CLEAN AIR NOW
Rapid solutions to the
AIR POLLUTION EMERGENCY
Air pollution is a grave risk that endangers the health of almost everyone in the world. It affects nearly every organ in the body, as well as our mental health and wellbeing. It is a leading risk factor for non-communicable diseases (NCDs) such as stroke, ischaemic heart diseases, lung cancer and chronic obstructive pulmonary disease (COPD). The World Health Organization (WHO) estimates that over seven million people die prematurely every year from exposure to polluted air. Most air pollution, and the associated health impacts and premature deaths, are preventable.

Policymakers are often torn between tightening controls on emissions to enhance the welfare of the population, and continuing business-as-usual due to economic and other political pressures. This tension is particularly acute in developing countries. In these cases, economic development is seen as positively impacting health by reducing poverty, but this often comes at a cost of deteriorating air quality from increased burning of fossil fuels for energy and transport. Around the world, policymakers may favour short-term commercial interests to long-term health benefits. Yet, the long-term health costs to the population almost always support the cost-effectiveness of reducing air pollution.

Evidence shows that local policies to reduce air pollution not only benefit air quality in cities, where more and more people live, but are also important for mitigating and adapting to global climate change. Given the central role of fossil fuels in driving climate breakdown and the increasing recognition of manifold impacts of climate change on health, the case for action is ever-stronger.

On 1 November 2019, a public health emergency was declared in Delhi, India, because of dangerous levels of air pollution. The local government announced plans to close schools temporarily and distribute millions of face masks to children, recognising that air pollution is not only harmful to children's health and wellbeing but also has a detrimental impact on learning outcomes. School closures on days with poor air quality are becoming increasingly common around the world, in countries including Thailand, Mexico, Malaysia and the US. Hot-off-the-press research shows that days of higher air pollution in the United Kingdom trigger hundreds more heart attacks, strokes and acute asthma attacks each year, resulting in avoidable deaths and a profound ‘health emergency’.1

Given that 90% of people in the world are exposed to levels of air pollution considered by WHO to be dangerous to health, air pollution should be tackled as a global public health emergency. This briefing explores the range of cost-effective response measures that are available and how quickly the benefits of each one are felt.

Reducing air pollution at its source has a rapid and substantial impact on individuals and public health. A focused review by the Forum of International Respiratory Societies (FIRS), on which this briefing is largely based, shows that within a just few weeks, respiratory and irritation symptoms, such as shortness of breath, cough, phlegm, and sore throat disappear. Furthermore, school absenteeism, clinic visits, hospitalisations, premature births, cardiovascular illness and death, and all-cause mortality decrease significantly.2

The widespread benefits across the population and short length of time for the benefits of the measures to be felt, as well as their cost-effectiveness and longer-term co-benefits for health through reducing the risks of climate change, further strengthen the case for urgently tackling air pollution at every level of governance. While cities and regions with the worst air quality have the greatest potential for health benefits, areas where air quality is relatively good by international standards can also achieve health improvements by implementing clean air measures.

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Interventions

Avoidance of polluted areas, building air filters, and the use of respirators (face masks) may have benefits, but halting or reducing air pollution at its source is by far the most important intervention.

**Special pollution reduction measures in Olympic host cities**

In the summer of 1996, the US city of Atlanta implemented a 17-day “alternative transportation strategy” that involved increased public transportation, teleworking options, and the closure of downtown Atlanta to automobile traffic. Peak morning traffic decreased by 23% and peak daily ozone levels decreased by 26%. In the next four weeks, there was a 42-44% reduction in children seeking medical care for asthma, an 11% fall in paediatric emergency department visits, and a 19% decrease in hospitalisations for asthma.19

For the 1980 Beijing Olympics, the Chinese government mandated factory emission reductions and travel restrictions from July to September, which resulted in reduced pollutant concentrations by up to 62%.20 Within two months, improved lung function among healthy and asthmatic adults in Beijing was observed.11 There were 58% fewer asthma-related physician visits; reduced cardiovascular mortality, especially among women and the elderly; and lower levels of systemic inflammation among healthy young adults.11

**Replacing dirty diesel school buses**

Children that are transported in older diesel buses are exposed to fine particulate matter (PM2.5), black carbon, particle-bound polycyclic aromatic hydrocarbons, and nitrogen dioxide (NO2). In the cities of Tacoma and Seattle in Washington state in the US, a study found that reducing pollution from diesel school buses decreased asthma and school absenteeism and improved lung function in the children.14 Moving to electric buses would provide even cleaner public transportation and greater health benefits.

**Cleaner cook stoves in homes**

Every year poor air quality claims 3.8 million lives from indoor pollution in homes, largely caused by burning household fuel for cooking, heating and lighting purposes.15 Studies in Mexico and Guatemala have shown that stoves which reduce or eliminate indoor air pollution improve respiratory and non-respiratory symptoms, such as eye discomfort and headaches; decrease respiratory infections; and improve lung function and lung growth.16 Several trials have also demonstrated that cook stove interventions lead to a long-term reduction in blood pressure.17,18 In Nigeria, cooking with an ethanol stove improved infant birth weight, gestational age at delivery, and perinatal mortality compared with open fire cooking.19 Interventions to reduce household air pollution in both low- and high-income countries have benefits to human health.20

**Factory and steel mill closures**

Factory closures have improved air quality and resulted in health benefits that are almost immediate. The 13-month closure of a large steel mill in Utah Valley in the United States, for instance, reduced heart and lung disease in the surrounding communities.21 A follow-up study found that women who were pregnant during the mill closure (especially those in their second trimester) were less likely to have premature births compared to women who were pregnant before the closure of the mill after its reopening.22 A copper smelter strike in four southwestern US states lasting 8.5 months in 1967-1968 led to an approximately 60% decrease in concentrations of suspended sulphate particles. This was associated with an estimated 2.5% decrease in related deaths.4

**Planned or unplanned interventions that reduce air pollution have had considerable health benefits**

Benefits of national and supranational air quality interventions

National policies to reduce pollutant emissions have demonstrated significant success, whilst being cost-effective due to the population-wide benefits.

US Clean Air Act

The US Environmental Protection Agency (EPA) calculated that the monetized health benefits of the Clean Air Act exceeded the implementation costs by a factor of 32.1,2 These benefits, valued at two trillion dollars in 2020, are primarily attributed to significant reductions in outdoor particulate matter (PM), leading to the prevention of an estimated 230,000 deaths per year caused by polluted air. Further benefits are also quantified as a result of lower ozone levels (7100 deaths prevented per year), fewer heart attacks (200,000 fewer cases of acute myocardial infarction per year), and a reduction in asthma attacks by 2.4 million per year.23

Air quality regulations in Europe, nationally and EU-wide

National and European Union air quality regulations have also resulted in dramatic reductions of air pollution in Europe. In Dublin, for example, black smoke concentrations declined by up to 70% after a ban on coal sales in 1980. Subsequently, annual respiratory deaths decreased by 17%. In Switzerland, between 1990 and 2001, the health of adult small airways improved as a result of better air quality. For every 10,000 people in the community, there were 259 fewer people with regular cough, 179 fewer people with chronic cough or phlegm, and 137 fewer people with wheezing or shortness of breath.24,25

Research from the National Institute for Public Health and the Environment in the Netherlands finds that European Union policies have considerably reduced concentrations of air pollutants since 1980. Without EU air quality policies, the study finds that the average life expectancy in the Netherlands would have been six years shorter.26

Counting the human cost of pollution peaks in England

Following the Great Smog of London, which lasted for five days in December 1952 and was largely attributed to the burning of low-grade coal in urban power stations and homes, several pieces of legislation were introduced, including the Clean Air Acts of 1956 and 1968. Official figures at the time recorded 4000 additional deaths during the five days of smog, but subsequent research places the death toll of the Great Smog at around 12,000 people.27 The Clean Air Act of 1956 banned the burning of polluting fuels in “smoke control areas” across the UK. Thanks to EU regulation, UK air quality has continued to improve. However, many cities are still breaching the European Union air quality standards by law. Emergency services in English cities are called out to significantly more life-threatening cases on peak pollution days. Across nine cities, research has shown that these peak pollution days result in over 120 additional cardiac arrests, more than 230 additional strokes, and nearly 200 more people with asthma requiring hospital treatment, compared with average pollution days.28

This demonstrates an immediate relationship between heart attacks, strokes, respiratory illnesses, and dirty air29,30 – as well as the better-known long-term health effects. It also illustrates that immediate action and interventions to improve air quality, tackle pollution, and reduce the number and intensity of peak pollution days will save lives, delivering immediate health benefits and reducing costs to health and emergency services.

Air quality regulations in Asia, national and city level

Air quality regulations at the national and city level in some Asian countries have resulted in important public health gains. A 1990 restriction on the sulphur content of fuel oil used for power plants and motor vehicles in Hong Kong led to a 45% drop in ambient sulphur dioxide levels. This intervention also led to a reduction in the annual rate of total deaths caused by exposure to sulphur dioxide (2.1%), respiratory deaths (3.9%) and cardiovascular deaths (2.0%); and it increased life expectancy by 20 days for women and 41 days for men.31

The Japanese government passed legislation to limit transport-related emissions in 2000. By 2009, the average fine particulate matter (PM2.5) levels had decreased from 38 to 26 μg/m³, and nitrogen dioxide had decreased from 30 to 21 ppb. This improvement in air quality was linked to a 0.6% and 1.1% lower prevalence of paediatric asthma caused by fine particulate matter and nitrogen dioxide, respectively.32

IN THE US

**BENEFITS**

valued at two trillion dollars in 2020

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23 Idem.


26 Hasunuma H, Ishimaru Y, Oyoda Y, Shima M. Decline of ambient air pollution levels due to measures to control automobile emissions and effects on the prevalence of respiratory and allergic disorders among children in Japan. Environ Res. 2014;131:111-8.


29 Source: https://www.theguardian.com/environment/2019/oct/21/scores-more-heart-attacks-and-strokes-on-high-pollution-days-figures-show

30 Idem. https://www.theguardian.com/environment/2019/dec/05/heart attacks and strokes on high-pollution days-facts-figure


Emergency measures in Delhi, India, 2019

Pictures from Delhi, India in autumn of 2019 make the horror of air pollution visible. The national government of India and several of its cities had previously put into place a broad range of policies to halt pollution and expand green space.15 The interventions included developing and monitoring air pollution standards, emissions testing, travel restrictions, increased taxes on and removal of subsidies from polluting sources, increased use of clean energy, and the restriction of burning biomass fuels.16,17 However, it is clear that the measures were insufficient or not adequately enforced, as Delhi declared an unprecedented air pollution emergency on 1 November 2019. Since then, further emergency measures have been introduced, including halting construction works, traffic restrictions, a temporary ban on fireworks, school closures, and the distribution of face masks.18 But local campaigners fear that the temporary measures will not sustainably tackle the main sources of pollution, including crop stubble burning, which is estimated to account for half of Delhi’s air pollution, along with transport and factory emissions.19

Non-implementation of clean air policies in Africa

Similar problems of population growth, urbanisation, and industrialisation make air pollution a major challenge in Africa.20 Many national and local programmes are in place to reduce indoor air pollution.21 However, national air pollution policies in many regions have not been implemented, and this has been blamed on a lack of data and information on air quality.22 There is increasing recognition of the need to implement and evaluate the impact of such policies, particularly through partnerships with other global agencies including the United Nations Environment Programme.23

Global
Climate Change Reduction Strategies as win-wins for clean air and health

Many studies have shown that the changes occurring in the Earth’s climate contribute to poor air quality and further exacerbate health risks.24,25 Warmer temperatures26 including more extremely warm days27; and changing weather patterns, including increased stagnation28, altered frequency of weather fronts29, more frequent heavy rain events30, and changing emissions from vegetation and human sources31; will affect future levels of ozone and particulate matter, which are air pollutants that especially impact human health.32 Curbing climate change is also essential to prevent air pollution-related deaths. Even in countries with relatively low average air pollution concentrations, populations in hot spots, such as highly urbanised areas with a high traffic load, can benefit profoundly from carbon-neutral mobility through its co-benefits of reducing air pollutants.33

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Conclusion

7 million people die prematurely every year around the world due to air pollution. This is a public health emergency of today. Solutions cannot wait. This briefing illustrates that actions taken around the world can bring various quick wins for health. Local, national and regional air pollution policies not only benefit air quality in cities, but also have important and immediate health co-benefits and are important for mitigating global climate change in the longer-term. Governments and UN agencies, including WHO, can use this evidence to identify cost-effective policy interventions to ensure safe, clean air for all. The assessment of clean air measures should consider the co-benefits across all of the Sustainable Development Goals, including for health systems and public budgets, economic development and productivity, equity and gender equality, urban mobility, and climate. Local and national leaders should not hesitate to adopt and implement packages of measures to tackle all causes of air pollution at-source, thus bringing immediate health benefits to their citizens.

Calls to Action

Research shows that commitment or investment can quickly pay for itself, and many times over, in terms of prevented NCDs, reduced health costs and economic burden, and will bring with it a suite of co-benefits for sustainable development. WHO recommendations should provide guidance to all levels of government, from national to local, to meet the WHO guideline levels for safe, healthy air quality, and must address the major sources of air pollution in different contexts and resource settings.

ADOPT AND STRICTLY ENFORCE EMISSION STANDARDS FOR ALL POLLUTANTS in all relevant sectors, including industry, energy, transport, waste and agriculture.

INCLUDE AIR QUALITY MEASURES in urban, rural and transport planning at city, regional and national level, including measures to encourage modal shift and active mobility, noting the additional benefits to health and wellbeing, the curbing of climate change, and the reduction of health inequalities.

RAPIDLY PHASE OUT HEALTH-HARMFUL SUBSIDIES for fossil fuels and polluting industries and introduce penalties for polluters and/or taxes on pollution.

REDIRECT INVESTMENT TO HEALTH-PROMOTING, accessible alternatives including clean transport and renewable energy, and towards the provision of universal health coverage.

IMPROVE HOUSING CONDITIONS and ensure access to clean energy sources for indoor cooking, heating and lighting.

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PM$_{2.5}$

Source: http://www.euro.who.int/__data/assets/pdf_file/0005/78636/E90038.pdf?ua=1
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