

EXPOSURE OF CHILDREN TO PM_{2.5} AIR POLLUTION IN BISHKEK

KEY MESSAGES



IOM/Kyrgyzstan/2022/ Shailo Dzhekshebaev



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EXPOSURE OF CHILDREN TO PM_{2.5} AIR POLLUTION IN BISHKEK – KEY MESSAGES

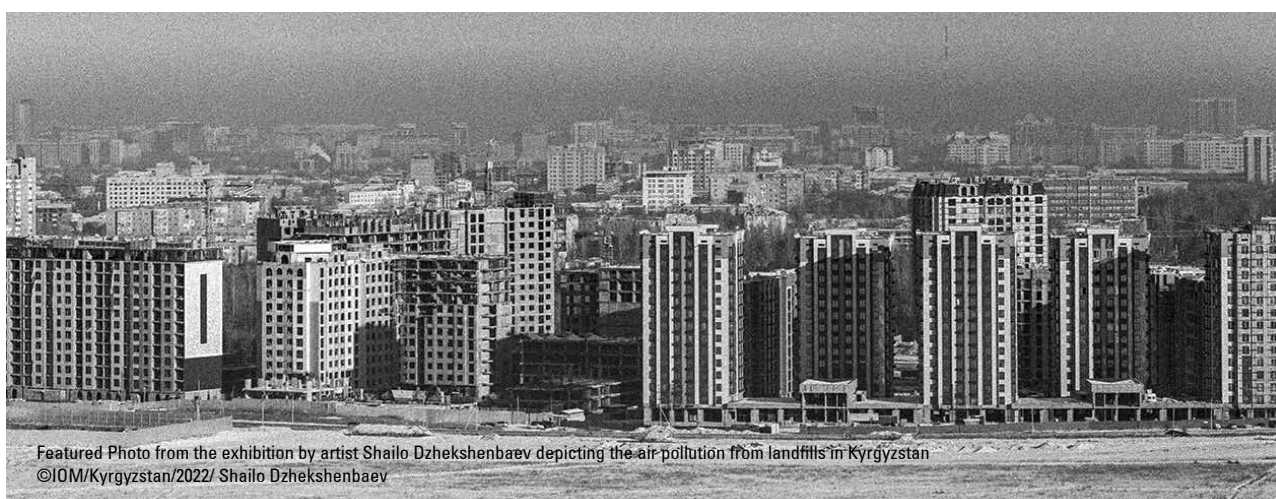
Audience: all

Impacts of PM_{2.5} air pollution

Small air pollution particles (PM_{2.5}), that are at least 30-200 times smaller than the width of a human hair, can penetrate deep into the lung, into the bloodstream, and be distributed to all organs of the body. These particles are the primary indicator of health effects for combustion-related air pollution. The population of Bishkek is exposed to wintertime PM_{2.5} concentrations that are on average ~3.6 times greater than those known to cause adverse health impacts in populations.

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

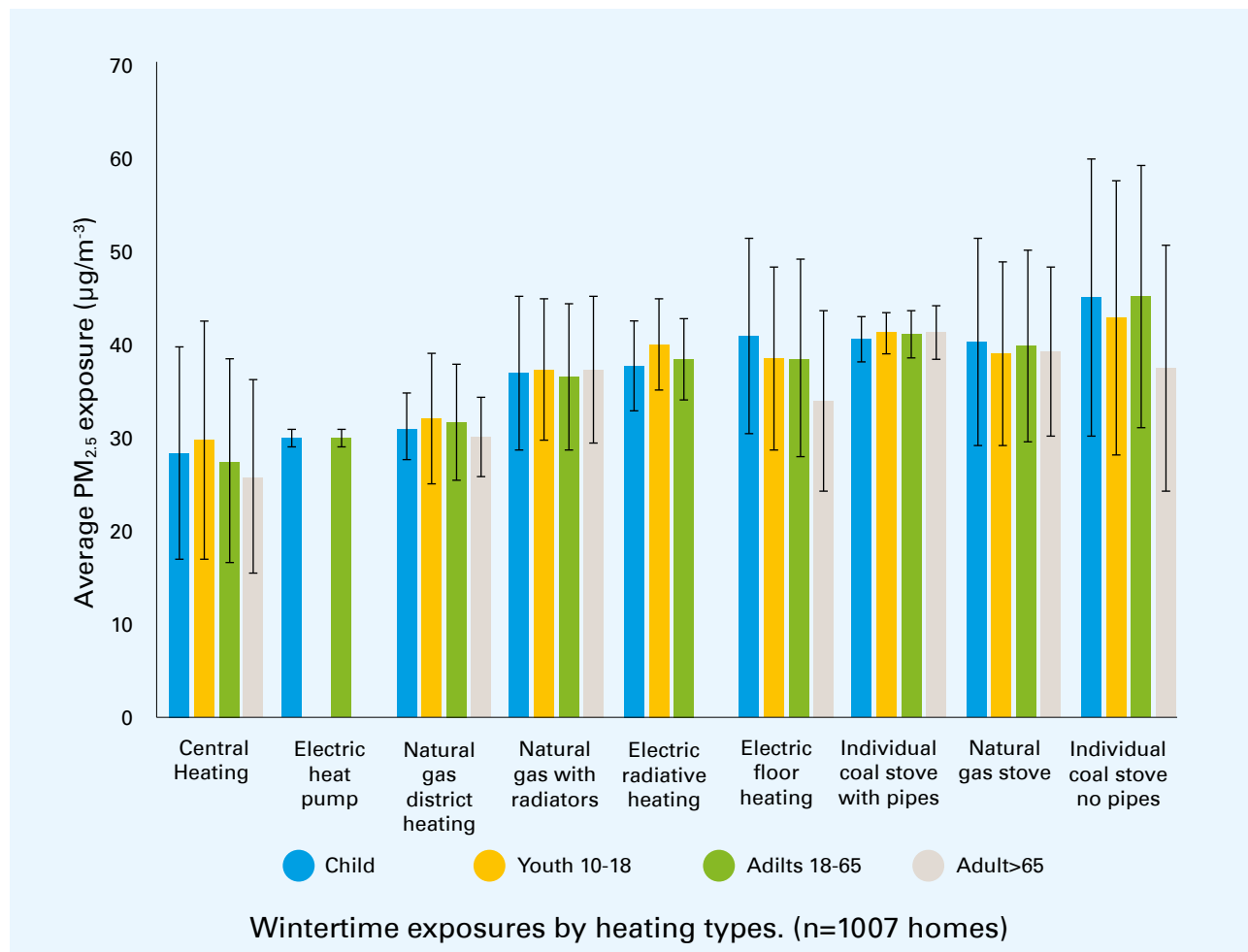
- Most of prenatal brain growth is in the third trimester when 40,000 synapses are formed per minute. This high growth rate is vulnerable to environmental insults and exposure to particulate air pollution levels typical of exposure in major cities around the globe can alter neurological responses and impair cognition
- Children's lungs are especially vulnerable to air pollution even at lower levels of exposure. Structure and function of the lungs are permanently altered during sensitive periods of fetal or early post-natal life with irreversible alterations in lung growth.
- Exposure to air pollution in children results in a large direct burden of disease due to acute lower respiratory infections (pneumonia), which impacts the incidence of chronic air pollution related disease across the lifespan.
- Compromised lung function in children is associated with long-lasting chronic conditions such as asthma and chronic obstructive pulmonary disease
- Prenatal exposure to air pollution can predispose individuals to cardiovascular disease later in life.



Featured Photo from the exhibition by artist Shailo Dzhekshenbaev depicting the air pollution from landfills in Kyrgyzstan
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Children bear a large part of the health burden, and children living in homes that use raw coal for space heating are more exposed than those with central heating.

- Children are exposed in all environments, including prenatally
- Children living in Bishkek account for an estimated 8% ± 1% of deaths and 22% ± 1% of disability adjusted life years lost attributable to exposures to air pollution
- The majority of the risk burden is in the first few days of life with 4277 (95% CI 780-8406)¹ deaths per 100,000 in children during the first 6 days of life in Kyrgyzstan.
- Children and youths living in homes that burn raw coal for space heating are more exposed by on average 7.5 µg m⁻³ during the year and 17 µg m⁻³ during the winter because of the neighborhood pollution that infiltrates their homes, compared to children with central heating.



1 Institute of Health Metrics and Evaluation 2019 IHME

Air pollution exposures impose a significant economic burden on society

- In general, pollution is costly for individuals, families, and society, both in treatment costs and in reduced productivity.
- Air pollution-related diseases cause productivity losses that reduce GDP in low-to middle-income countries by 0.3-0.4 % per year²
- Air pollution related treatment costs and welfare losses are typically externalized, and thus not attributed to the effects of the pollution
- In Bishkek, based on mean willingness to pay for household improvements to reduce air pollution, estimated welfare loss from PM_{2.5} air pollution in 2021-2022 was 1.6 billion KGS (95% CI 1.4-2.0) or 20 million USD (95% CI 17-24).



² Lancet Commission on pollution and health

THE NEED FOR ACTION

Measures that can be taken to reduce air pollution exposures in children

- Centralize air pollution intervention measures under a high-level inter-ministerial steering committee to coordinate actions across sectors, and formalize an urban master plan to map primary energy choices to different geographic areas of Bishkek over the next 10 years that relate to:
 - Expansion of existing district central heating in central urban areas through energy efficiency measures, temperature regulation and turn down ability on existing dwellings
 - the expansion of gas distribution networks in residential urban areas
 - pricing incentives and finance mechanisms for connection to gas distribution
 - piloting air-to-air heat pumps together with the development of electricity pricing structures, pricing incentives and finance mechanisms to increase accessibility
- Increase energy conservation measures in private residences
- Prioritize the promotion of coal-free zones in urban areas to reduce household coal combustion, together with demonstration of cost-effective alternatives assisted by incentive programs and finance models.
- Increase economic modelling of tiered electricity and gas pricing structures that maintain average commodity prices to provide the incentive framework for wider adoption of clean alternatives
- Expand legal authority for control of air pollution beyond municipal boundaries through the creating of air quality management areas that encompass the settlements on the fringes of the city that predominantly use raw coal
- Increase the use of objective scientific information in policy making guided by cost effectiveness of intervention measures, through improvements in:



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- quality of ambient air pollution surveillance
- quality of e-health data and capacity of the health workforce in epidemiologic surveillance
- modernization of ambient air standards and stationary and non-stationary sources emissions standards
- Pilot air pollution intervention measures to demonstrate effectiveness in reducing air pollution and affordability prior to expenditure of limited resources
- Develop a communications strategy to inform residents of cost effectiveness of clean heating solutions
- Increase incentives for energy conservation measures in all sectors, as it remains an important tool to reduce emissions from households, industries, facility level heat boilers, and allow expansion of district heating networks



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Protection during pregnancy and in the first days of life.

- Develop approaches to reduce exposures during pregnancy and in the first 100 days of life, such as loans of air filtration equipment as part of prenatal care
- Increase awareness in primary healthcare of the harms caused by air pollution and measures to prevent its effects
- In addition to reducing exposures, reinforce the need for breastfeeding, healthy antioxidant nutrition and immunization to reduce vulnerabilities to air pollution
- Adopt an Air Quality Index (AQI) based on health impacts and actions the public can take to reduce exposures.

FOR NOTES

Handwriting practice lines consisting of a solid top line, a dotted midline, and a solid bottom line, repeated down the page.

For every child

Whoever she is.

Wherever he lives.

Every child deserves a childhood.

A future.

A fair chance.

That's why UNICEF is there.

For each and every child.

Working day in and day out.

In more than 190 countries and territories.

Reaching the hardest to reach.

The furthest from help.

The most excluded.

It's why we stay to the end.

And never give up.



for every child

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