



# Urban Health Initiative

a model process for catalysing change

## Air pollution: effects on your body

Air pollution is one of the world's leading killers. Globally, air pollution causes some 7 million deaths annually from outdoor and household sources.

### Overview

Some 4.2 million people a year die from outdoor air pollution and 3.8 million people die from household air pollution. It is the number one cause of childhood pneumonia and the leading risk for childhood asthma. Overall, air pollution is estimated to cause:

- one quarter of deaths from stroke and heart attacks;
- one third or more of deaths from lung cancer and chronic obstructive pulmonary disease;
- nearly half of all pneumonia deaths in children under 5 years old.<sup>1</sup>

Over 90% of urban residents globally are exposed to air pollution levels that exceed WHO guidelines



### The path from pollution to disease

Particulate matter (PM) is considered one of the most dangerous air pollutants. Particulate matter comprises:

- heavy metals, sulfates and nitrates (from incomplete fuel combustion);
- ammonia emissions from farm fertilizers and livestock manure;
- black carbon from kerosene, diesel or biomass burning; and
- sand and mineral dust.

Chronic exposure to high levels of the smallest particles is very closely associated with disease and premature deaths.

### PILOT PROJECT: DEATHS FROM AIR POLLUTION IN GHANA

In Ghana, WHO estimates the burden of air pollution air pollution from all (outdoor and household) sources was 28 210 deaths in 2016, including over 4000 children under 16 years old. In not meeting the WHO guidelines for outdoor air pollution in the Greater Accra Region of 4 million people, outdoor air pollution caused some 1800 deaths in 2017 (preliminary figures based on Ghana Environmental Protection Agency monitoring data).

<sup>1</sup> Ambient (outdoor) air pollution: key facts. WHO, 2018 ([https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health), accessed 22 February 2021).

# Worldwide **1 in 8 deaths** linked to **air pollution**

## THE **INVISIBLE KILLER**

Air pollution may not always be visible, but it can be deadly.



**29%**  
OF DEATHS FROM  
**LUNG CANCER**



**24%**  
OF DEATHS FROM  
**STROKE**



**25%**  
OF DEATHS FROM  
**HEART DISEASE**



**43%**  
OF DEATHS FROM  
**LUNG DISEASE**

Air pollution is a mixture of solid particles and gases in the air. Particles with a diameter of 10 microns or less ( $\leq PM_{10}$ ) penetrate and lodge deep inside the lungs. They inflame the airways and lungs, impairing the immune response and laying the basis for cancer and lung disease. Fine particles with a diameter of 2.5 microns or less ( $\leq PM_{2.5}$ ) are the most dangerous. These penetrate the lung barrier and enter the blood stream, reducing oxygen-carrying capacity. Concentrations of  $PM_{2.5}$  are an exposure indicator for health risks.

Fine particles also trigger blood chemistry changes that increase blood clotting and cause vessels to constrict. This, in turn, increases the risks of heart attacks and stroke. People with respiratory or heart disease, hypertension and smokers are at higher risk for air pollution-related effects.

Other pollutants with health impacts include ground-level ozone, which is a major factor in asthma morbidity and mortality. Nitrogen dioxide and sulfur dioxide also play a role in asthma, as well as triggering bronchial symptoms, lung inflammation and reduced lung function.

Ground level ozone – as opposed to the upper atmospheric ozone layer – is a major component of smog, formed when pollutants interact in sunlight. As a result, the highest levels of ozone pollution occur during periods of sunny weather.

## WHO Air Quality Guidelines

The WHO Air Quality Guidelines recommend a limit of no more than 10 micrograms per cubic metre of air for fine particulates ( $PM_{2.5}$ ), the pollutant most closely associated with increased premature deaths. The guidelines also set limits for ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide.

In 2016, 8 out of 10 cities monitored worldwide exceeded WHO guideline levels for  $PM_{2.5}$ . Low- and middle-income cities tend to suffer from the highest outdoor air pollution levels due to dirty vehicles, waste burning, industrial and power plant emissions, energy-inefficient buildings, and domestic cooking and heating with biomass, kerosene and coal.

Some low-income cities do meet WHO guidelines – reflecting the fact that affordable strategies exist to combat air pollution. These typically include:

- cleaner vehicles and better public transport systems;
- walkable, cycle-friendly and green cities;
- energy-efficient homes;
- caps on power plant and industrial emissions; and
- reduced open burning of municipal and agricultural waste.

For household energy, liquified petroleum gas (LPG), ethanol and biogas stoves and fuels, as well as electric induction stoves and certain ultra-efficient biomass stoves, can reduce emissions.

## Climate change

Air pollution also accelerates climate change, directly and indirectly. Directly, emissions from waste, biomass burning and diesel engines are leading sources of short-lived pollutants, such as black carbon and methane – powerful accelerators of global warming. Conversely, reducing air pollution by shifting from diesel generators to solar power and from diesel to electric vehicles, reduces carbon emissions.

