

A newborn baby is lying in a clear plastic incubator. The baby's right hand is extended outwards, with fingers slightly curled. The baby is wearing a patterned hospital gown. The background is blurred, showing other parts of the incubator and possibly other babies in the background.

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**Breathless beginnings:**  
the alarming impact of air  
pollution on children in  
Europe and Central Asia

# Breathless beginnings: the alarming impact of air pollution on children in Europe and Central Asia

Air pollution is a major environmental health risk for children. In 2019, 5,801 children and teenagers in 52 countries in Europe and Central Asia died from causes linked to air pollution. Many more suffered the health and development effects of breathing polluted air, including non-fatal diseases, hospitalizations and disabilities.

Around 85 per cent of under-20s who died from causes related to air pollution in Europe and Central Asia in 2019 did so before their first birthday – accounting for the deaths of 4,917 infants. These deaths were preventable.

Children are uniquely vulnerable to air pollution, with devastating effects on their health and development. Scientific evidence shows air pollution contributes to adverse birth outcomes including preterm births and low birth weights, infant mortality<sup>1</sup>, damaged lung function, illness and diseases including asthma, cardiovascular disease and cancer, and an increased risk of neurological disorders. Other respiratory illnesses associated with air pollution include

common childhood conditions such as upper respiratory tract infections, otitis media and allergic diseases.

Children are physically more exposed to air pollution than adults because they breathe twice as fast, often by mouth, taking in more pollutants, and are often closer to the ground where pollutants accumulate. Children are physiologically more vulnerable to air pollution than adults because their brains, lungs and other organs are not maturely developed, thus protective mechanisms are not available as they are for adults during exposure to toxic pollutants. Prolonged exposure to toxic pollutants leads to damaged growth and development of their organs, and affects brain development in the critical early years, resulting in long-term consequences to children's physical and mental development.

The right to clean air is far from the reality for children and young people in Europe and Central Asia. More than 83 per cent of children<sup>2</sup> in 50 countries across the region are exposed to ambient air pollution.



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# ~85%

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# 83%

More than

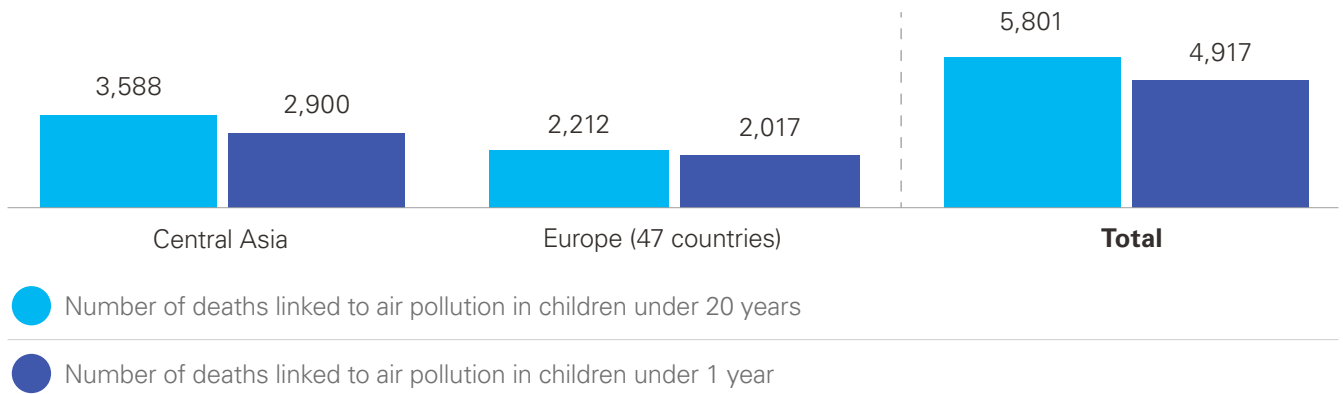
of children in 50 countries across the region are exposed to ambient air pollution.

# 4,917

infant deaths were recorded as a result of this. **These deaths were preventable.**



# Number of children dying from causes related to air pollution (2019)



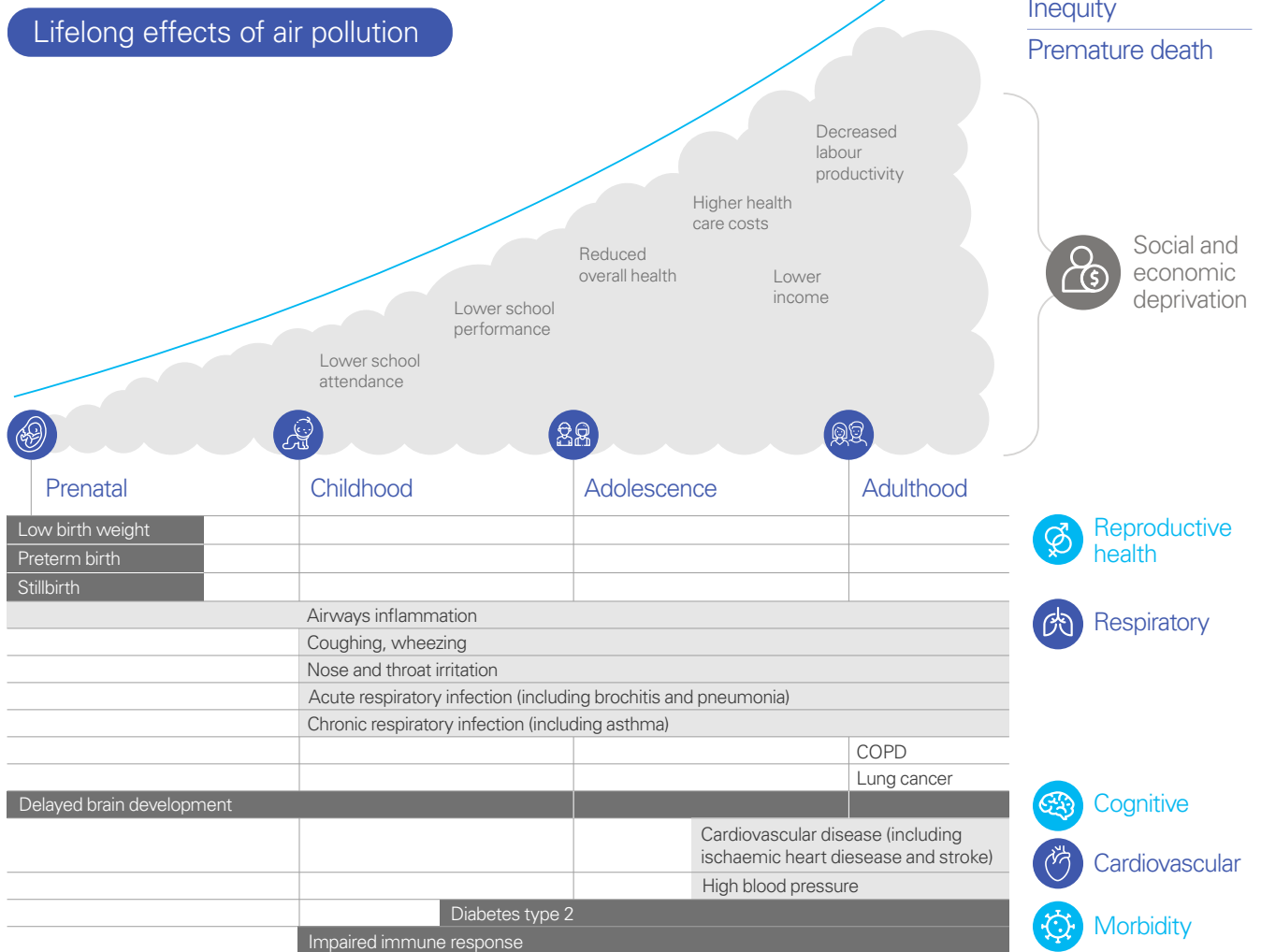
Source: The Institute for Health Metrics and Evaluation: <https://vizhub.healthdata.org/gbd-results/>

**Methodology (Source):** The data for this paper were extracted from the Global Burden of Disease Study 2019 (GBD), dated 14 August 2023. The GBD 2019 database was accessed using a predefined set of filters. The filters applied included GBD estimate (Risk Factor), Measure (Deaths), Metric (Number and Percent), Risks (Air Pollution), Cause (all Causes), Location (all countries of Central Asia and Europe), Ages (<1 year and <20 years), Sex (both), and year (2019). These filters collectively narrowed down the dataset to the pertinent information required for the analysis.

Upon applying the filters to the GBD database, the resulting dataset contained estimates of mortality due to air pollution in Central Asia and Europe for 2019. The primary outcome of interest was the cumulative number of deaths attributed to air pollution in the selected group in the regions.

## The impact of air pollution on child health

The cumulative effects of air pollution can cause social and economic deprivation that exacerbates poverty and inequity.



**Note:** These infographics are meant to be illustrative only. The impacts of air pollution on children varies considerably depending on the context, exposure and treatment options.



Air pollution is the single biggest environmental risk factor for premature death and ill-health. Ill health due to PM2.5 pollution is particularly prevalent among young children during their first 1,000 days of life and for the elderly. Children who breathe polluted air are at higher risks of severe health problems including acute respiratory infections and complications such as pneumonia and asthma.

Air pollution is a public health crisis. Children's health and development are uniquely vulnerable to the damaging impacts of air pollution, with sometimes deadly and often life-long negative consequences for individuals and increased pressure on public services. There is a strong correlation between early exposure and later health outcomes.

Air pollution – PM2.5 and PM10 – in Europe and Central Asia is largely caused by residential, commercial and institutional practices that rely on fossil fuels, with the use of coal particularly harmful for children's health.

- Air pollution causes higher rates of asthma, bronchitis, respiratory tract inflammation and eye irritation among children.

- Early and frequent exposure to air pollution in children leads to long-term health impacts including pulmonary disease, cardiovascular disease, lung cancer, neurodevelopmental impacts and neurodegenerative disease and diabetes, with lasting damage to child health and well-being.
- Ultrafine air pollution particles – PM2.5 – are up to 200 times smaller than the width of a human hair and pose a high risk to children because they can easily enter the blood stream and cross the blood brain barrier more easily. This causes neuroinflammation and disrupts brain development, particularly damaging for young children as their brains go through a period of rapid development during the early years, leading to poor cognitive development and school performance.
- Air pollution can seriously affect the health of a fetus. Pregnant mothers are advised to avoid exposure to air pollution wherever possible. Chronic exposure to high levels of PM2.5 is associated with higher rates of early fetal loss, preterm delivery – and lower birthweight.

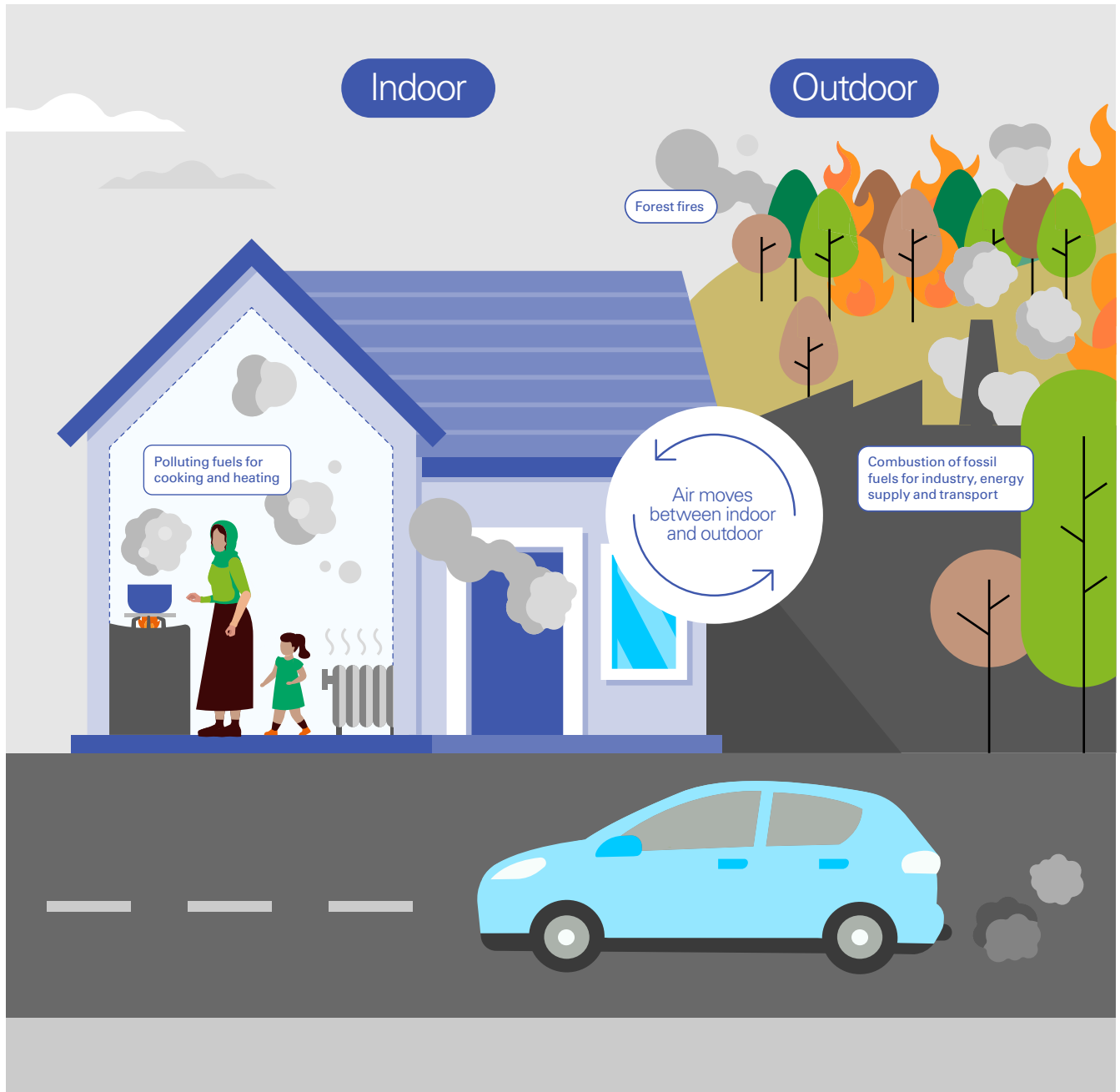


PM10 is roughly one-seventh the diameter of a human hair. It consists of sulfate, nitrates, ammonia, sodium chloride, and black carbon; it may also include concentrations of natural windblown dust. PM10 is harmful to health because it can block and inflame nasal and bronchial passages, causing a variety of respiratory-related conditions that lead to illness or death. PM10 is a major component of indoor air pollution and forest fires.<sup>3</sup>

PM2.5 is 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.<sup>4</sup> PM2.5 pose an especially high risk because they can more easily enter the blood stream 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.<sup>5</sup>

## Sources of air pollution in Europe and Central Asia



In Europe and Central Asia, the key sectors responsible for PM 2.5 and PM 10 are residential, commercial, and institutional. The sources of air pollution vary between and within countries. Ambient and household air pollution varies depending on the level of development and availability of energy sources.

Ambient and indoor air pollution is a complex mixture of pollutants that includes particulate matter, ozone, nitrogen dioxide, carbon monoxide and sulfur dioxide. It can also include several other noxious substances, such as benzene or heavy metals, which include arsenic, chromium, lead and mercury. Common

indoor air pollution comes from heating or cooking using coal, and or biomass, with insufficient ventilation.

Outdoor 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. Common outdoor air pollution comes from fossil fuel combustion, such as coal, industrial processes, open burning of waste and waste incineration, agricultural practices, construction and demolition. Climate change is expected to worsen air quality with increased ground-level ozone and wildfires.

## UNICEF's work on cleaner air for children in Kyrgyzstan

In Kyrgyzstan, air pollution is the single biggest environmental risk factor for premature death and ill-health, with young children among the most affected. In Bishkek, Kyrgyzstan a UNICEF study found that residents are exposed to annual average concentrations that range from moderately elevated to far more than concentrations known to cause major health impacts. This is largely a result of residential winter heating and cooking using raw coal. In summer, air pollution exposures are close to WHO air quality guidelines with an average household exposure of  $7.3 \pm 1.7 \mu\text{g}/\text{m}^3$ . These patterns reinforce that high air pollution exposures in Bishkek are driven by local winter heating, and the greatest increase in exposures is for those living in areas where raw coal burning is more evident. These patterns also reinforce that measures to reduce air pollution across the city would benefit all residents.<sup>6</sup> UNICEF is working with the government in Kyrgyzstan to identify solutions to reduce exposure to air pollution for children and youth in kindergartens, schools and their homes through improved insulation and ventilation. In parallel UNICEF is working with the Ministry of Health to strengthen the capacity of primary health care professionals on early screening to detect air pollution-related illnesses and recommend ways to reduce air pollution exposure.



The benefits are clear: lowering air pollution levels will lead to enormous improvements in public health for people of all ages breathing cleaner air, especially children.

After years of research, the World Health Organization (WHO) updated its 2005 Global Air Quality Guidelines (AQG) in September 2021. The new air quality guidelines (WHO AQG) reflect the impact of air pollution on global health. UNICEF supports the recommendations of the new WHO AQG and urges countries to use the WHO AQG

as a guide for air quality and emission reduction policies in Europe and Central Asia and around the world.

There is ample evidence to support government action to reduce air pollution and address climate change simultaneously. The updated WHO AQG stresses the importance of lowering air pollution concentrations at every level. The benefits are clear: lowering air pollution levels will lead to enormous improvements in public health for people of all ages breathing cleaner air, especially children.

The cost effectiveness of air quality actions is increased by the close link between air pollution and greenhouse gas emissions. A reduction of air pollution emissions will also feed into efforts for climate neutrality and vice versa, making benefits from investments in one area count twice.<sup>7</sup>





## Recommendations to governments across Europe and Central Asia

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 and access to clean energy, support cleaner air measures and protect children from exposure. Particular attention must be paid to addressing the magnified health risks faced by the most vulnerable children.

The policy framework provides national governments and institutions with recommendations on how to protect children.

### Walk the talk:

- 1 Ensure air quality standards are in line with WHO guidelines.
- 2 Support access to clean energy and the use of cleaner fuels and reduce the dependency on the use of fossil fuels. Promote energy efficiency including expanding district heating, revision of existing building standards for public facilities (schools, kindergarten and hospitals) for children, improved ventilation and insulating of private and public buildings and using energy certification systems and labelling.
- 3 Ban smoking in all public indoor areas, including public transport, workplaces, health institutions, educational and government facilities, universities, retail shops and shopping malls, hospitality and catering facilities, such as restaurants, pubs, bars, hotels, community and

sports centres, manufacturing and processing plants, and all public areas in multiple unit dwellings, including lobbies, elevators and stairwells.

- 4 Scale up and expedite the implementation of plans to reduce air pollution at national and municipal levels.

### Focus on child-sensitive interventions:

- 5 Ensure pollution free zones near schools, kindergartens, and health facilities.
- 6 Set up and maintain air quality monitoring systems nearby kindergartens and schools, and report information to the public and noting levels of air pollution that are dangerous to children and pregnant women.
- 7 Train health providers and professionals to assess child history of air pollution exposure and provide counsel on exclusive breastfeeding, nutrition, exercise, immunization, early screening to detect air pollution-related illnesses and recommend ways to reduce air pollution exposure.
- 8 Mobilize financial resources at national and regional levels to support implementation of air quality plans with focus on child-sensitive interventions, and advocate for greater focus on air quality issues.



### Raise awareness and advocate:

- 9 Raise awareness of air pollution and its impact on child health
- 10 Collect disaggregated data on the effects and sources of air pollution, with a specific focus on research and recognition for pregnant women, infants and children.
- 11 Advocate for air pollution and its impacts on children to be considered in national climate and environmental policies, such as municipal action plans for air quality, National Adaptation Plans or Nationally Determined Contributions, ensuring inclusion of child-sensitive health commitments and specific air quality targets.
- 12 Incorporate air quality in children's education and include young people in air quality policy processes development and implementation and enhance awareness among policymakers to inform child-sensitive action on air quality issues including municipal action plans on air quality.

- 13 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. Additionally, the [UN Committee on the Rights of the Child](#) 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.

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