Health effects of air pollution

Key pollutants: PM, CO, O₃, NO₂, SO₂
Exposure pathway: respiratory tract
Particulate matter impact: can penetrate deep into lungs and bloodstream

Short-term health effects of air pollution exposure

- Ear, nose, and throat irritation – coughing, difficulty in breathing, water in eyes
- Respiratory infections
- Reduced lung function
- Aggravation of allergies, asthma

Long-term health effects of air pollution exposure

- Increased risk of stroke
- Chronic heart disease
- Chronic obstructive pulmonary disease
- Lung cancer
Air quality and health in the Western Pacific Region

- Clean air is a basic human right and fundamental for human health, well-being and sustainable development
- Unequal burden and biggest impacts in lower- and middle-income countries
- The Western Pacific Region shares great mortality and morbidity burden
- Non-communicable diseases attributable to ambient PM pollution per 100,000 population:
  - 78.65 in the Region
  - 47.5 global

Ambient air pollution attributable deaths (who.int)
Air quality in the Western Pacific: key indicators

Concentrations of fine particulate matter ($PM_{2.5}$)

Population with primary reliance on clean fuels and technologies for cooking (%)

Source: WHO Air Quality Database
Health impacts of air pollution

- Ambient air pollution – 4.2 million premature deaths globally
  - 89% in LMIC
  - Greatest number in the WHO South-East Asia & Western Pacific Regions

- Indoor air pollution – 3.2 million deaths globally
  - 237,000 deaths of children under 5

- 2.4 billion globally cook using open fires or inefficient stoves which generate harmful household air pollution
  - leads to noncommunicable diseases

- The combined effects of ambient & household air pollution are associated with 6.7 million premature deaths annually

- If 2021 WHO AQG level for PM$_{2.5}$ is achieved: 3.1 million deaths can be avoided in the Region -> benefit of US$ 4.6 trillion
Health and cost benefits from reducing pollutant concentrations to AQG levels

How many premature deaths could be avoided?

If achieved 2021 WHO AQG level for PM$_{2.5}$,

- **3.1 million deaths** avoided in the Region → annual economic benefit of **US$ 4.6 trillion**
- Gradual achievement of the interim targets bring substantial health benefits, in particular in areas with high PM$_{2.5}$ concentrations

### Reducing premature death by achieving AQG level in the Western Pacific Region
(scenario analysis for 2016 air pollution levels)

<table>
<thead>
<tr>
<th>IT 1</th>
<th>IT 2</th>
<th>IT 3</th>
<th>IT 4</th>
<th>AQG level</th>
</tr>
</thead>
<tbody>
<tr>
<td>9%</td>
<td>20%</td>
<td>36%</td>
<td>50%</td>
<td>80%</td>
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</tbody>
</table>

Sources:
Health and economic benefits of meeting WHO air quality guidelines, Western Pacific Region - PMC (nih.gov)
World Bank, 2021
WHO global air quality guidelines, 2021
Compliance with WHO Air Quality Guidelines

Particulate matter (annual average)

By region
- African Region
- Region of the Americas
- South-East Asia Region
- European Region
- Eastern Mediterranean Region
- Western Pacific Region

By income
- High income
- Low-and-middle income

Nitrogen dioxide (annual average)

By region
- African Region
- Region of the Americas
- South-East Asia Region
- European Region
- Eastern Mediterranean Region
- Western Pacific Region

By income
- High income
- Low-and-middle income
### Key challenges in addressing air pollution

<table>
<thead>
<tr>
<th>Category</th>
<th>Challenges</th>
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</table>
| **Diverse sources of pollution**              | - Each source requires different strategies and policies for effective management  
                                               - Biomass burning, municipal solid waste, transport, energy residential and industrial, etc.                                                                                                             |
| **Technological and economic challenges**     | - Developing and implementing advanced pollution control technologies can be costly and technologically challenging, particularly in developing countries.  
                                               - Key challenge to balance economic growth and environmental protection                                                                                                                                   |
| **Policy and regulatory challenges**          | - Effective policy implementation to control air pollution requires coordination across different levels of government and sectors.  
                                               - Administrative and governance issues are complex and interwoven with major socioeconomic issues                                                                                               |
| **International cooperation**                 | - Transboundary issue of air pollution.                                                                                                                                                                   |
| **Monitoring and data collection**            | - Technically and financially challenging                                                                                                                                                                |
| **Health impact assessment**                  | - Ongoing challenges in researching and quantifying health effects of air pollution  
                                               - Necessary for informing policy decisions                                                                                                                                                             |
| **Urban planning and infrastructure**         | - Effective urban planning and development of green infrastructure can mitigate pollution but require long-term planning and investment                                                                         |
Examples of interventions in the region

**China**
- Setting time-bound targets for major air pollutants in its five-year plans

**Japan**:
- Zero Emissions Strategy for net-zero CO2 emissions by 2050

**Mongolia**
- National Program for Air Pollution Reduction with 50 measures
- Master Plan for decreasing air pollution in Ulaanbaatar city was approved in 2018

**Korea**
- Launched the 4th Fine Dust Seasonal Management program

**China**
- Bluetech Clean Air Alliance for advanced clean air technologies

**Japan**
- Hydrogen-powered buses in cities

**Mongolia**
- Banned raw coal use in Ulaanbaatar city

**Korea**
- Ban grade 5 vehicles in the cities (Seoul, Busan, and Daegu) and increase use of zero-emission vehicles
- Sector-specific dust reduction measures
Examples of interventions in the region

**Financial incentives**

**China**
- Pollution Protection Tax Law to incentivize companies to reduce emissions

**Mongolia**
- Providing discounted bank loans for environmentally friendly products (electric heaters and cars)

**Korea**
- Providing 5% reduction in automobile tax, and other discounts through the Commute Trip Reduction programme

**Summary of interventions**

Substantial efforts and progress being made in countries/cities:

- Policy improvements
- Enforcement by effective interventions such as transport, energy sectors
- Adequate financing mechanisms
- Role and impact of cities in advancing national, regional and global agenda (Seoul, Tokyo, Ulaanbaatar)
Realizing the co-benefits of action on climate and the environment

WHO Asia-Pacific Centre for Environment and Health has launched a new series of briefs for Parliamentarians on the co-benefits of action on climate change and the environment.

Briefs are available on topics such as:

- Air pollution
- Chemical safety
- Climate change
- Climate-resilient and environmentally Sustainable Primary Health care facilities
- Water, sanitation and hygiene in healthcare facilities
Realizing the co-benefits of action on climate and the environment

Key reasons for immediate action:
• 2 million deaths in the Western Pacific in 2019 from ambient and household air pollution
• 99% of the global population breathe air exceeding WHO limits
• Many air pollutants contribute to climate change

Lawmaking:
• Be informed about legal frameworks for AQ
• Advocate for legislation aligning with WHO guidelines and interventions supporting clean energy transition

Representation and Leadership:
• Understand and communicate the health risks of air pollution to constituents
• Promote govt leadership in energy efficiency
• Engage in regional and global dialogues on AQ

Budgeting:
• Prioritize activities with potential health co-benefits
• Redirect funds from polluting subsidies to clean energy incentives

Oversight and accountability:
• Ensure governance mechanisms to mitigate industry manipulation (e.g. creation of anti-corruption agencies)
• Mandate responsible entities to provide updates to parliament

Actions for parliamentarians to consider

Realizing the co-benefits of action on climate and the environment
Key considerations

• Setting and enforcing health-based air quality standards and policies aligned with WHO AQG are key drivers for reducing pollution and its adverse effects

• Strengthen air quality management and accountability mechanisms at all levels and promote proactive multisectoral actions

• Develop/maintain vigilant monitoring, surveillance and reporting systems

• Policies and investments supporting cleaner transport, energy efficient homes, power generation, industry and better municipal waste management would reduce key sources of outdoor air pollution.

• Integrate health impact assessments in environmental policy decisions

• Prioritize green urban planning and sustainable city development

• Community involvement, engagement and empowerment critical to success