in Europe and Central Asia is caused mainly by residential, commercial and institutional practices that rely on fossil fuels, with the use of coal particularly harmful for children's health.⁸ Energy sources vary between and within countries depending on the availability of energy and infrastructure, such as district heating distribution networks. In some urban areas during winter, residential heating, particularly using coal, drives high ambient particulate air pollution.

Ambient air pollution interacts closely with indoor air pollution in homes, schools, health facilities and other spaces, which can be major sources of exposure for children. Climate change is expected to worsen air quality with increased ground-level ozone and wildfires.



Air pollution is a children's rights issue

In 2022 the UN Human Rights Council officially recognized the right to access a clean, healthy, and sustainable environment. Articles 24 and 29 of the Convention on the Rights of the Child include specific protections related to the environment. Article 24 states that every child has the right to the best possible health, including the right to safe drinking water and protection from environmental pollution. In addition, the <u>UN Committee on the Rights of the Child</u> has clarified that to "meet their obligation to adopt measures to ensure that business enterprises respect children's rights, States should require businesses to undertake child-rights due diligence". Ensuring the effective prevention of adverse impacts by business on children's rights also contributes to the achievement of the Sustainable Development Goals, namely Goals 8 and 12.

Source: International Energy Agency



Nexhare, 34, stands with two of her five children outside their home in Obiliq, Kosovo.¹ The family lives next to a power plant which releases toxic pollutants into the air, which are affecting her children's health. "When [my son] was just one week old, he had to be hospitalized for three months. He coughs a lot and often has a fever. We are constantly worried because when his fever goes above 38 Celsius, he has convulsions," says Nexhare. March 2024.

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¹ All references to Kosovo should be understood to be in the context of United Nations Security Council resolution 1244 (1999).

What are PM10 and PM2.5?

PM10

PM10 is a fine particle matter roughly one-seventh the diameter of a human hair. It consists of sulphate, nitrates, ammonia, sodium chloride, and black carbon; it may also include concentrations of natural windblown dust. PM10 is harmful to health because it can block and inflame nasal and bronchial passages, causing a variety of respiratory-related conditions that lead to illness or death. PM10 is a major component of:



Indoor air pollution; and



Forest fires.

The International Agency for Research on Cancer classifies both outdoor air pollution and particulate matter, a major component of ambient air pollution, as Group 1 carcinogens, causing cancer in humans.

PM2.5

PM2.5 is a fine particle matter often considered even more dangerous to human health because of its ultrafine size. Not only can PM2.5 penetrate deep inside the lungs, but it can also enter the bloodstream, causing a variety of health problems including heart disease and other cardiovascular complications. PM2.5 is often the result of



Fossil fuel combustion from vehicle exhaust;



Industrial production and **power plants**; as well as from



Natural sources such as **windblown dust** and **volcanic activity**.

PM2.5 particles pose an especially high risk because they can more easily enter the bloodstream and travel through the body to the brain, causing neuro-inflammation by damaging the blood-brain barrier – which is a thin, delicate membrane that protects the brain from toxic substances.



Keeping schools safe: pollution free zones and air quality monitoring

Poor air quality causes impaired cognitive development, leading to poor school performance. To make matters worse, many schools and kindergartens across the region were built without sufficient consideration of energy efficiency. Heat transfer lines from coal boiler systems also often are not adequately insulated or are in decay.

The combined impacts of inadequate insulation and large heat losses often increase exposure to air pollution. Supporting energy efficiency through improved climateresilient infrastructure dramatically reduces the amount of heat energy required and, therefore, the purchase and running costs of low emissions systems.

A transition to clean energy sources would dramatically reduce the amount of pollution emitted. Ensuring pollution-free zones near schools, kindergartens,

"I want there to be a lot of trees, parks. I want us to have more soccer fields where we could play ball. I would like us to have clean air and people to learn how to properly dispose of garbage," says Kemenger, March 2024.

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and health facilities will also help to reduce local concentrations of air pollution.

Air quality alert systems are a vital part of protecting children in schools and kindergartens. On days when there is high risk from air pollution, measures can be taken to keep children indoors. The expanded use of networks that combine low-cost sensors with ambient fixed-site monitoring are vital tools in helping to inform early warnings, particularly in kindergartens and schools. UNICEF endorses the World Health Organization (WHO) air quality guidelines (WHO AQG) and urges countries to use the WHO AQG and interim targets as a guide and common framework to develop air quality alert systems and associated action plans for schools and kindergartens in Europe and Central Asia.



A call to action for governments

Air pollution is a public health crisis: policy recommendations to strengthen health systems.

UNICEF proposes a range of public health interventions to improve air quality and protect children across Europe and Central Asia from the damaging impact of air pollution.

Home air purification for pregnant women

Studies have demonstrated that, when implemented during pregnancy, stand-alone air purification to mitigate impacts of residential coal smoke exposures can improve birth weight outcomes⁹, IQ¹⁰ and childhood cognitive development.¹¹

Maintain air quality in neonatal intensive care units



Some neonatal intensive care facilities across the region do not have filtered supplies of clean air and rely on cross-ventilation protocols to open windows. Opening windows during periods of high pollution puts vulnerable children at increased risk. Improved air supply is critical through investment in high quality heating, ventilation and cooling (HVAC) or in resource-constrained settings through wall-filtered ventilation or standalone mechanical air-filtration units.

Pneumococcal conjugate vaccine (PCV) for children



Small children are the most susceptible to acute respiratory infections caused by air pollution. The burden of bacterial pneumonia infections can be reduced through the pneumococcal conjugate vaccine (PCV). An analysis showed that the PCV vaccine led to a 17 per cent reduction of clinical pneumonia and a 31 per cent of radiologically confirmed pneumonia in children under two.¹² The vaccine has been shown to dramatically reduce the incidence of pneumonia-related hospitalization in children under five.¹³

Stronger support for home visiting programmes



Home visiting programmes are a critical mechanism to provide pregnant women and parents with information and advice on protecting their babies from the health effects of air pollution, and the benefits of PCV vaccination. Including training modules and materials about air pollution and the associated health risks helps to mitigate environmental health impacts at the community level and raises awareness of how to improve air quality.¹⁴ Ensuring high PCV coverage and implementing measures to reduce air pollution exposure are both important strategies to protect children's health in polluted environments.

Nertena, 22, cradles her one-year-old son in their home in the Gazi Baba district of Skopje, North Macedonia. The mother of three is expecting her fourth child any day now. She worries about her children's deteriorating health aggravated by air pollution. Families facing multiple deprivations are disproportionally affected by air pollution and suffering the most. March 2024.

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UNICEF calls on governments and institutions in countries across the region to devote greater attention and resources to prevent worsening air pollution, support energy efficiency, access to clean energy, support cleaner air measures and protect children from exposure.



Efforts to address air pollution: the need for child-sensitive policies and interventions

Ensure air pollution and its health impacts on children are considered in National Determined Contributions (NDC), National Adaptation Plans (NAPs), National and local Air Quality Plans, and National Health Plans.



Establish pollution-free zones near schools, kindergartens, and health facilities.

Set up and maintain air quality alert systems near residential areas, playgrounds, health facilities, kindergartens and schools, and report information to the public (noting levels of air pollution that are dangerous to children and pregnant women).



Improve air quality

- Promote air quality standards in line with the World Health Organization (WHO) air quality guidelines (WHO AQG).
- Develop air quality alert systems and associated action plans for schools and kindergartens in Europe and Central Asia.
- 6 Improve data collection to facilitate more robust analyses on the scale and scope of local air pollution problems. These should include updating and modernizing emission inventories using frameworks established by the Convention on Long-Range Transboundary Air Pollution.

Incentivize the transition to sustainable energy and air-to-air heat pumps to reduce residential coal use. Promote energy efficiency in homes, including the metering of district heating, building standards for new construction that include insulation, improved ventilation and the use of energy certification systems and labelling.

Enforce smoking bans in all public indoor areas, including bars, cafes, restaurants, hotels, entertainment venues, and public areas in multiple unit dwellings.



Raise awareness

Incorporate air quality in teacher training to reach students of all ages.

10 Incorporate environmental health, including air pollution, into the curriculum of health and public health professionals.

Raise awareness of air pollution and its impact on the health of pregnant women, infants and children through disaggregated data on the effects and sources of air pollution.

Methodology

The regional estimates are based on an analysis of 2021 Global Burden of Disease data, the latest available from the Institute of Health Metrics and Evaluation. Health impact estimates are not intended to be predictors of disease in individuals; rather they are intended as an objective assessment of health impacts on a population basis.

For more information on Disability-Adjusted Life Years (DALYs), please see: <u>https://www.who.int/data/gho/indicator-metadata-registry/imr-details/158</u>

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https://ceh.unicef.org/spotlight-risk/air-pollution

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Cover photo:

A young boy receives treatment for pulmonary disease at the National Center for Maternal and Child Health in Bishkek, Kyrgyzstan. Children in Bishkek breath some of the most polluted air in the world, affecting their health and development. March 2024.

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