Notes:

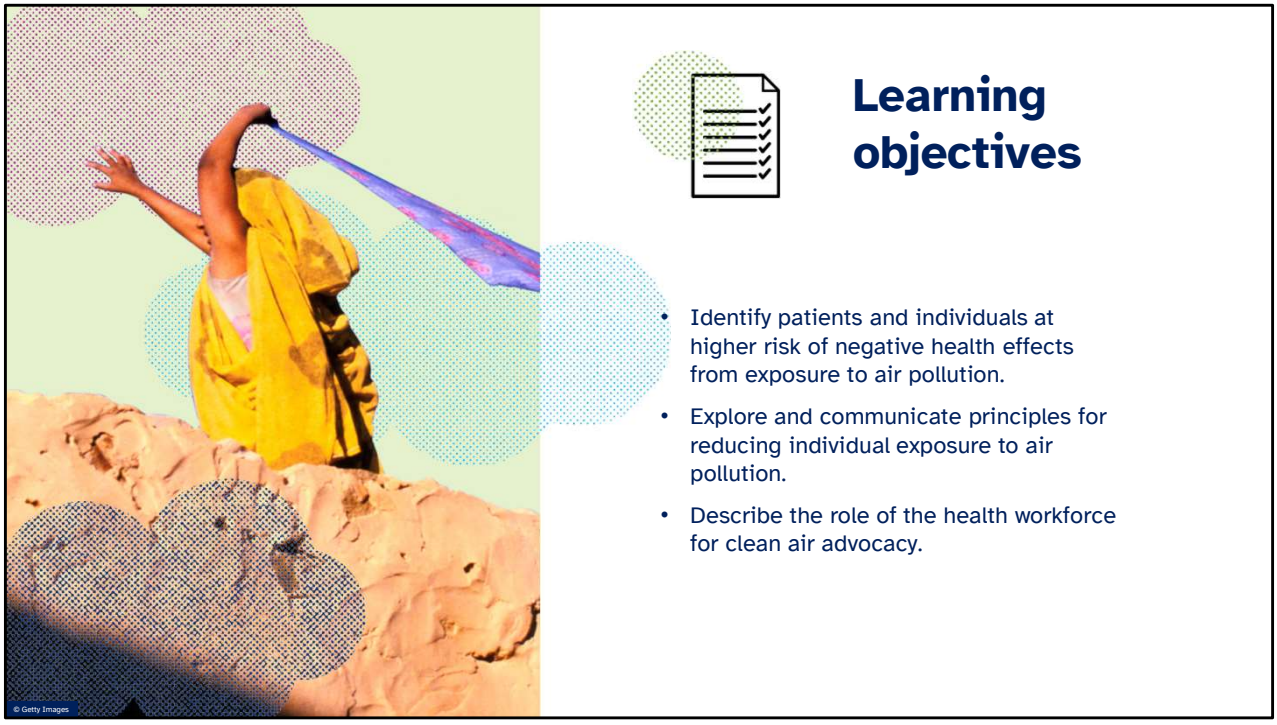
This module contains a large set of slides from which the presenter should select the most relevant ones to use in a specific presentation. These slides cover many facets of the problem. Present only those slides that apply most directly to the local or regional situation. Where relevant, you can adapt the information, statistics and photos within each slide to the particular context in which this module is being presented.

This module belongs to the Air Pollution and Health Training toolkit targeting health workers (APHT). It has been developed in collaboration with more than 30 experts from government agencies, WHO collaborating centers, non-state actors, including medical and environmental health associations, as well as academic institutions. The methodology used for development included a mapping of existing air pollution and health training opportunities targeting health workers which informed gaps and needs for a global set of materials. Experts identified through existing collaborations with WHO contributed on the definition of outline and populating the training modules with contents. Peer review and pilot test coordinated by WHO ensured the collection of feedback and input for finalization of the products.

WHO made all possible effort to ensure geographical and gender balance for the development of the training toolkit acknowledging limitations in terms of expertise, experience and overall feasibility.
You can use and have access to other APHT modules where relevant.
To see the full package visit: https://www.who.int/tools/air-pollution-and-health-training-toolkit-for-health-workers

For more information on WHO's work on air quality, energy and health, please visit: https://www.who.int/teams/environment-

climate-change-and-health/air-quality-and-health



Learning objectives for this module are:

1. Identify patients and individuals at higher risk of negative health effects from exposure to air pollution.
2. Explore and communicate principles for reducing individual exposure to air pollution
3. Describe the role of the health workforce for clean air advocacy

Acronyms

AQ(H)I	air quality (health) index
CHEST	clean household energy solutions toolkit
COPD	chronic obstructive pulmonary disease
CVD	cardiovascular disease
EPHF	Essential public health function
HAP	household air pollution
ICD	international classification of diseases
IFMSA	International Federation of Medical Students' Associations
IHD	ischaemic heart disease
LPG	liquified petroleum gas
NCD	noncommunicable diseases
NGO	nongovernmental organization
NIOSH	United States National Institute for Occupational Safety and Health
PAC	Portable air cleaner
PM	particulate matter
UN	United Nations
UNEP	United Nations Environment Programme
US EPA	United States Environmental Protection Agency
WAQI	world air quality index

Module outline

1. Public health workforce: definition and roles.

2. Populations at higher risks and clinical assessment:
- vulnerable and susceptible individuals;
- clinical screening tool for air pollution risk assessment: an example;
- the ICD codes for exposure to air pollution.

3. Principles for reducing individual exposure to air pollution:
- reducing exposure to outdoor air pollution;
- key messages on household air pollution.

4. Air pollution and physical activity.

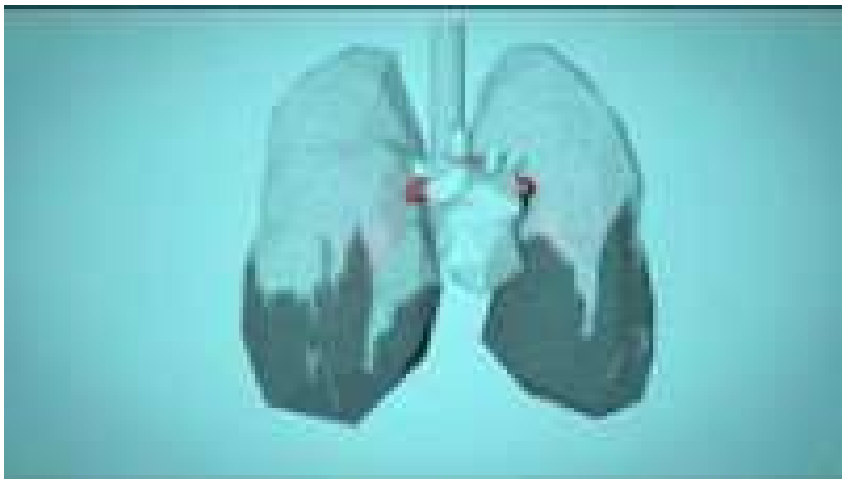
5. Portable air cleaners and face coverings in the context of air pollution.

6. The unintended consequences of changing behaviour to reduce exposure to air pollution.

7. Advocating for clean air in the (health) community:
- the role of health workers as clean air advocates: key principles;
- the BreatheLife campaign;
- air quality information as communication tools;
- citizen science and low-cost sensors;
- sharing success stories: lead by example.

8. Ready-to-use material.

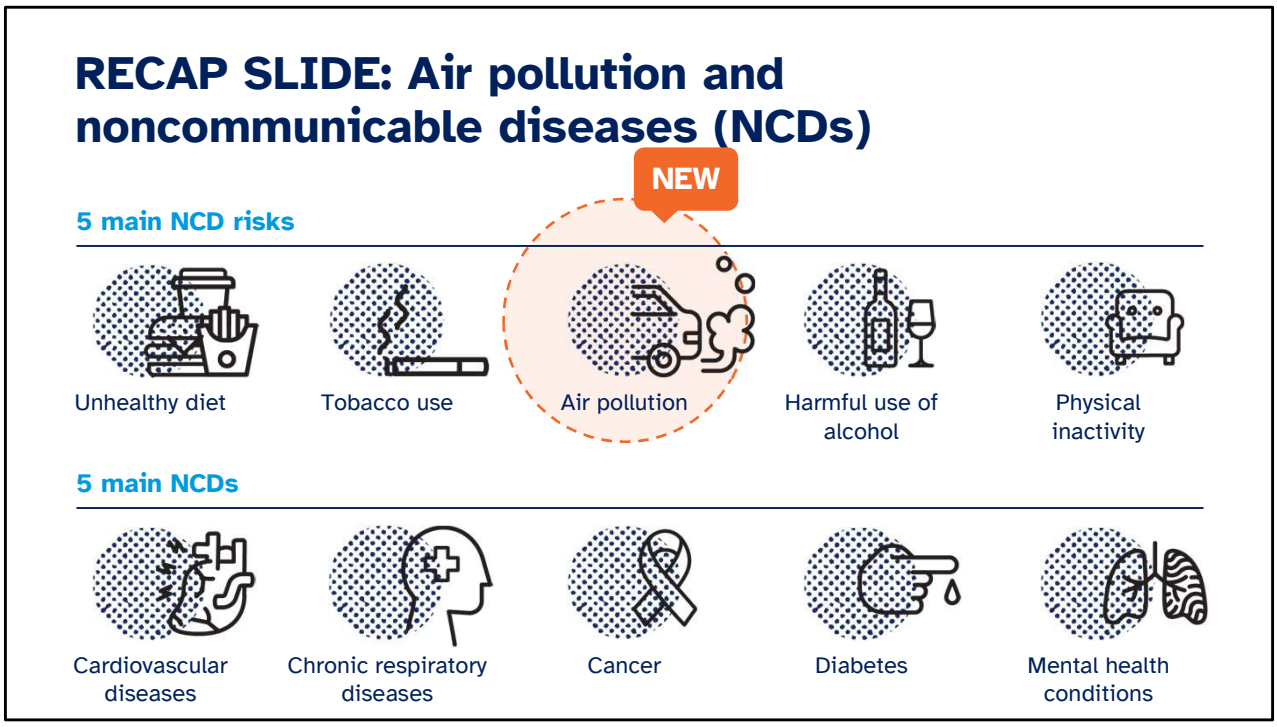
RECAP VIDEO: How is air pollution able to affect the health of our body?



Let's watch a video to remind ourselves of how air pollution can affect the health of our body. (To play the video, double-click on the screen.)

Bibliography

- Breathe Life: how air pollution impacts your body. Geneva: World Health Organization; 2018 (https://www.youtube.com/watch?v=GVBeY1jSG9Y&feature=emb_logo, accessed 18 November 2022).



As shown in the previous video, air pollution not only affect the lungs. Its massive burden of health has been confirmed from the consistent scientific evidence, and air pollution is now recognized as a risk factor for the development of noncommunicable diseases (NCDs).

In September 2018, the United Nations General Assembly staged the third High-level Meeting on the prevention and control of NCDs.

The meeting undertook a comprehensive review of the global and national progress achieved in putting measures in place that protect people from dying too young from heart and lung diseases, cancers and diabetes.

A political declaration was adopted, transforming the historically 4 x 4 agenda (4 risk factors and 4 main diseases) into a 5 x 5 agenda, including air pollution as a risk factor and mental health as a disease.

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- Political declaration of the third high-level meeting of the General Assembly on the prevention and control of non-communicable diseases A/73/L.2. United Nations General Assembly; 2018 (https://www.un.org/ga/search/view_doc.asp?symbol=A%2F73%2FL.2&Submit=Search&Lang=E, accessed 9 December 2024).
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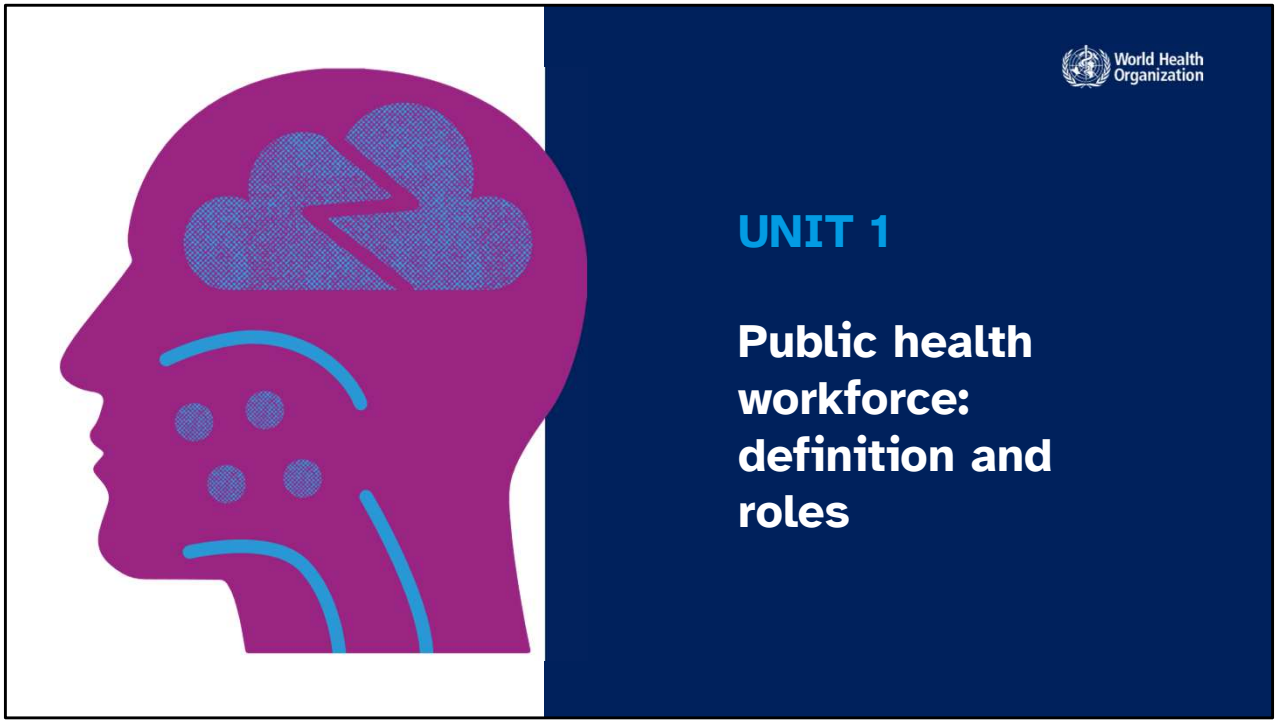
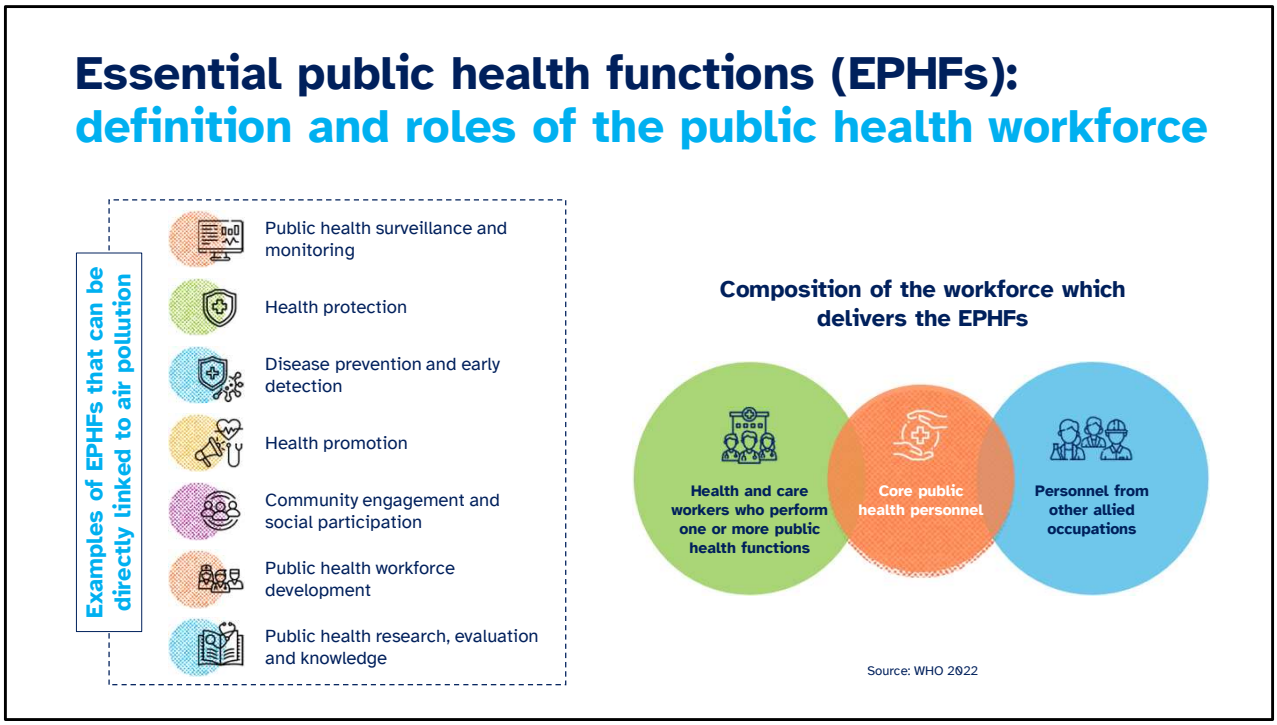

World Health Organization
UNIT 1
Public health workforce: definition and roles



Essential public health functions (EPHFs) are generally regarded as “the set of collective actions under the responsibility of the State which are needed to meet public health goals, including the attainment and maintenance of the highest level of population health possible within given resources”.

The workforce responsible for delivering the EPHFs includes all individuals involved in providing at least one of these functions within integrated services and systems. This workforce encompasses a range of different occupations, spanning both the health sector and other sectors, rather than representing a single profession. Categories can be summarized as follow:

- Core group of public health professionals who have received formal training and/or are registered with professional bodies in public health, coming from either health-related or other backgrounds.
- Health and care workers who support one or more public health functions through their clinical or social care responsibilities.
- A broad range of allied personnel involved in addressing health determinants, such as those working in water and sanitation, food supply chains, and road safety.

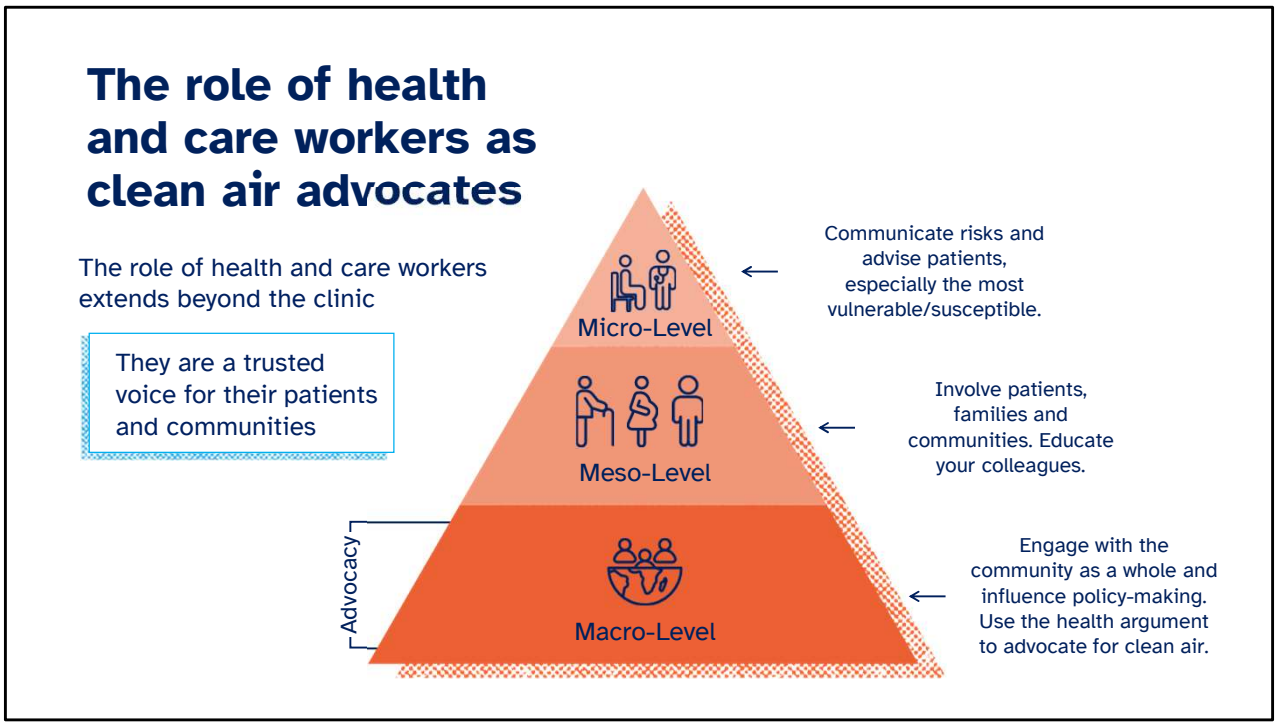
WHO’s unified list of EPHFs consists of 12 high-level activities. Examples of EPHFs that can be directly linked to the air pollution are:

- Public health surveillance and monitoring: monitoring and surveillance of population health status, risks,
- Health protection: protecting populations against health threats, for example, environmental and occupational hazards, communicable and noncommunicable diseases, including mental health conditions, food insecurity, and chemical and radiation hazards.
- Disease prevention and early detection: prevention and early detection of communicable and noncommunicable diseases, including mental health conditions, and prevention of injuries
- Health promotion: promoting health and well-being as well as actions to address the wider determinants of health and inequity.
- Community engagement and social participation: strengthening community engagement, participation and social mobilization for health and well-being.

- Public health workforce development: developing and maintaining an adequate and competent public health workforce.
- Public health research, evaluation and knowledge: advancing public health research and knowledge development.

The other EPHFs are more general and may have indirect linkages with air pollution. For example, to address a public health issue such as air pollution, public health stewardship systems must be in place; multisectoral planning, financing and management should be ensured; and in situations where it becomes a public health emergency, public health emergency management capacities are needed.

Bibliography:
- Defining essential public health functions and services to strengthen national workforce capacity. Geneva: World Health Organization; 2024. (https://iris.who.int/handle/10665/376579, accessed 9 December 2024)
- National workforce capacity to implement the essential public health functions including a focus on emergency preparedness and response: roadmap for aligning WHO and partner contributions. Geneva: World Health Organization; 2022. (https://iris.who.int/handle/10665/354384, accessed 9 December 2024)
- 21st century health challenges: can the essential public health functions make a difference? Discussion paper. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/351510, accessed 9 December 2024).



Health and care workers work with individual patients and families, but they are also well-respected members of the communities within which they work and their credibility is high.

Although it might appear challenging working out which type of health and preventive messages and measures health professionals can provide to patients and the community they serve when it comes to air pollution, they have a big role to play.

There are different levels at which health and care workers can be advocates.

Micro-level: for patients and individuals in the clinical context, especially the most vulnerable/susceptible e.g. assess whether air pollution exposure might play a role on symptoms/disease onset or progression, counseling and advising about how to reduce exposure.

Meso-level: health workers' role also extends beyond the clinic to involve families and communities (either urban or rural) to protect and promote people's health and well-being, e.g. support people in the community with access to healthcare, access to clean energy, housing, food, maternal and childcare beyond the clinical context. As well, it entails educating and raising awareness of peers and colleagues.

Macro-level: Influence policy making, use the health argument to advocate for clean air and a healthy planet, e.g. by supporting activities for clean air, clean drinking water and sanitation, safer communities and roads, and sustainable transports and agriculture, urban health, resilient and low-carbon health care facilities.

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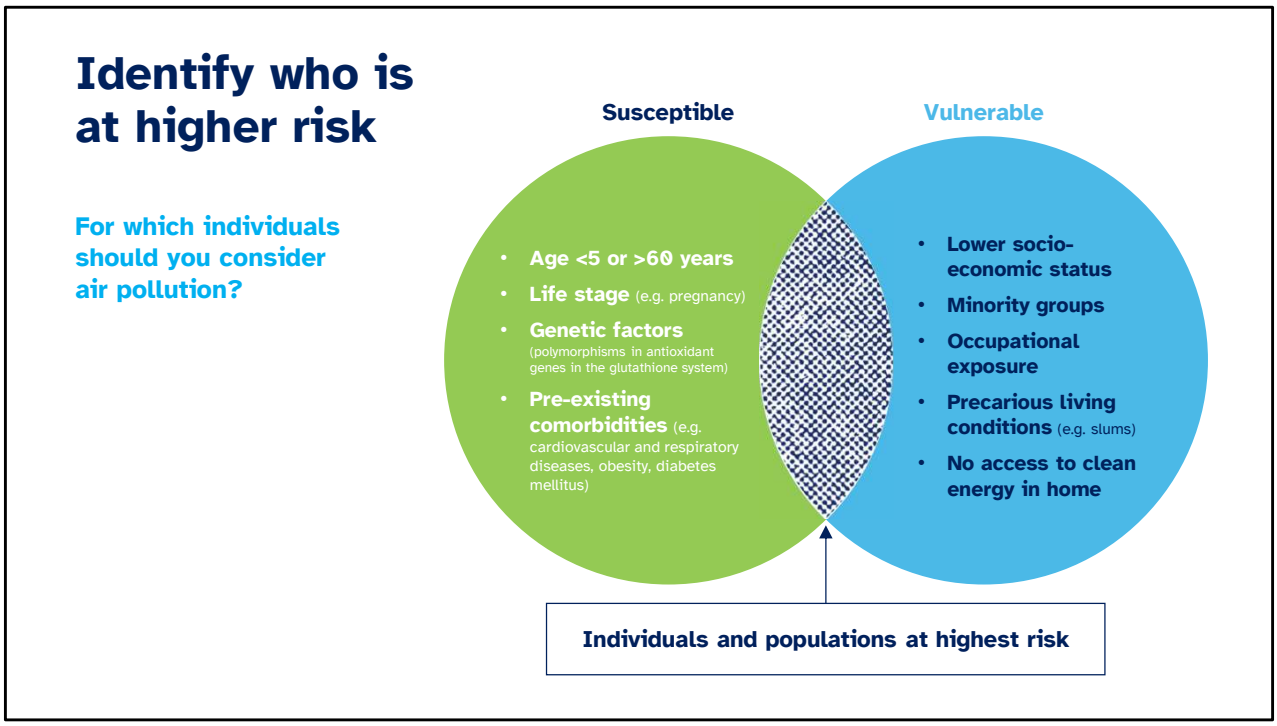
- Buchman S, Woollard R, Meili R, Goel R. Practicing social accountability: from theory to action. Can Fam Physician. 2016;62(1):15–8.
- Hoffmann B, Boogaard H, de Nazelle A, Andersen ZJ, Abramson M, Brauer M, Brunekreef B, Forastiere F, Huang W, Kan H, Kaufman JD, Katsouyanni K, Krzyzanowski M, Kuenzli N, Laden F, Nieuwenhuijsen M, Mustapha A, Powell P, Rice M, Roca-Barceló A, Roscoe CJ, Soares A, Straif K, Thurston G. WHO Air Quality Guidelines 2021-Aiming for Healthier Air for all: A Joint Statement by Medical, Public Health, Scientific Societies and Patient Representative Organisations. Int J Public Health. 2021 Sep 23;66:1604465. doi: 10.3389/ijph.2021.1604465. PMID: 34630006; PMCID: PMC8494774.
- Smith, R. Medicine's neglect of air pollution reflects a wider failure BMJ 2022; 378 :o2214 doi:10.1136/bmj.o2214.

World Health Organization

UNIT 2

Identify at-risk groups: clinical assessment



Air pollution should be considered by health and care workers as an important risk factor for health. The first step is to identify situations where air pollution might be involved as an upstream risk factor.

Medical sociologist Irving Zola told a story to illustrate the meaning of “upstream risk factor”. A witness sees a man caught in a river current. The witness saves the man, only to be drawn to the rescue of more drowning people. After many have been rescued, the witness walks upstream to investigate why so many people have fallen into the river. Perhaps he finds that there is a hole in the bridge. If this hole is patched (a simple intervention), then many rescues downstream will be averted, and many lives will be saved.

When consulting with a patient, it is important to think about the upstream determinants of health.

This module will help you to recognize air pollution as an upstream factor.

We start by asking you to be aware of the clinical situations that may have been caused, or aggravated, by air pollution. Some people are more susceptible and/or vulnerable to the effects of air pollution.

Susceptible populations are at higher risk of developing cardiovascular morbidity and mortality for a given level of exposure to air pollution as a result of a range of internal factors. The data on susceptibility remain somewhat mixed, but most studies suggest that the risk factors include: age (e.g. being < 5 or > 60 years), life stage (e.g. pregnancy), genetic factors, or pre-existing comorbidities (e.g. hypertension, hyperlipemia, diabetes mellitus, obesity and atherosclerosis).

Vulnerable populations are those who are exposed to higher levels of air pollution as a result of a range of external factors, for example: place of residence, type of occupation and/or type of (if any) ventilation (especially for children). Other factors associated with lower socioeconomic status can make a person more vulnerable to exposure to air pollution, such as: poor diet, lack of exercise, lack of access to green space, lack of access to health care, living next to a busy road or having to

commute in busy traffic.

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- Anderson KM, Wilson PWF, Odell PM, Kannel WB. An updated coronary risk profile. A statement for health professionals. Circulation. 1991;83(1):356–62.
- Hadley MB, Baumgartner J, Vedanthan R. Developing a clinical approach to air pollution and cardiovascular health. Circulation. 2018;137(7):725–42.
- Personal interventions and risk communication on air pollution. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/333781, accessed 9 December 2024).
- Zola IK. The problems and prospects of mutual aid groups. Rehab Psychol. 1972;19(4):180–3.

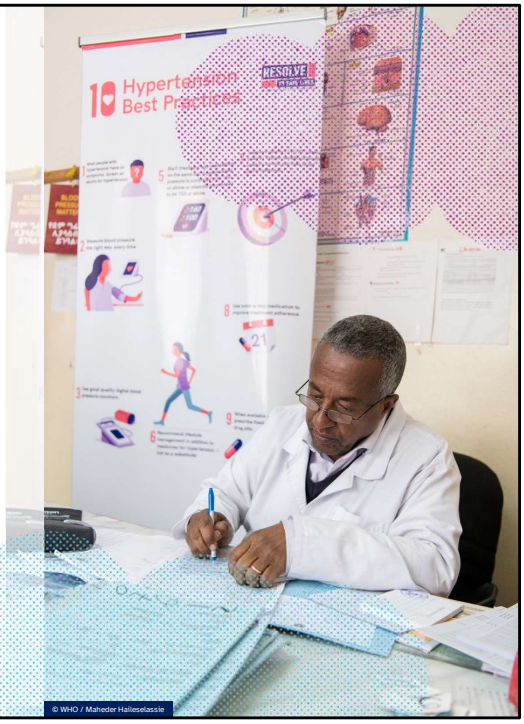
Clinical risk scores for air pollution exposure

Air pollution is:

- Hard to assessable in clinical examination
- not clearly recognizable by simple blood tests/investigations.

Yet

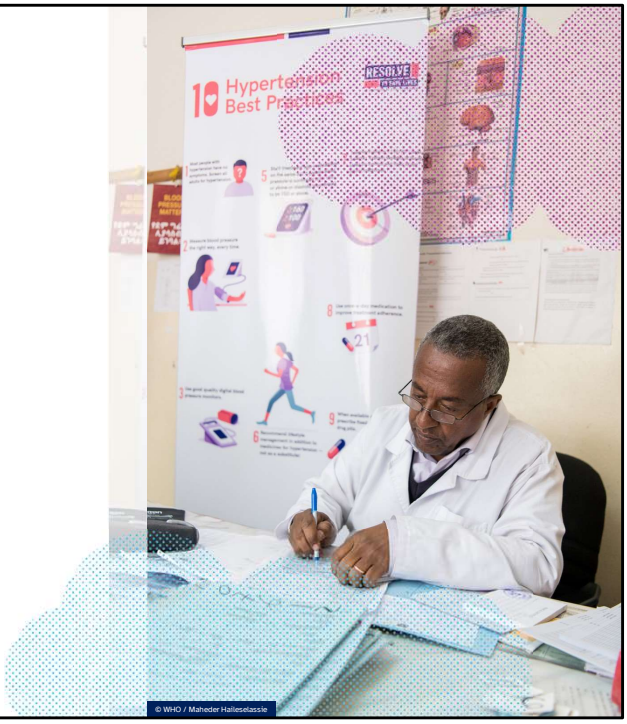
- it is a real health burden.



Although air pollution exposure is hard to assess in the clinical examination of patients, and not clearly recognizable by simple blood tests or other exams, it causes a real and tangible health burden.

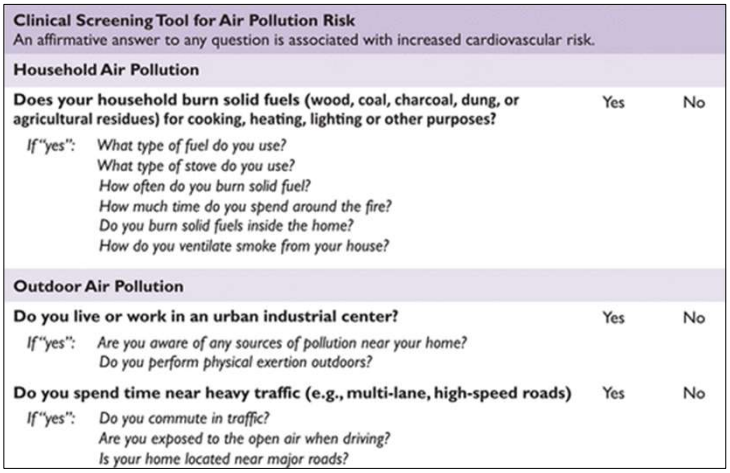
Clinical risk scores for air pollution exposure

- Include consideration of susceptibility/ vulnerability factors and levels of air pollution.
- Useful for guiding decisions about personal interventions.
- Initial tools are available, stream of work in progress.



While this stream of work is still in progress, clinical risk scores and tools for risk stratification could include consideration of susceptibility/vulnerability factors and levels of air pollution. This can be useful for guiding decisions about personal interventions. Some researchers have developed tools that you can consider as initial examples.

Clinical screening tool for air pollution risk assessment: an example



Clinical Screening Tool for Air Pollution Risk An affirmative answer to any question is associated with increased cardiovascular risk.		
Household Air Pollution		
Does your household burn solid fuels (wood, coal, charcoal, dung, or agricultural residues) for cooking, heating, lighting or other purposes?	Yes	No
If "yes": *What type of fuel do you use?* *What type of stove do you use?* *How often do you burn solid fuel?* *How much time do you spend around the fire?* *Do you burn solid fuels inside the home?* *How do you ventilate smoke from your house?*		
Outdoor Air Pollution		
Do you live or work in an urban industrial center?	Yes	No
If "yes": *Are you aware of any sources of pollution near your home?* *Do you perform physical exertion outdoors?*		
Do you spend time near heavy traffic (e.g., multi-lane, high-speed roads)	Yes	No
If "yes": *Do you commute in traffic?* *Are you exposed to the open air when driving?* *Is your home located near major roads?*		

How to assess whether someone might be exposed to air pollution: clinical screening tool for air pollution risk

Source: Hadley et al. 2018

The check list shown is a screening tool that clinicians can use to assess vulnerability to hazardous exposure and design tailored interventions for susceptible patients. Questions focus on evidence-based predictors for exposure to fine PM.

For household air pollution, the use of solid fuel is the primary indicator of hazardous exposure. If patients confirm this use, clinicians should inquire about other factors that might influence exposure levels, such as the type of fuel, type of stove, burning frequency, time spent near the fire, and kitchen layout and ventilation. Individuals who experience higher exposure levels typically burn fuel indoors multiple times per week, use solid fuels and low-efficiency stoves, spend extended periods near the fire, and have poor ventilation or air filtration.

For ambient (outdoor) air pollution, spending time near urban industrial centers or heavy traffic is a used as predictor of hazardous exposure. If patients confirm exposure, clinicians should ask about their proximity to traffic and specific industrial pollution sources near their work or home. Living, working, or driving close to multi-lane or high-speed roads may indicate exposure to air pollution. Higher exposure levels are also observed in individuals who drive during rush hour with windows down or use air conditioning with external circulation. For patients in rural or less developed areas, clinicians should ask about proximity to other pollution sources, including small-scale industries, wildfires, and burning of seasonal agricultural or solid waste.

An open-ended question about air pollution in the patient's community can help identify overlooked risk sources. In populations known to have widespread elevated exposure levels to ambient or household air pollution, qualitative assessments might be bypassed. Occupational exposures, which also contribute to cardiac risk, are not addressed in this tool.

Note: you can consider asking the audience questions such as "Would you change or add any questions?" or "What questions are relevant in your community?"

Note: See also the ready-to-use material at the end of this module for example of screening questions for children.

Bibliography

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The International Classification of Diseases (ICD) code for exposure to air pollution

The International Classification of Diseases (ICD) includes diagnostic codes for contact with and exposure to environmental pollution and hazards in the physical environment, under which a specific code for exposure to air pollution is listed.

- In ICD-10 it is the code **Z58.1** Exposure to air pollution
- In ICD-11 it is the code **QD70.1** Problems associated with exposure to air pollution (Chapter 24)

- They describe a situation of exposure which plays a role in the health status of the person/patient.
- Training and awareness of health workers to use these codes could improve data surveillance and monitoring of air pollution-related diseases.

The International Classification of Diseases (ICD) includes diagnostic codes for contact with and exposure to environmental pollution and hazards in the physical environment, under which a specific code for exposure to air pollution is listed.

- In ICD-10 it is the code Z58.1 Exposure to air pollution
- In ICD-11 it is the code QD70.1 Problems associated with exposure to air pollution (Chapter 24)

Categories in Chapter 24 of the ICD are provided for occasions when circumstances other than a disease, injury or external cause classifiable elsewhere are recorded as "diagnoses" or "problems". This situation pertains, for example, when some circumstance or problem is present which influences the person's health status but is not itself a current illness or injury. Such circumstance or problem may be elicited during population surveys (at times when the person may or may not be sick) or be recorded as additional information to be borne in mind when the person is receiving care for some illness or injury.

These codes describe a situation of exposure which plays a role in the health status of the person/patient.

Training health care workers to use these codes could improve data surveillance and monitoring of air pollution-related diseases.

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- International Statistical Classification of Diseases and Related Health Problems (ICD) [website]. Geneva: World Health Organization. 2024 (https://www.who.int/standards/classifications/classification-of-diseases, accessed 9 December 2024)
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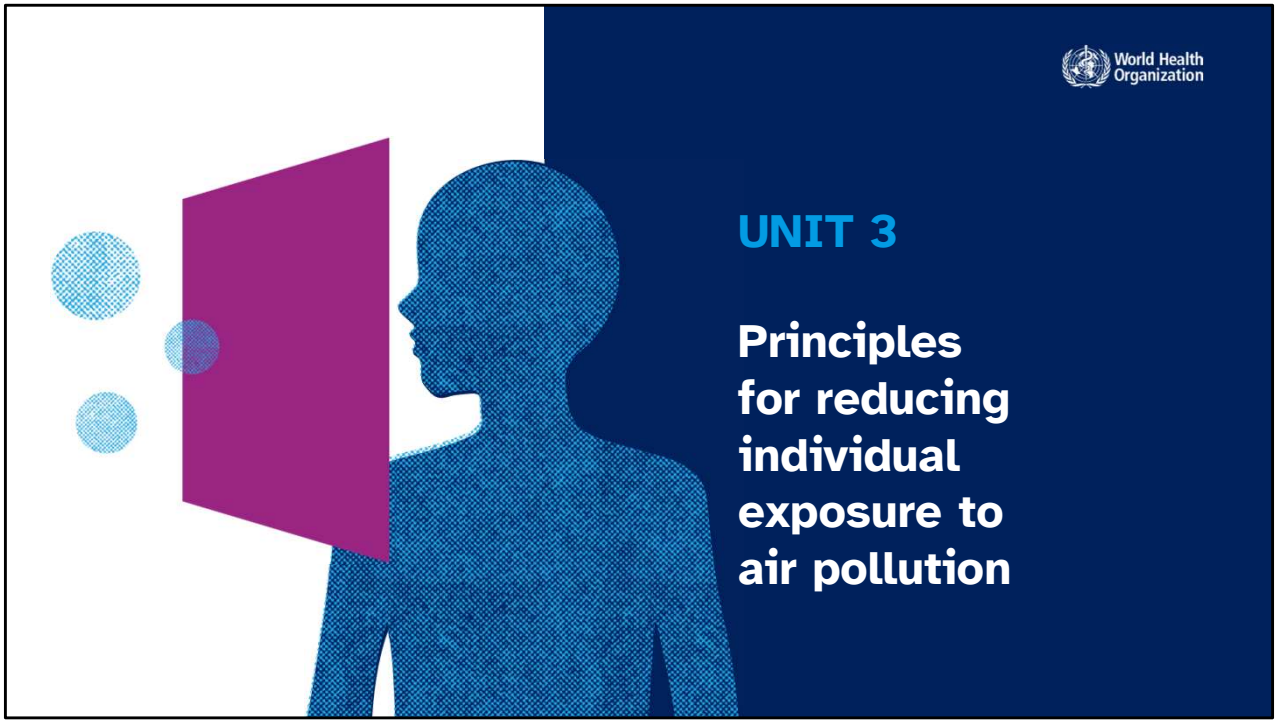
World Health Organization
UNIT 3
Principles for reducing individual exposure to air pollution

Reducing exposure to outdoor air pollution

Commute at less congested times of day

If walking, running or cycling, commute on less busy roads

Exercise away from sources of pollution

Manage community waste effectively; do not burn it

Follow authorities' advice related to wildfires (e.g. leave the area, close windows, use indoor air filters)

Key messages for reducing exposure to outdoor air pollution include:

- reduce exposure to traffic-related air pollution by commuting at less congested times of the day or, if walking, running or cycling, to commute on less busy roads;
- exercise away from sources of pollution, such as busy traffic;
- community waste should be collected and managed effectively instead of burned in open air;
- in case of wildfires, leave the area if possible, close windows or use indoor air filters as well as wear masks where appropriate; and finally
- where available, consider checking local air quality information to know more about air quality in your context.

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- Personal interventions and risk communication on air pollution: summary report of WHO expert consultation, 12–14 February 2019, Geneva, Switzerland. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/333781, accessed 9 December 2024).
- Personal-level actions to reduce air pollution exposure in the WHO European Region. World Health Organization; 2024. Regional Office for Europe. (https://iris.who.int/handle/10665/375889, accessed 9 December 2024)
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Reducing exposure by avoiding polluted places
Key messages

- **Be informed of the daily routine of your patients**, especially those who are more susceptible.
- Where possible, **encourage changes in behaviour**, such as walking along or exercising in less polluted streets, travelling at different times of day or changing the mode of transport.
- Keep in mind that **people who spend a lot of time driving are vulnerable to greater exposure**, particularly in urban areas.
- **Proximity to traffic leads to higher exposure**, depending on type and age of vehicles, and the individual level of physical activity and ventilation rate.
- Pay attention to **outdoor workers: they are likely to experience higher levels of exposure than indoor office workers.**

What variables influence exposure and the inhaled dose of air pollutants during transport or travel? These are: the means of travel, proximity to sources (nearby vehicles), type and age of vehicles, operating mode (filtration and open or closed vents or windows) and level of physical activity (ventilation rate).

During major pollution episodes, reducing exposure is often recommended to reduce the risk of acute harm; however, the greatest health benefit is likely to be achieved with daily reductions in the risk of chronic harm.

Staying indoors and/or reducing physical activity are classic public health precautions for reducing exposure when air pollution is elevated; however, these may not be possible or even advisable, according to individual circumstances.

Key messages:

- Be informed of the daily routine of your patients, mostly for those at higher risk.
- Where possible, encourage changes in behaviour such as walking along less polluted streets, travelling at different times of the day or changing the mode of transport.
- Keep in mind that people who spend a lot of time driving are vulnerable to greater health impacts, particularly in urban areas.
- At the same time, the amount of polluted air inhaled depends on proximity to traffic, type and age of vehicles, how vehicles are ventilated, and the level of physical activity and ventilation rate of the patient.
- Pay particular attention to outdoor workers: they are likely to have experienced higher exposure to air pollution than indoor office workers.

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- Personal interventions and risk communication on air pollution: summary report of WHO expert consultation, 12–14 February 2019, Geneva, Switzerland. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/333781, accessed 9 December 2024).
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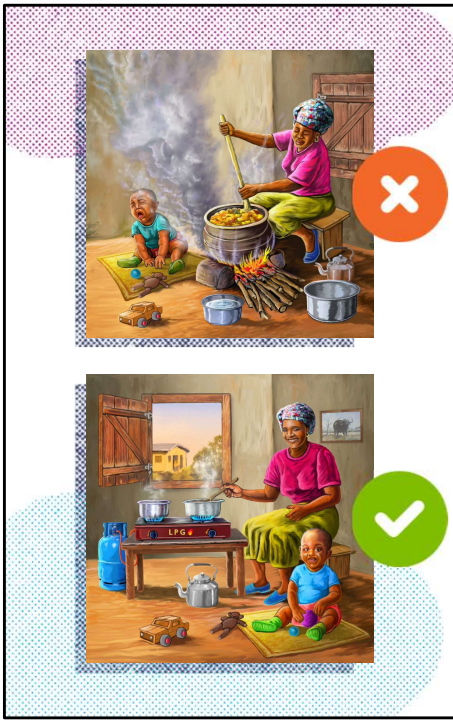
- Personal-level actions to reduce air pollution exposure: practical advice. Technical document. World Health Organization; 2024. Regional Office for Europe. (https://www.who.int/europe/publications/m/item/personal-level-actions-to-reduce-air-pollution-exposure, accessed 9 December 2024)



Principles for protecting health against the harmful effects of household air pollution

- Reduce the time spent close to the pollution source (e.g. polluting cookstove).
- Ensure better ventilation of the spaces through chimneys, windows and vents.
- Explore possibilities of using cleaner fuels and technologies such as LPG and/or electricity.

"Prescribe" clean household energy solutions for your families and communities!

To protect themselves against the harmful effects of exposure to HAP, you can advise your patients to:

- Minimize exposure to HAP by reducing the time spent close to the pollution source, especially vulnerable population groups (e.g. neonates/children, pregnant women, people older than 65 years and individuals with relevant comorbidities).
- Minimize concentrations of HAP within the home through better ventilation (e.g. chimneys, windows, vents, etc.).
- Minimize emissions from fuel combustion: control HAP at source (e.g. by burning fuels more efficiently or using cleaner fuels such as gas and/or electricity);

Reducing emissions involves keeping the home and fuel dry. Damp fuel emits more air pollutants than dry fuel when burned. Dampness in buildings is also associated with an increased risk of adverse respiratory outcomes. Reducing concentrations of emissions through ventilation lowers their accumulation indoors and therefore improves the quality of indoor air. However, venting high concentrations of household air pollution will increase outdoor (also known as ambient) air pollution.

"Prescribe" clean household energy solutions for your families and communities!

Bibliography:

- Fact-sheet: household air pollution. [website] In: World Health Organization; 2024 (https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health, accessed 9 December 2024)

World Health Organization

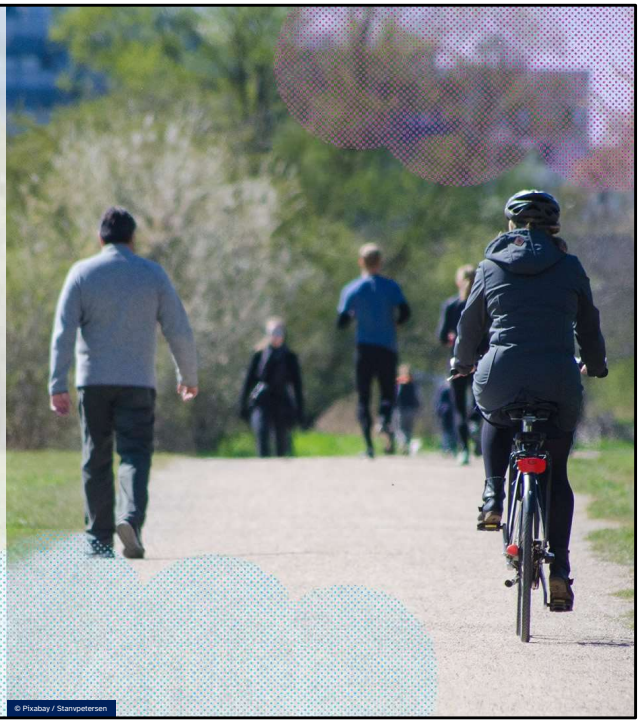
UNIT 4

Air pollution and physical activity

Air pollution and physical activity

Should physical activity be reduced to avoid exposure to air pollutants?

Each population should receive specific advice on modifying their physical activity according to their level of exposure to specific air pollutants.



Should activity be curtailed to reduce inhaled quantities of air pollutants, and what are the possible net adverse effects on health? What practical advice should be given to the general public, children and other at-risk groups, including outdoor workers?

Each population (by age, sex, health status and other determinants of susceptibility or vulnerability) should receive specific advice on modifying their physical activity according to their level of exposure to specific air pollutants. Evidence on healthy adult populations in high-income countries supports continued promotion of regular physical activity, even if the air quality does not reach the levels recommended by WHO, as the health benefits of physical activity are maintained. Research has shown that in healthy adult populations in high-income countries, the long-term benefits of regular physical activity in reducing mortality outweigh the adverse effects of air pollution for $PM_{2.5}$ concentrations of below 100 µg/m^3. With exposure to air pollution, the short-term beneficial effects of physical activity remain but are reduced.

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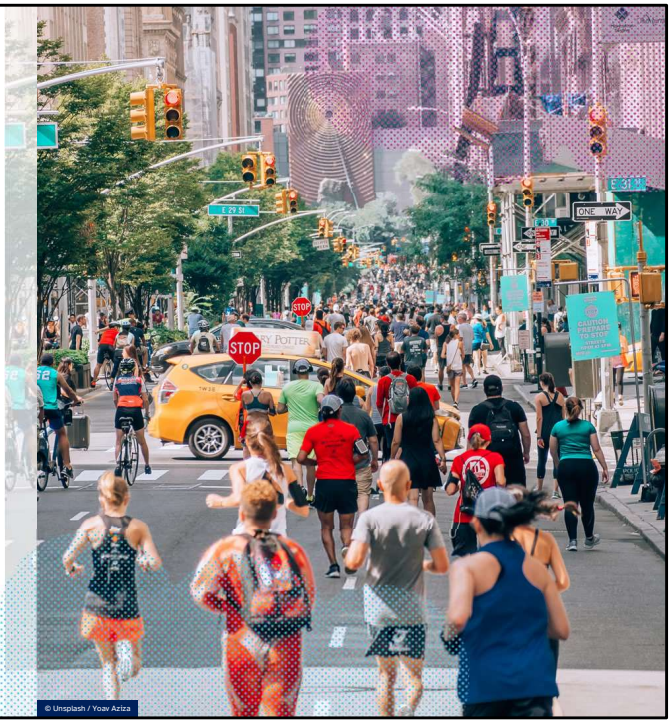
Air pollution and physical activity

Regular physical activity should be promoted even if the local air quality is not optimal.

- Adapt intensity, timing and location of physical activity as needed to reduce air pollution exposure.
- Consider ozone and temperature, especially in warmer climates.



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In general, regular physical activity should be promoted even if the local air quality is not optimal.

The intensity, timing and location of physical activity should be adapted to reduce exposure to air pollution.

Any recommendation should also consider ozone and temperature levels, especially in warmer climates.

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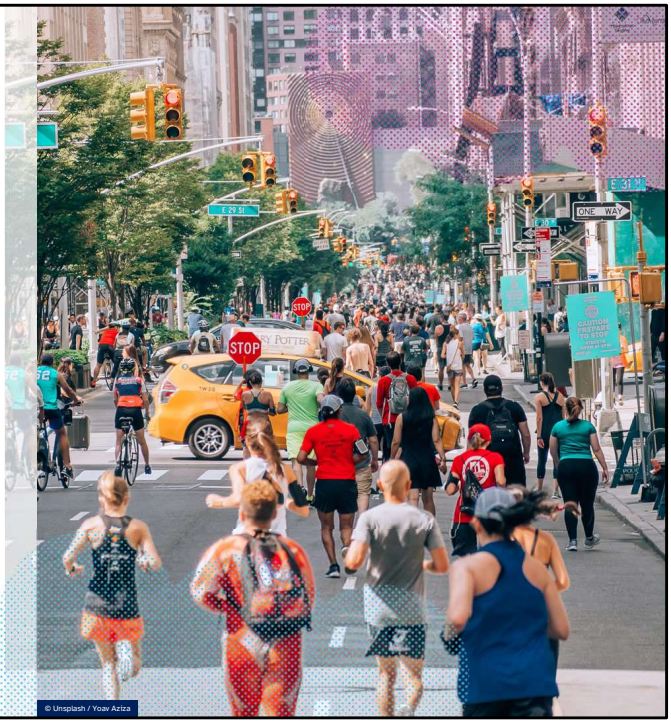
Air pollution and physical activity

- Patients who take medication should follow their physician's recommendations.

High-risk populations should be advised:

- about the best time and location for physical activity/work;
- to reduce activity/work during high air pollution episodes.



Patients who take medication should follow their physician's recommendations, for example adapting the asthma treatment during episodes of high air pollution.

In accordance with the precautionary principle, populations at specific risk (because of their health status or occupation) should be advised:

- about the best time and location for physical activity or for work ;
- to reduce moderate to vigorous physical activity or outdoor work during episodes of high levels of air pollution.

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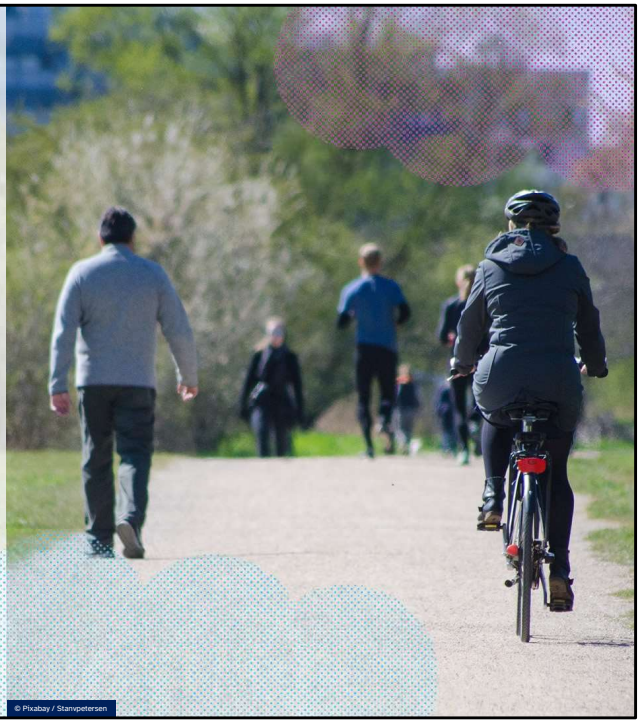
Air pollution and physical activity

Additional studies are needed to increase the evidence for:

- low- and middle-income countries;
- populations other than healthy adults;
- pollutants other than $PM_{2.5}$;
- higher levels of $PM_{2.5}$;
- unintended consequences of alerts about air pollution on overall physical activity.



Additional studies are needed to increase the evidence for low- and middle-income countries, populations other than healthy adults, pollutants other than $PM_{2.5}$, higher levels of $PM_{2.5}$ and unintended consequences of alerts about air pollution on overall physical activity.

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- Personal interventions and risk communication on air pollution: summary report of WHO expert consultation, 12-14 February 2019, Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/333781, accessed 9 December 2024).
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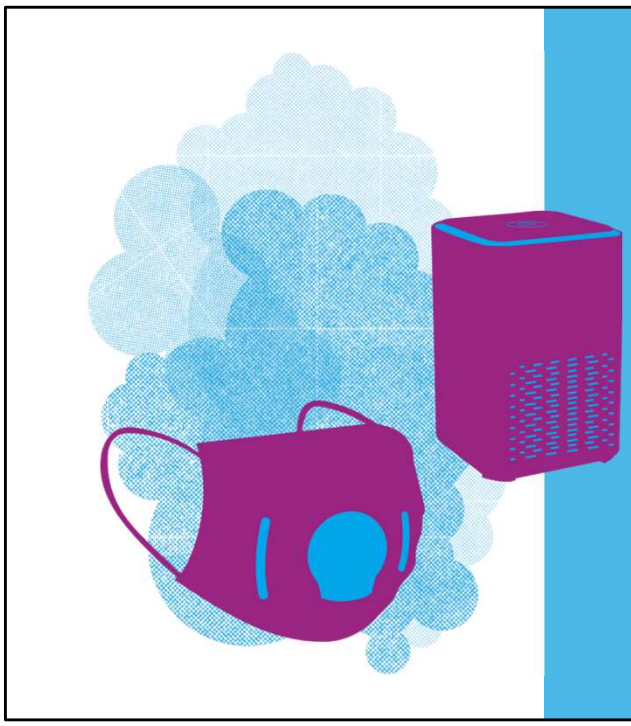
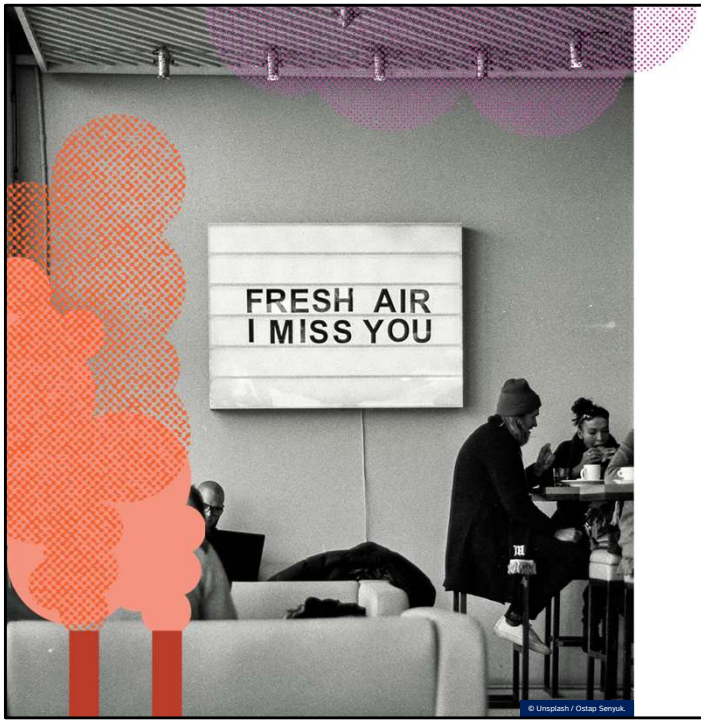


World Health Organization

UNIT 5

Portable air cleaners and face covering in the context of air pollution



Portable air cleaners: systematic review main results

- Reduction in systolic blood pressure
- Increase in peak expiratory flow
- Overall improvement in cardiovascular/respiratory health indicators

Changes in health measurements were **not consistent** across study populations.

Note: Studies carried mainly on PM2.5 as indicator

Portable air cleaners (PACs) are small mobile electric air cleaning units used in living spaces (bedroom, offices) to reduce the concentration of airborne particles and, sometimes, of vapours and gases. Portable air cleaners use different methods to separate airborne contaminants from ambient air, such as air filters (e.g. HEPA filters) that capture particles on fibrous materials and electronic air cleaners (e.g. ionizers or electrostatic precipitators) that remove airborne particles via electrostatic force.

A systematic review was conducted to assess publications on the efficacy of portable air filters in:
- **reducing indoor concentrations** of air pollution; and
- **mitigating health risks** in real-world situations.

Some clinical improvements were observed, including:
- an overall reduction in systolic blood pressure;
- an increase in peak expiratory flow; and
- some overall improvement in several cardiovascular and respiratory health indicators.

However, the changes in health measurements were not consistent across study populations.

The observed improvements were generally **greater in healthy adults** than susceptible participants.

Note: Studies carried mainly on $PM_{2.5}$ as indicator.

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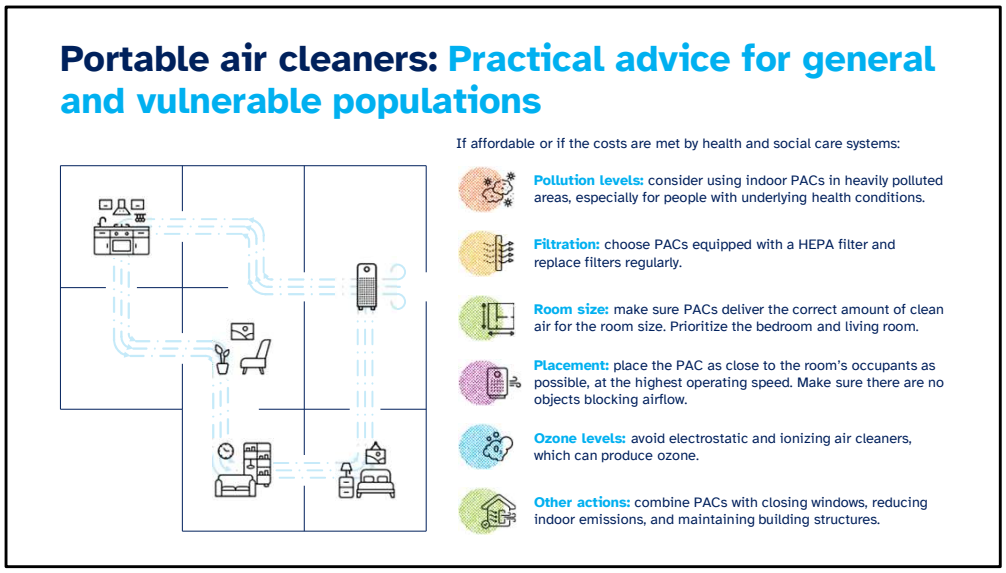

The effectiveness of PACs depends on the type of filtration used, regular maintenance and where they are positioned, among other factors. When combined with other actions, the use of portable air cleaners can be an effective part of a holistic strategy to reduce air pollution exposure. However, owing to their considerable cost, health and social care systems should assess these devices and consider including them in benefit packages, especially for vulnerable people. The effectiveness of PACs will vary based on their characteristics and pattern of use, indoor and outdoor emission levels, characteristics of the building, and social factors. Some intervention studies found that after an initial period of use, PACs are often incorrectly maintained and may be used less often, turned off completely or put into storage, often because of annoyance related to operating noise or other factors.

Practical advice for general and vulnerable populations

If affordable or if the costs are met by health and social care systems:

- Consider the use of indoor PACs, especially for people with underlying health conditions who live in heavily polluted locations or during high air pollution episodes.
- Use PACs with a HEPA filter.
- Select PACs with an appropriate clean air delivery rate (m3 /min) for the room size.
- Use PACs at the highest operating speed possible when the room is occupied and position them close to occupants.
- If the PAC is too small to cover the entire living space, then prioritize the bedroom or living room.
- Locate PACs away from objects that can reduce airflow.
- Change filters according to the manufacturer's recommendation.
- Avoid PACs that may produce O3 (e.g. electrostatic and ionizing air cleaners).
- Combine PAC use with closing windows, reducing indoor air pollution emissions and maintaining building structures that minimize air pollution penetration and air leakage.

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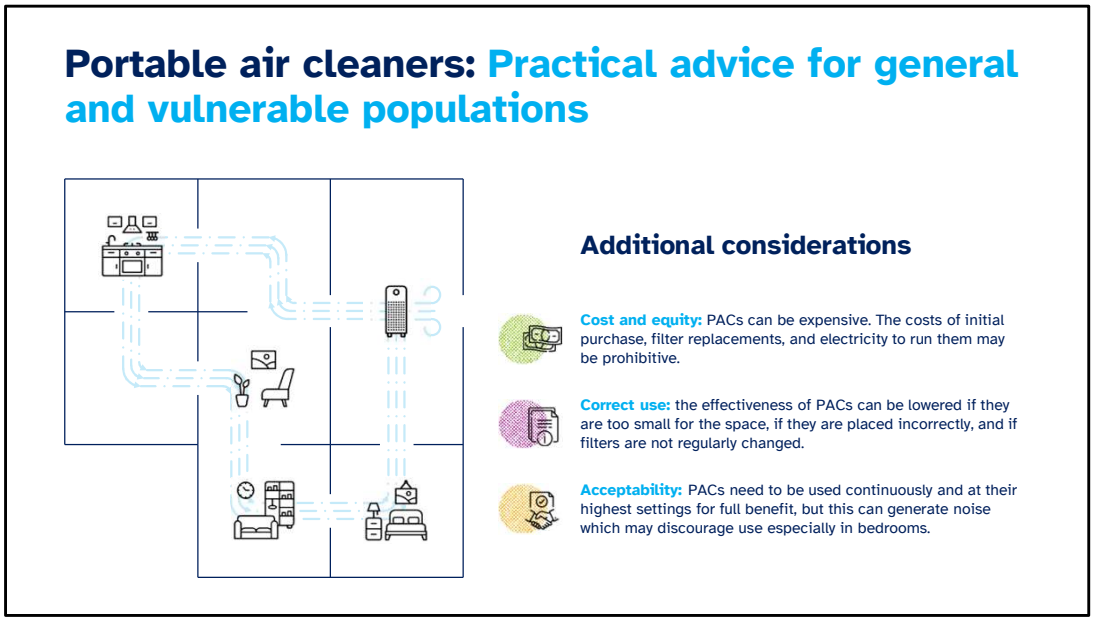

This advice takes the following considerations into account, among others:
• reduced exposure and associated health benefits (e.g. potential cardiorespiratory health improvements);
• risks to health and environment (e.g. raised ozone levels, increased energy consumption); and
• additional considerations (e.g. personal costs, operating noise).

Reduced exposure and associated health benefits
Using PACs can lower air pollution (particles and, in some cases, gases) from indoor sources, outdoor air pollutants leaking into buildings, household chemicals, and pollen. PACs with HEPA filters are most effective, as long as the filters are replaced at least every 6 months. Consistent and correct use of PACs may improve respiratory and cardiovascular health outcomes, especially when used alongside other efforts to reduce air pollution exposure.

Risks to health and environment
PACs that work through ionization of particles can generate ozone, which can be dangerous to health. Some PACs generate noise, which can have an adverse effect on health and may discourage use. However, this should be weighed against the health benefits of cleaner indoor air. PACs have some negative environmental impacts like electricity consumption and waste generation.

Additional considerations
• Cost and equity: PACs can be expensive. The costs of initial purchase, filter replacements, and electricity to run them may be prohibitive.
• Correct use: the effectiveness of PACs can be lowered if they are too small for the space, if they are placed incorrectly, and if filters are not regularly changed.
• Acceptability: PACs need to be used continuously and at their highest settings for full benefit, but this can generate noise which may discourage use especially in bedrooms.

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Both respirators and face masks are types of face covering.

Face masks are cloth or synthetic face coverings. They do not protect the wearer from inhaling air pollutants or other substances, but instead reduce the amount of exhaled droplets or pathogens entering the environment. Thus, face masks are not considered personal protective equipment and are not a recommended method to reduce air pollution exposure.

Respirators are personal protective devices that cover the nose and mouth. The difference from face masks is that a respirator creates a facial seal, meaning that they filter air both entering and exiting the lungs. When worn correctly, respirators can reduce exposure to air pollution. Their effectiveness depends on the rating and how well they fit the face.

Respirators are personal protective devices that cover the nose and mouth and reduce the inhalation of PM2.5 and other particles with an efficiency that depends on the rating.

In the European Region, the filtering facepiece class 2 (FFP2) removes over 95% of inhaled particles of 0.3 µm in diameter, and the filtering facepiece class 3 (FFP3) removes over 99% of inhaled particles of the same size. United States and Chinese respirators can be also found on the European market, with N95 or KN95 respirators equivalent to FFP2 devices, and N99 or KN99 respirators equivalent to FFP3 devices.

Respirators that filter 95% of airborne particles are called either:
- N95 in the United States of America;
- KN95 in China; or
- FFP2 in Europe.

These terms refer to the particle removal efficiency of respirators. However, the terms have not been patented or copyrighted, so they can be used by any maker even without proper testing. This makes that a wide variety of respirators available in the market may not provide effective respiratory protection, even if they cover all or part of the face. Therefore, packaging should be examined for certification or approval by a national or international authority.

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There are six factors that ensure that a respirator is effective:

1. Putting it on correctly.
2. Ensuring that it fits properly.
3. Continuous use during exposure.
4. Change of the respirator or the filter when it becomes saturated.
5. Confirming that it has been approved to remove 95% or more of particles.
6. Certification by a relevant agency

Because of facial anthropometric differences across the world, no single respirator can be guaranteed to fit all users. In general, for example, there appear to be few to no commercial respirators designed for children.

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Respirators and air pollution: systematic review main results

- Overall improvements in variations in heart rate during short-term interventions
- Changes in health measurements not consistent in different study populations
- Most articles did not provide information on how well the respirators actually worked or fitted

A systematic review of studies on the use of personal masks or respirators in the context of air pollution was conducted to assess their efficacy in terms of:

- **reducing exposure** to air pollution; and
- **mitigating health risks** in real-world situations.

The findings of this review were:

- some overall improvements in variations in heart rate during short-term interventions;
- however, the changes in health measurements were not consistent in different study populations in terms of direction, magnitude or timing of response; and
- most articles did not provide information on how well the respirators actually worked or fitted.

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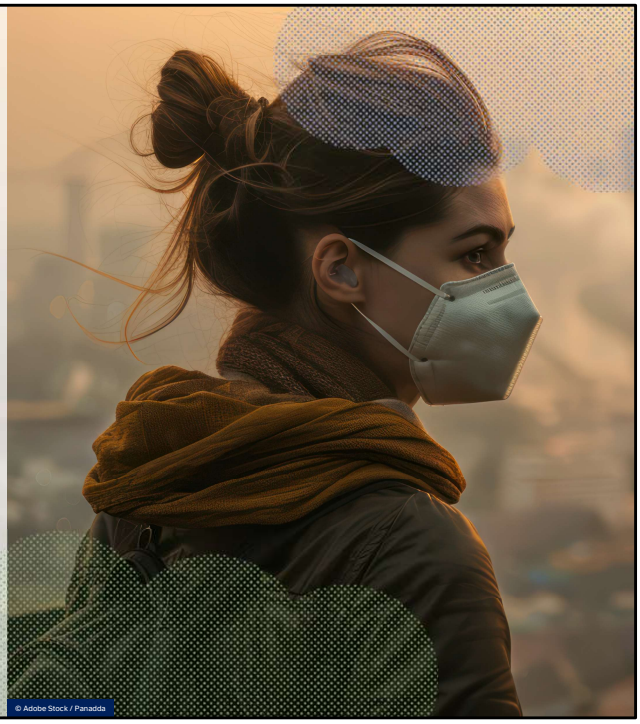
Respirators and air pollution: gaps and needs to determine efficacy

- More studies with larger samples/ longer follow-up in general and high-risk populations
- More information on the effectiveness in real-world conditions
- More data on the tolerability



To determine the efficacy of respirator use:

- more high-quality studies with larger samples and longer follow-up in general and high-risk populations should be conducted;
- more information is also needed on the effectiveness of respirators in real-world conditions by both healthy and susceptible populations. In particular, more data should be provided on the effectiveness and tolerability of respirators.

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Use of respirators against air pollution: practical advice for general and vulnerable populations

Only consider using a respirator when air pollution exposure is unavoidable, such as occupational exposure and for protection against air pollutants during wildfires, volcanic eruptions, desert dust episodes or clean-up after disasters.

- Choose respirators over face masks.
- Only consider using close-fitting respirators that have been approved to remove at least 95% of particles (e.g. FFP2, N95, KN95).
- Respirators are only validated for use by adults.
- Facial hair can reduce the efficacy of respirators.
- People with respiratory, cardiac or other health conditions that make breathing difficult should check with their health care provider before using a respirator for protection against air pollution.
- Follow the respirator's instructions and consider its limitations.
- Change the respirator according to the manufacturer's recommendations.
- Consider other measures to reduce personal-level exposure to air pollution.

Although respirator use can be perceived as a simple, low-cost method of protection against air pollution, it is only recommended under certain conditions. This is because of limited evidence of effectiveness, evidence that a respirator with very high theoretical efficacy often has limited or no effectiveness in real-life conditions of use by the general population, and their social and environmental impacts. Lastly, the lack of distinction between respirators and face masks among the general public may be a barrier to the selection of respirators over face masks.

Only consider using a respirator when air pollution exposure is unavoidable, such as occupational exposure and for protection against air pollutants during wildfires, volcanic eruptions, desert dust episodes or clean-up after disasters.

Practical advice for general and vulnerable populations

• Choose respirators over face masks.
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• Respirators are only validated for use by adults.
• Facial hair can reduce the efficacy of respirators.
• People with respiratory, cardiac or other health conditions that make breathing difficult should check with their health care provider before using a respirator for protection against air pollution.
• Follow the respirator's instructions and consider its limitations.
• Change the respirator according to the manufacturer's recommendations.
• Consider other measures to reduce personal-level exposure to air pollution.

Note: The general guidelines for the use of respirators in the context of occupational exposures have been established under very specific protocol and controlled situations. This subject is beyond the scope of this training module.

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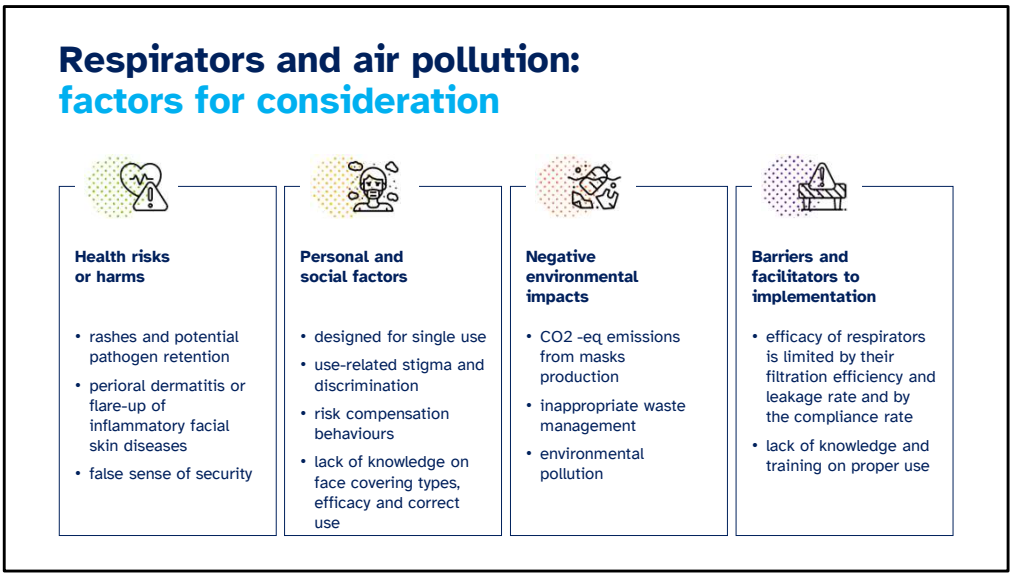

Prolonged respirator use can cause rashes, overheating and skin inflammation. They can increase resistance to breathing, which could have adverse health outcomes in people with respiratory and cardiovascular diseases. Poorly fitting respirators can create a false sense of security, which can lead the wearer to unknowingly placing themself at risk. They have the potential to cause choking and suffocation in babies and toddlers. Single-use respirators can cause high levels of waste and litter, with negative environmental impacts. Their production also causes carbon emissions.

Health risk or harms

Face coverings can trap warm, moist air, leading to rashes and potentially to pathogen retention. Perioral dermatitis or flare-up of inflammatory facial skin diseases have also been reported among workers who are required to constantly wear face coverings. In addition, wearing a poorly fitted respirator or reusing a respirator may be ineffective and provide a false sense of protection, which may lead to decisions or behaviours that increase air pollution exposure.

Negative environmental impacts

The environmental cost of face coverings relates to all parts their life cycle (production, use and disposal). It should also be noted that respirators are designed for single use. In 2020 in the United States, 600 metric tonnes of plastic waste from respirators was generated each week. In Europe, the European Parliament is estimated to produce 12 000 kg of FFP2 and face mask waste each year. A 2020 global survey with more than 1000 participants reported that only 45% of users dispose of their respirators and face masks in a solid or hazardous waste bin. The other 55% reported throwing them away in the street, flushing them down the toilet or burning them. Furthermore, the production of each FFP2 respirator (excluding transportation) releases 50 g of carbon dioxide equivalent (CO_2 -eq).

Personal costs

In recent years, the retail cost of respirators has varied. For example, in Spain in 2020 prices ranged from €0.10 to €2.00. Although the retail cost of respirators may be considered low, at least in most developed countries, they are designed for single use. Therefore, their cost should be multiplied by the number of respirators needed to maintain the protection over time.

Social factors

They include a lack of universal use, use-related stigma and discrimination, risk compensation behaviours, and a lack of knowledge about the various types of face coverings, their efficacy and how they should be used.

Barriers and facilitators to implementation

The effectiveness of respirators can be limited by facial hair, which can interfere with the face seal and cause leaks. Furthermore, some people cannot obtain a good seal because the dimensions of the respirator are incompatible with the size and shape of their face, and most types of respirators have not been certified for use by children.

Furthermore, vulnerable groups (e.g. people with low incomes) may be less aware of the availability and efficacy of respirators. However, even among vulnerable people who are aware of the benefits of respirator use in reducing air pollution exposure, a lack of knowledge and training on the proper use could reduce the efficacy of these devices. Moreover, people may decide to reuse respirators to reduce costs even though this reduces the protection against air pollution. Inclusive communication and information strategies to increase awareness and knowledge about the effectiveness, types and costs of respirators, together with instructions for their proper use, should be considered to reduce inequities and increase the benefits of respirators.

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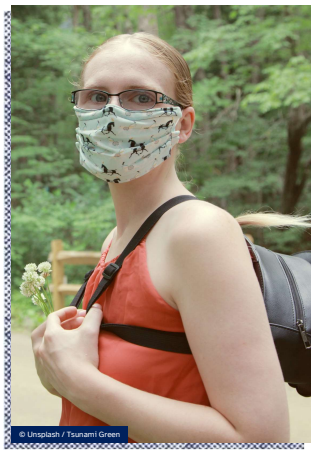
Use of face masks against air pollution: practical advice for general and vulnerable populations



Practical advice for general and vulnerable populations

- The evidence does not support a recommendation to use face masks (cloth or surgical) to reduce exposure to air pollution.
- Consider other measures to reduce personal-level exposure to air pollution.

This advice takes the following considerations into account, among others:

- reduced exposure and associated health benefits (e.g. very limited effectiveness);
- risks to health and environment (e.g. skin irritation); and
- additional considerations (e.g. false sense of security, knowledge about face mask effectiveness)

The efficacy of face masks is limited by their filtration efficiency and leakage rate and by the compliance rate (i.e. the length of wear time and proportion of population wearing the device). Since their function is not to protect the wearer's respiratory tract but rather to prevent them from contaminating the environment, there is no specific advice on their effective use in reducing air pollution exposure. Therefore, although face masks are simple to use and have a low initial cost, they should not be recommended as a method to protect people against air pollution exposure based on their low effectiveness, impact on the environment and social factors.

Practical advice for general and vulnerable populations

- The evidence does not support a recommendation to use face masks (cloth or surgical) to reduce exposure to air pollution.
- Consider other measures to reduce personal-level exposure to air pollution.

Bibliography

- Personal interventions and risk communication on air pollution: summary report of WHO expert consultation, 12-14 February 2019, Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/333781, accessed 9 December 2024).
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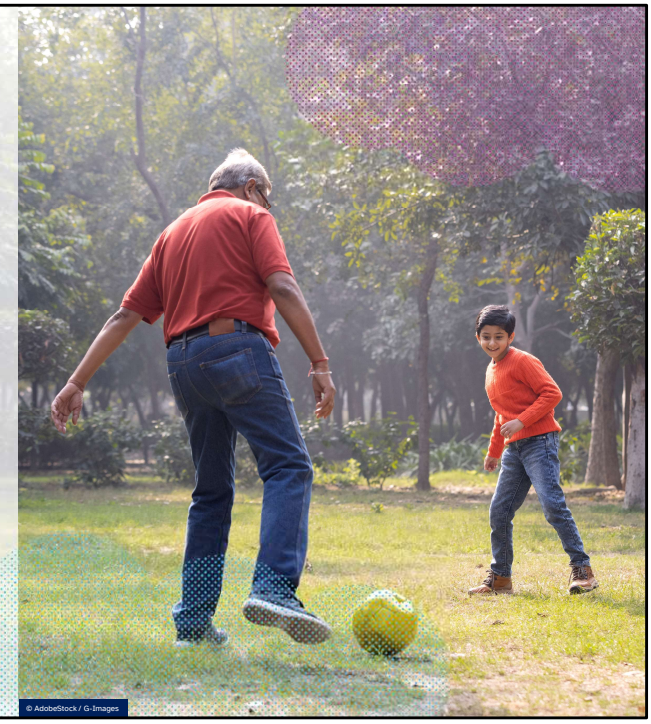
World Health Organization

UNIT 6

The unintended consequences of changing behaviour to reduce exposure to air pollution

Interventions to reduce exposure to air pollution may have unintended **negative consequences.**

Health care workers must be **aware of** and **prevent** unintended effects.



There is the possibility that personal-level interventions to reduce exposure to air pollution may have unintended negative consequences.

Health care workers must be aware of and prevent these unintended effects.

Let's look at some examples.

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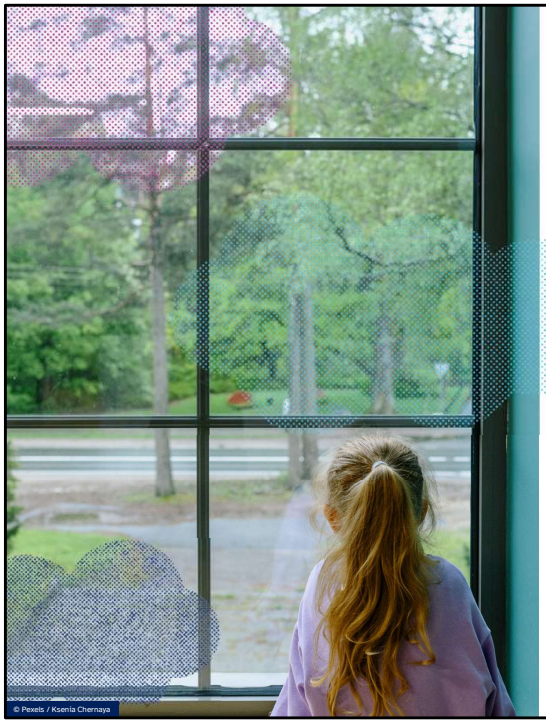
- Personal interventions and risk communication on air pollution: summary report of WHO expert consultation, 12-14 February 2019, Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/333781, accessed 9 December 2024).



Unintended consequences of behavioural change

Efforts to avoid air pollution exposure might:

- reduce benefits of **outdoor physical activity;**
- reduce **social interaction.**

Increased susceptibility to the adverse effects of some interventions:

- increased **psychological and physiological stress;**
- increased **cardiorespiratory demands** of wearing a **respirator.**

Higher costs may result from **increased energy use**, e.g. air purifiers.

Efforts to avoid air pollution exposure might **reduce the benefits of outdoor physical activity.**

They may also **reduce social interaction**, for example:
- children may be discouraged from playing outside; or
- people may be reluctant to leave the house.

This could be detrimental for children's development, both physical and mental, as well as the overall mental health of individuals.

People who are more susceptible to air pollution may also be more susceptible to the adverse effects of some interventions, such as increased psychological and physiological stress and increased cardiorespiratory demands of wearing a respirator.

Finally, higher costs may result from increased energy use, for example, for air purifiers and filters, and mechanical rather than natural ventilation.

All of these consequences may negate the intended benefits of the reduction measures.

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World Health Organization

UNIT 7

Advocating for clean air in the (health) community

Role of health and care workers as clean air advocates: key principles

1. Use the evidence base
2. Maintain credibility
3. Seek and clearly define effective interventions
4. Activate collaborations

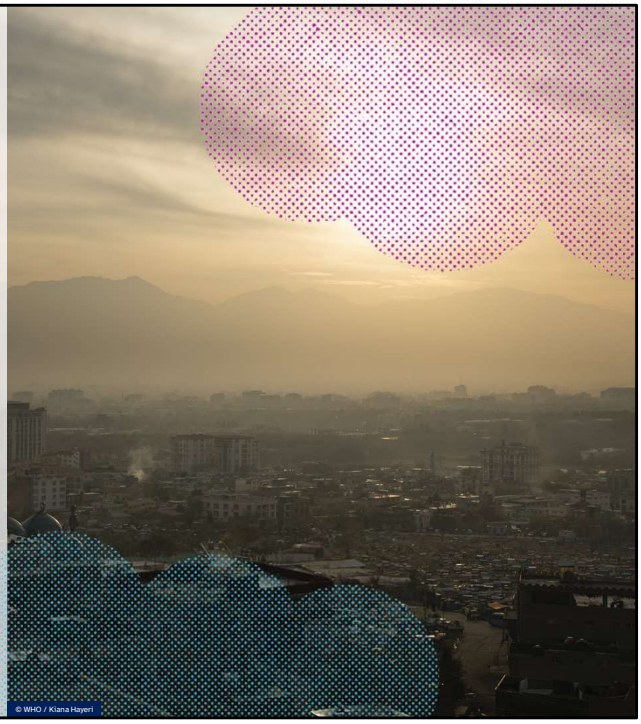
There are some key principles to remember when acting as an advocate, namely:

1. Use the evidence base
2. Maintain credibility
3. Seek and clearly define effective interventions
4. Activate collaborations

Advocating for clean air: key principles

1 **Use the evidence base**

- Scientific literature
- Other credible sources:
  - Institutional and intergovernmental reports, including WHO websites, data and publications



The first principle is to use the evidence base.

Health professionals need to respect the evidence base, and not use any unverified data or information.

The evidence base is derived from **scientific literature or other credible sources**, such as institutional and intergovernmental reports, including WHO websites, data and publications.

Advocating for clean air: key principles

Use the evidence base

1

- Consider official local data on:
  - Exposure to air pollution
  - Morbidity/mortality associated with air pollution

- Explore and use WHO tools for impact assessment (e.g., AirQ+, BAR-HAP, IAQ RiskCalculator)

- Explore the WHO Clean Household Energy Solutions Toolkit

If available, it is important to consider **local data** on:

- exposure to air pollution; and
- morbidity and mortality associated with exposure to air pollution.

WHO has also developed tools that can be used to quantify the health impacts of air pollution in a given population to guide policy interventions especially interesting for public health professionals.

AirQ+ is a software for health risk assessment of air pollution. It allows the quantification of the negative health effects of exposure to air pollution, including estimates of the reduction in life expectancy. AirQ+ can be used for any city, country or region, and its estimates provide a starting point to develop or adjust policies and measures that protect people's health. More information at: https://www.who.int/europe/tools-and-toolkits/airq---software-tool-for-health-risk-assessment-of-air-pollution

Clean Household Energy Solutions Toolkit (CHEST) is an analytical toolkit that contains tools for assessment of the current state of household energy use, air pollution and health impacts.

CHEST facilitates the design of policies that promote the adoption of clean household energy at local, programmatic or national level.

CHEST includes six modules that provide resources for mapping key stakeholders; conducting a situational assessment; identifying technological and policy intervention options; setting standards; performing monitoring and evaluation; engaging the health community; and improving communications and raising awareness. Some of the specific tools included in these modules are models for estimating emissions, health impacts and cost-effectiveness of household energy interventions; survey questions to track household energy use; databases with information on the fuels and technologies used in homes and their health impacts; training materials; and communication strategies. More information at: https://www.who.int/tools/clean-household-energy-solutions-toolkit

Benefits of action to reduce household air pollution (BAR-HAP) tool
This tool can be used to compare the costs and benefits of different interventions to promote cleaner household cooking energy use. Users can determine the costs and benefits associated with five different potential policy interventions (stove subsidies, fuel subsidies, stove financing, behaviour change communication, and technology or fuel bans) and 16 different stove and fuel transitions. The tool breaks out costs to governments and individuals in terms of monetary and time investments for fuel, stoves, and promotion programs. It also values benefits related to health (including morbidity and mortality), time savings, climate, and the environment. Policy-makers can compare different interventions applied to scenarios with different cooking technology combinations to select solutions that will achieve their desired outcomes in a financially feasible and economically beneficial way. More information at: https://www.who.int/tools/benefits-of-action-to-reduce-household-air-pollution-tool

Indoor Air Quality RiskCalculator (IAQ)
The IAQRiskCalculator is a tool developed by WHO/Europe to support the protection of children's health from chemical pollution of indoor air in settings where children spend substantial amounts of time, such as schools, kindergartens and day-care centres. The tool estimates the health risks for children from combined exposure to multiple hazardous chemicals in indoor air, which are often higher than the sum of risks posed by single chemicals as a result of possible synergistic effects. The IAQRiskCalculator is aimed primarily at public health professionals and other specialists responsible for creating healthy indoor environments for children. The support of an epidemiologist or health-impact assessment expert is recommended to interpret results.

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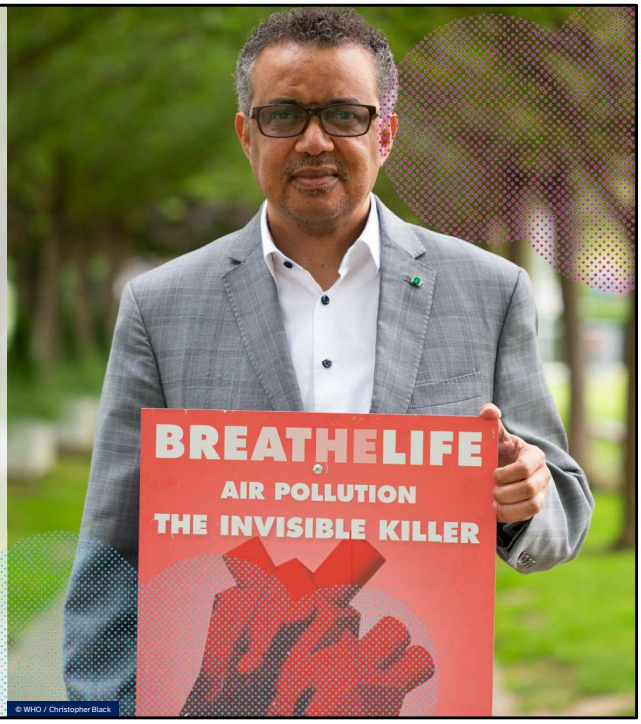
Advocating for clean air: key principles

2 **Maintain credibility**

- Health workers are seen as a **trusted source of health information**
- This respect is dependent on arguments remaining carefully evidence based



The next principle is to **maintain credibility**.

Health workers have significant credibility and are seen as a **trusted source of health information**, often more so than government and other scientists.

This respect is dependent on arguments remaining carefully evidence-based.

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Advocating for clean air: key principles

3 **Seek and clearly define cost-effective interventions**

- Policy interventions with positive health impact
- Key policy issues related to air quality
- Evidence to support policy planning and implementation

In thinking about possible ways to be an advocate, it is important to **seek and clearly define cost-effective interventions**.

For example:

- What policy interventions would have a significant positive health impact?
- What are the key policy issues related to improving the air quality?
- Is there a role for health evidence to support policy planning and implementation (for example in urban/rural, transportation, energy, waste, agriculture or household air pollution)?

Mapping: who else is involved in community interventions?

- Public health professionals in the area
- Supported work of allied occupations
- Researchers
- Active NGOs in tackling air pollution
- Health and care workers as advocates

When planning advocacy or community interventions, it is important to first understand who else might be involved. For example:

- Are public health professionals or professionals from allied occupations working in the area?
- Are there researchers in this area? Their data would be useful to guide work.
- Are there nongovernmental organizations active in air pollution? If they are reliable and evidence-based, there might be an opportunity to work with them.
- Can other health workers act outside the clinic, as community advocates?

Advocating for clean air: key principles

4 **Activate collaborations**

- Professional in the health workforce must seek out other individuals or groups including from allied occupations
- Such co-advocates must be credible and hold evidence-based views

Professionals in the health workforce cannot act alone, so it is important to **seek out other individuals or groups**, including experts or practitioners in other disciplines and from allied occupations, that would complement or support clean air interventions.

Such co-advocates must be **credible** and hold **evidence-based** views.

As an example of this, health care workers are not experts on transportation, but as a team they can contribute evidence regarding the health impacts of transportation-related air pollution.

Note: Allied occupations refers to a broad range of personnel involved in addressing health determinants, such as those working in water and sanitation, food supply chains, and road safety.

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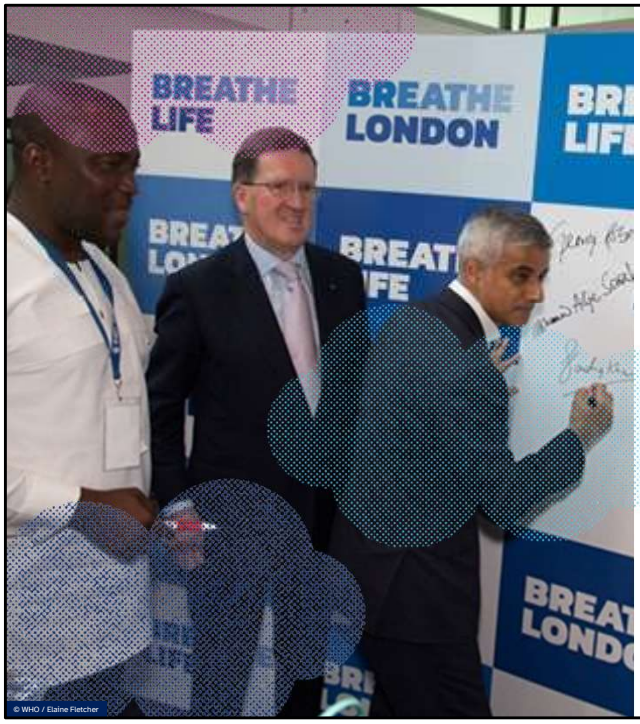

Demand action and **promote collaboration** between all civil society relevant actors, political parties and institutions.

- Power structures may differ by location
- Local advocacy groups can help with coordinating advocacy actions

Health workers can **demand action and promote collaboration** between all civil society relevant actors, political parties and institutions.

Power structures may differ depending on location, and it can be difficult to understand who holds the strings.

Local advocacy groups can be invaluable in understanding who controls what and coordinating advocacy action.

Here is an example of who can influence policy and create change in your area. For example, Sadiq Khan (shown in the picture) is the mayor of London and has control of major roads and public transport via Transport for London (TFL). However, 90% of the roads in London are controlled by the 23 local councils. To advocate for an extension of the ultra-low emission zone (ULEZ) or improvements to public transport you would need to collaborate with TFL and the mayor, but for local interventions such as school streets or low-traffic neighbourhoods you would have to contact the particular local council or even all of the local councils. This power structure will depend on where you live, and obtaining an understanding of who holds the strings can be difficult. Often a local advocacy group, such as the London Cycling Campaign, can be invaluable in understanding who controls what and coordinating your advocacy action.

New data from the City Hall showed that the expansion of the Ultra Low Emission Zone across all London boroughs resulted in lower pollutant emissions in 2023 compared to a scenario without it. This should lead to cleaner air for millions of citizens.

Ask your mayors to respect WHO air quality guidelines!

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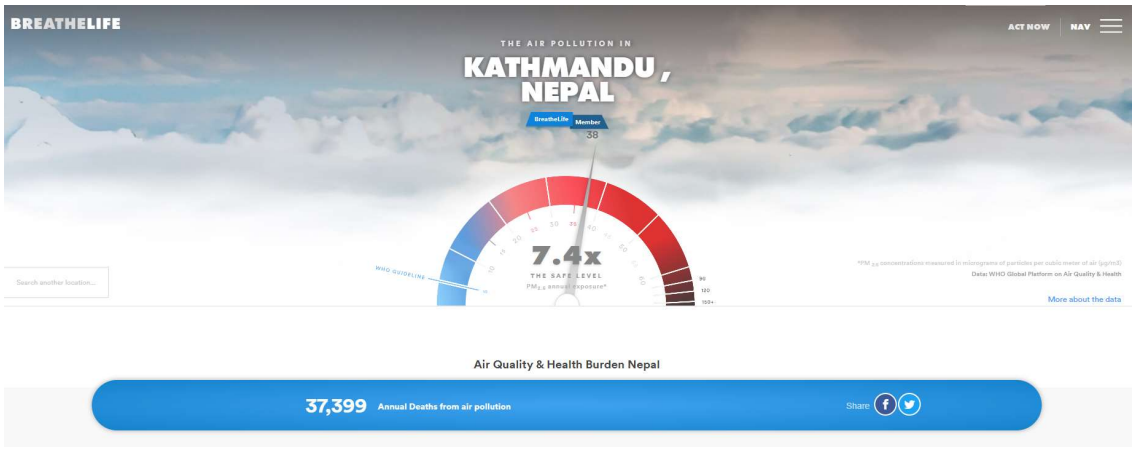
The BreatheLife campaign



You can customize this slide by visiting the BreatheLife website and typing the name of your city, taking a screenshot of the gauge and pasting it here.

https://breathelife2030.org
#BreatheLife

BreatheLife is a global campaign aiming to mobilize cities and individuals to protect our health and our planet from the effects of air pollution. It is supported by WHO, the Climate and Clean Air Coalition, United Nations Environment Program and the World Bank.

By visiting the website and entering the name of your city in the appropriate field, you will find out: the average annual level of $PM_{2.5}$ (measured in micrograms of particles per cubic metre of air, µg/m3); to which extent the levels exceed (or do not exceed) the level of safety as indicated by the WHO Air Quality Guidelines (indicated by the blue line in the gauge at 10 µg/m3); and the associated number of annual deaths from exposure to $PM_{2.5}$ at the country level. This slide is an example from Kathmandu, Nepal.

Some of the goals of BreatheLife apply here:

- increase monitoring: work with municipalities to expand monitoring efforts to keep citizens informed and facilitate more sustainable urban development;
- empower individuals: educate people about the burden air pollution poses to our health and our climate, and provide meaningful ways to take action both locally and globally; and
- empower health professionals: by learning about the impact of air pollution on patient health, health care professionals can inform patients and act as advocates for improved standards.

BreatheLife is also a repository of successful stories and initiatives from countries.

Note: You can customize this slide by visiting the BreatheLife website and entering the name of your city, taking a screenshot of the gauge and pasting it here.

Bibliography

- A global campaign for clean air. BreathLife; 2022 (https://breathelife2030.org, accessed 9 December 2024).

What are the levels of air pollution in your community? Resources

1. WHO Air Pollution Data Portal

https://www.who.int/data/gho/data/themes/air-pollution

2. BreatheLife Campaign

Contains information about annual level for $PM_{2.5}$ of many cities around the world on the website https://breathelife2030.org

3. Indexes such as the Air Quality (Health) Index (AQI/AQHI)

Data updated every few hours (i.e. short-term variations); if not available, search online (e.g. environmental institutions in your country) or world air quality index in UNEP tool: https://iqair.com/unep

Where can you find information about the quality of the air in the community where you work, and where your patients live, commute, work, go to school and play?

The BreatheLife website (https://breathelife2030.org/) allows you to enter the name of your city to find out the average level of $PM_{2.5}$ over the period of a year, and the associated number of deaths per year.

In many cities or regions, you can also find out air quality information as well as the real-time measure of air pollution. Use your smart phone or device to check the AQI in your city, region or country. Some countries use a different air index, the AQHI. These tools are not available everywhere. If not available, you can also check a tool that was developed by the United Nations Environment Programme, although these data have not been validated by countries.

For household air pollution, there are no available readings of the level of pollution. However, more information about the risks and burden of disease from household air pollution in your country is available from the WHO Air Pollution Data Portal.

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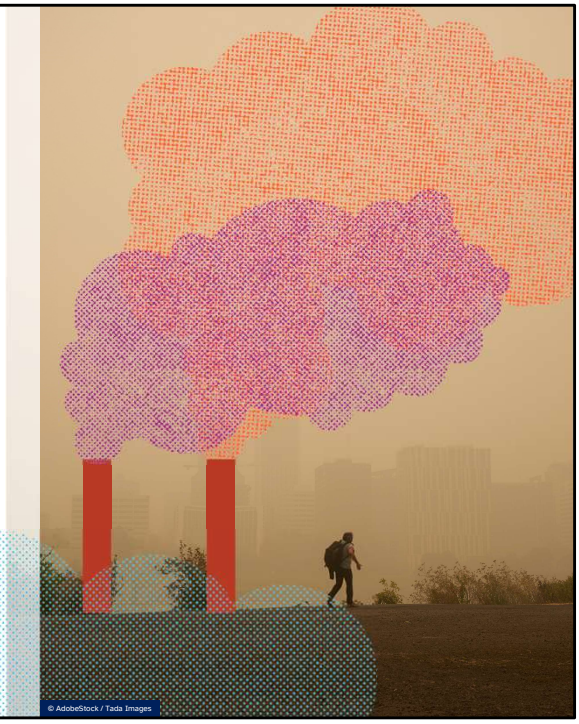
Air quality information as communication tools: the need for public available data

- The use of air quality information stands as the basis to produce estimates on the health impacts;
- They are also important to raise awareness, communicate the risks and demand for clean air actions;
- Official air quality data should be publicly available and open access.

Air quality information can support risk communication with the general population, including vulnerable groups and patients.



The use of air quality information stands as the basis to produce estimates on the health impacts; as well it is important for awareness raising, risk communication as well as advocacy actions for clean air.

Official air quality data should be publicly available and open access.

It has to be acknowledged that many countries still lack proper air quality monitoring and management capacity.

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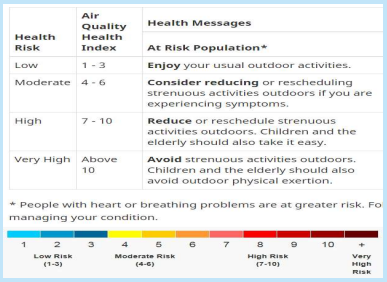
- Personal interventions and risk communication on air pollution: summary report of WHO expert consultation, 12-14 February 2019, Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/333781, accessed 9 December 2024).
- Personal-level actions to reduce air pollution exposure in the WHO European Region. World Health Organization; 2024. Regional Office for Europe. (https://iris.who.int/handle/10665/375889, accessed 9 December 2024)

Air quality information as communication tools: The Air Quality Index example

A tool used by governments to inform the public about short-term air quality changes in specific areas.

- **It can communicate health messaging** that encourages individuals to reduce personal exposure
- Separate health messages may be provided for the general population and the populations at higher risk

Limitation: Most of the local AQIs have not been validated or evaluated.



Health Risk	Air Quality Health Index	Health Messages At Risk Population*
Low	1 - 3	**Enjoy** your usual outdoor activities.
Moderate	4 - 6	**Consider reducing** or rescheduling strenuous activities outdoors if you are experiencing symptoms.
High	7 - 10	**Reduce** or reschedule strenuous activities outdoors. Children and the elderly should also take it easy.
Very High	Above 10	**Avoid** strenuous activities outdoors. Children and the elderly should also avoid outdoor physical exertion.

* People with heart or breathing problems are at greater risk. Fo
managing your condition.

1 2 3 4 5 6 7 8 9 10 +
Low Risk (1-3) Moderate Risk (4-6) High Risk (7-10) Very High Risk

Source: Air Quality Health Index, Canada.

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

U.S. Air Quality Index

An air quality index is a communication and raise of awareness tool used by some governments including municipalities to inform the public about short-term changes in air quality, like hours or days in a specific area.

There are two types:
- air quality index (AQI); and
- air quality health index (AQHI).

An **air quality index** communicates to the general public current and forecast ambient air quality conditions based on one or more air pollutants.

An **air quality health index** is similar to the air quality index, but it communicates the risk to human health based on current and forecasted ambient air quality conditions with health messages to reduce exposure for both general population and high-risk groups.

These indexes may **communicate health messaging** that encourages individuals to reduce personal exposure to ambient air pollution based on current and forecasted pollutant concentration levels.

Separate health messages may be provided for the general population and the at risk (susceptible or vulnerable) population, who are more sensitive to the adverse health effects of air pollution exposure.

Much like a weather forecast lets you know if you should pack an umbrella, an air quality forecast aims to let you know when you may consider to change or adapt your outdoor activity plans to potentially reduce exposure to air pollution.

A main limitation is that most AQIs have not been validated or evaluated.

Many forecasters also provide information about:
- when pollution is expected to be highest during the day;
- whether there are times when air quality is expected to be better;
- health advice for the population based on the air pollution levels; and
- which regions are particularly exposed to high air pollution levels

AQIs typically use both numerical ranges and color-coded categories to indicate varying levels of air pollution and corresponding levels of health concern. AQIs are ratios of predetermined thresholds based on regulatory or recommended levels (which may or may not necessarily be in line with WHO air quality guidelines). As these levels differ by country and their efficacy in protecting health remains uncertain, actual measured data of concentrations for major pollutants also need to be reported. As well, actual concentration of the individual pollutants should be included in the AQI summary, including which pollutant is contributing the most, as people may be sensitive to different pollutants.

In this slide you can see an example of the AQI in the USA at bottom side of the slide. This is a tool developed for communicating daily air quality. On the upper side of the slide, the Air Quality Health Index of Canada is shown. This AQI also includes specific health messages for general population and at-risk population depending on the index value.

If not available in your country/city, the world air quality index developed by the UN Environment may be useful, noting that there may be limitations in terms of data input and overall score. More info at: https://iqair.com/unep

There are countries that do not offer an AQI but instead provide information on the collected raw air quality data.

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Medical/health education and practice

- Medical students perceives that approximately 11% of medical school curricula worldwide address air pollution and health issues
- Clinical practice and disease prevention guidelines frequently do not address air pollution and health issues

Climate and air pollution literacy should be a mandatory requirement for all clinical education programmes.

Source of data: IFMSA 2020

In addition, health workers can also promote the integration of air pollution in medical school curriculum.

In 2020, medical students perceive that approximately 11% of medical schools worldwide address air pollution and health issues.
In addition, clinical practise and disease prevention guidelines (for example, for pneumonia and noncommunicable diseases) frequently do not address air pollution and health issues.

Health workers should partner with associations of health professionals and teaching institutions to make climate and air pollution literacy a mandatory requirement for all health education programmes.

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Disseminate the knowledge

Work in the community:
- Publish a fact sheet/article
- Give a TV interview
- Make a podcast/blog
- Work in or from clinic or hospital

Train colleagues/medical students:
- Work/collaborate with health organizations/ other professionals

Educate yourself, and train colleagues and communities.

Health care workers can also increase education on air pollution by:

- Doing some work in their community, for example:
  - publishing a fact sheet or article;
  - giving a TV interview;
  - making a podcast or blog; or
  - working in or from a clinic or hospital.
- Training colleagues and medical students via lectures, workshops, webinars or other formats.
- Working or collaborating with health organizations or other professionals.

Promote self-efficacy through citizen science

Citizen science:
- Meets the needs and concerns of citizens
- Is developed and endorsed by the citizens themselves
- Is supported by scientists

Raise public awareness in communities
Encourage behavioural change to reduce emissions
Foster policy actions for mitigation strategies to reduce emissions

Promote self-efficacy = belief that an individual's actions can have an effect

Finally, it is important **to promote self-efficacy** – the belief of individuals that their actions can have an effect.

An example of self-efficacy is **citizen science**.

Citizen science is a form of science that meets the needs and concerns of citizens, and is developed and endorsed by the citizens themselves, supported by scientists.

Citizen science, through speaking out awareness in communities;
- encourage behavioural change; and
- foster policy action for mitigation strategies to reduce on air quality issues, can:
- raise public emissions.

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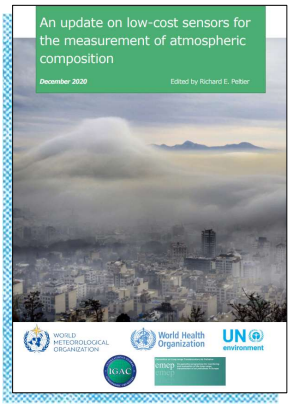
Citizen science and low-cost sensors

An increasing number of affordable and easy-to-use low-cost sensors have become available on the market.

They represent a clear opportunity to support citizen science initiatives and make new measurements in low- and middle-income countries which are often understudied by the research and operational atmospheric science communities.



How can a citizen scientist use low-cost sensors?

- observation of air pollution parameters;
- public information, education and awareness activities; and
- provide data for advocacy and local empowerment.

People's awareness of air pollution and its health consequences has grown significantly over the years thanks to the contribution of campaigns led by NGOs, supported by groups of concerned citizens and amplified by media coverage.

To inform themselves about their local air quality, increasing numbers of people are taking the initiative to measure the level of pollutants in the air. This is particularly common in cities with highly polluted air. In recent years, an increasing number of simple, relatively cheap samplers and sensor monitoring devices have become available on the market. Some NGOs offer measurement kits that people can assemble and deploy themselves. Interested members of the public are also organizing themselves in citizen science initiatives to monitor their local air quality and present their results in a coordinated way on the internet or by using apps.

In some countries, groups of concerned citizens (often supported by NGOs) have taken authorities to court over air quality issues, and the courts have ruled in favour of the right to clean air in several instances.

Low-cost sensors provide an opportunity to support citizen science initiatives and to record data in low- and middle-income countries, which are often understudied by public health and atmospheric science research communities. Low-cost sensors can be used to: measure air pollution parameters; support public information, education and awareness activities; and provide data for advocacy and local empowerment.

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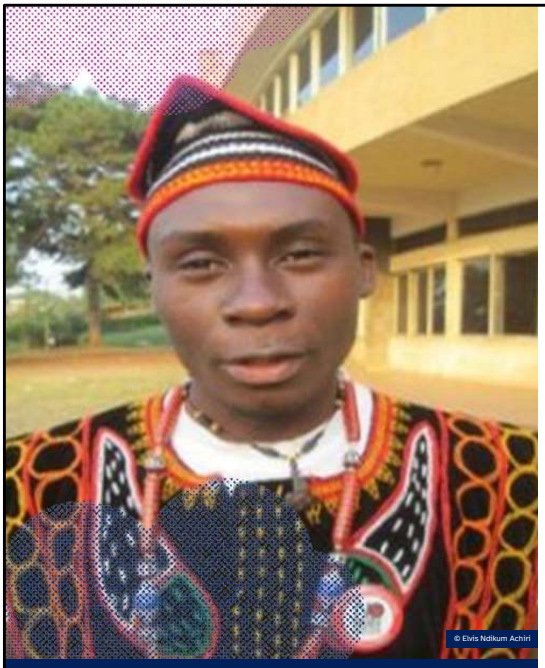

Elvis Ndikum is a community health worker, advocate and student in the University of Yaoundé I, Cameroon.

Lead by example: air pollution and health education in the health community in Cameroon

Through advocacy action a collaboration with the Ministry of Health was established in Cameroon to facilitate air pollution and health training of staff at health care facilities (e.g. health districts and clinics), as well as raising awareness of air pollution and health with the general public in Yaoundé.

Engagement of:

- students in the faculty of medicine;
- doctors in Jamot Hospital, on the need to advise patients on air pollution and health; and
- head teachers, encouraging them to include air pollution and health in the school programme, and obtained partnerships to train students and pupils.

Let's now look at some of the ways health care workers can advocate for clean air. Challenge the participants about what role they could play in disseminating information about air pollution and health to their colleagues and other health professionals. Here are some examples from other train-the-trainer programmes.

Elvis Ndikum is a community health worker, advocate and student in the University of Yaoundé I, Cameroon. Elvis has led advocacy actions towards the Ministry of Health from September to November 2019 by writing letters and visiting the Ministry, requesting collaboration to facilitate training of staff at health care facilities (such as health districts and clinics) and raising awareness with the public.

He engaged with students in the Faculty of Medicine and doctors at Jamot Hospital on the need to advise patients on the negative health effects of air pollution. Elvis also met with principals and head teachers of schools, encouraging them to include air pollution and health in school programmes, and obtained partnerships to train students and pupils.

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Dr Enrique Barros is a medical doctor from Brazil, pictured here with a community leader; note the air health sensor box above.

Lead by example: use of low-cost sensors and citizen science for training the health community in Brazil

A rural family doctor collaborated with engineers to build low-cost air pollution sensors to measure $PM_{2.5}$.

The monitors were financially crowdsourced and were placed at local health centres.

The $PM_{2.5}$ data generated were used to train the health centre staff, educate patients in the community using a citizen science approach, and advocate for action to reduce community sources of air pollution.

A family doctor, helped initiate Air Alegre, a transdisciplinary project to implement a high-tech/low-cost network of $PM_{2.5}$ sensors in primary care clinics in Porto Alegre, Brazil. A study is investigating how daily air pollution levels as measured by these $PM_{2.5}$ sensors impact risk perception and attitude among health professionals in the pilot units. The team is working to install monitors in primary care clinics in the fire belt in the Amazon and other regions in Brazil. Their slogan is “One monitor in every primary care clinic”.

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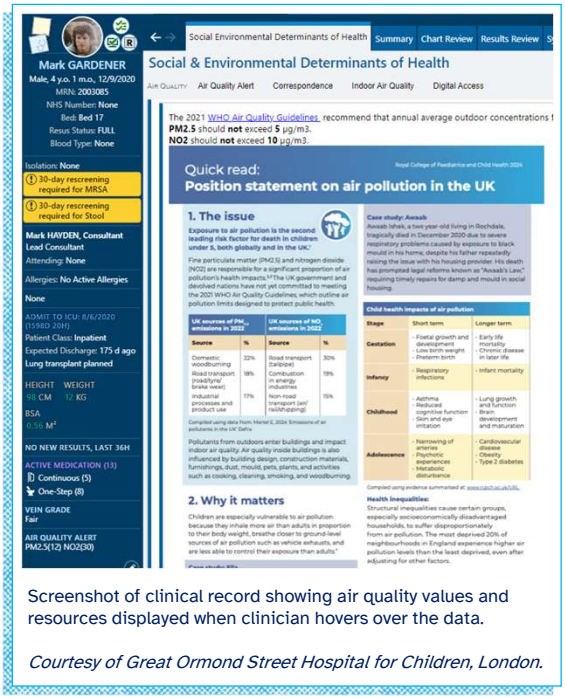

Screenshot of clinical record showing air quality values and resources displayed when clinician hovers over the data.

Courtesy of Great Ormond Street Hospital for Children, London.

Lead by example: display local air quality data in children's clinical records and include education and suggested actions, London, UK

Great Ormond Street Hospital for Children has collaborated with Imperial College London to display annual $PM_{2.5}$ and NO_2 levels to clinicians in children's clinical records, based on a patient's postcode.

This both individualizes the risk and allows educational support for staff and patients to be delivered and shared during routine clinical activity.

Both clinicians and patients will benefit from this support.

Great Ormond Street Hospital for Children has collaborated with Imperial College London to display annual $PM_{2.5}$ and NO_2 levels to clinicians based on a patient's postcode. This both individualizes the risk and allows educational support for staff and patients to be delivered and shared during routine clinical activity. Both clinicians and patients will need this support to help answer the question of what they can personally do about air pollution. The slide shows a screenshot of electronic medical record display of patients' postcode air quality values and resources displayed when clinician hovers over the data.

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Video: How can we improve health services in urban settings?

2018 video series at WHO First Global Conference on Air Pollution and Health

Dr Tollulah Oni,
University of Cambridge

Source:
https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/videos/mosaic/speakers/tolullah-oni#

<1 min 28 sec video>

Note: You can use other videos and embed them in the presentation using the WHO video mosaic series on air pollution and health: https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/videos/mosaic

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World Health Organization

UNIT 8

Ready-to-use material

Example of screening question for patient's assessment

Ambient air pollution and children's health

- **Are there sources of smoke, smog, fog, or dust close to your home?** Examples may include fires from burning waste, smoke, smog or dust from surrounding industrial or agricultural activities.
- **Does your child play outdoors in areas near busy roads or highways?** What time of the day do they engage in these activities?
- **How often do lorries, or other heavy vehicles such as machinery or buses, pass through the street where you live?** What is the distance from your house to the nearest busy road?
- **Is your child's school or day care located close to any major sources of pollution,** such as traffic, power plants or factories?
- **Does your child have any unexplained respiratory symptoms,** such as wheezing or whistling in the chest, coughing or shortness of breath? If so, how often? Has your child ever been diagnosed with any respiratory condition, such as asthma? Have they been prescribed any medication?
- **If your child has respiratory symptoms, do they become worse after time spent outside?** Does your child have respiratory symptoms that become worse at night or early morning?

Health professionals can ask their patients and families screening questions that may help in detecting exposure to ambient air pollution and identifying at-risk children or pregnant women. Key questions can help to build a paediatric environmental history, assess whether a child is suffering from symptoms related to air pollution and how to avoid exposure to high levels. These questions must be context specific to each patient.

Examples of questions include:

- Are there sources of smoke, smog, fog, or dust close to your home? Examples may include fires from burning waste, smoke, smog or dust from surrounding industrial or agricultural activities.
- Does your child play outdoors in areas near busy roads or highways? What time of the day do they engage in these activities?
- How often do lorries, or other heavy vehicles such as machinery or buses, pass through the street where you live? What is the distance from your house to the nearest busy road?
- Is your child's school or day care located close to any major sources of pollution, such as traffic, power plants or factories?
- Does your child have any unexplained respiratory symptoms, such as wheezing or whistling in the chest, coughing or shortness of breath? If so, how often? Has your child ever been diagnosed with any respiratory condition, such as asthma? Have they been prescribed any medication?
- If your child has respiratory symptoms, do they become worse after time spent outside? Does your child have respiratory symptoms that become worse at night or early morning?

Note: if you have examples of questions that have been useful in your context or region they can be added here.

Note: for more information on completing a paediatric environmental history please see the module. The paediatric environmental history is available at https://www.who.int/publications/m/item/children-s-environmental-record--green-page

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Example of screening question for patient's assessment

Household air pollution and children's health

- **Are there open fires or other sources of smoke inside or around the home?**
- **Are fuels such as wood, coal, charcoal or other biomass, used inside or nearby the home** for cooking, heating or lighting requirements?
- **Do cookstoves have hoods or chimneys? How is the home ventilated?**
- **Are cooking, heating and lighting appliances used in the home regularly maintained?**
- **How many hours per day does your child spend indoors?**
- **How and where do you store fuel used for cooking, heating and lighting?** Particularly, if used, how and where do you store kerosene?

Health professionals can ask their patients and families screening questions that can help in detecting levels of air pollution inside the home and identifying at risk children or pregnant women. Key questions can help to build a paediatric environmental history, assess whether a child is suffering from symptoms related to household air pollution and identify methods to reduce and prevent exposure. These questions must be context specific to each patient.

Examples of questions include:

- Are there open fires or other sources of smoke inside or around the home?
- Are fuels such as wood, coal, charcoal or other biomass, used inside or nearby the home for cooking, heating or lighting requirements?
- Do cookstoves have hoods or chimneys? How is the home ventilated?
- Are cooking, heating and lighting appliances used in the home regularly maintained?
- How many hours per day does your child spend indoors?
- How and where do you store fuel used for cooking, heating and lighting? Particularly, if used, how and where do you store kerosene?

Note: for more detailed questions on household air pollution please see reference.

Note: if you have examples of questions that have been useful in your context or region they can be added here.

Note: for more information on completing a paediatric environmental history please see the module The paediatric environmental history is available at https://www.who.int/publications/m/item/children-s-environmental-record--green-page

Bibliography:

- Air pollution and child health: prescribing clean air. Summary. Geneva: World Health Organization; 2018 (https://apps.who.int/iris/handle/10665/275545, accessed 9 December 2024).
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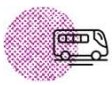
Tips and information on breathing clean air: ambient air pollution

Children, pregnant women, older people, people suffering from cardiovascular and/or respiratory diseases are particularly at risk for the negative health effects of air pollution exposure.

Pay attention to your symptoms and whether they increase or decrease based on the levels of air pollution in your setting. Consult a health professional when appropriate.

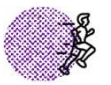


Try to commute at less congested times of day: if walking, running or cycling (active transportation), try to do this on less busy roads.

Check with your doctor whether your situation would benefit from the use of **an indoor air filter** or a **mask**.

Check air quality information e.g. **air quality indexes or alerts**, if available in your city.

Note that medications might need to be adjusted in the case of episodes of high levels of air pollution. Consult a health professional when needed.



Physical activity is generally recommended when air pollution levels are not optimal. However, consider modifying the intensity, timing and location of your exercise to avoid **air pollution sources**, including traffic.

In case of a **wildfire**: leave the area if possible, or else close the windows and use indoor air filters or respirators as appropriate.

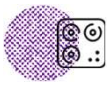
Tips and information on breathing clean air:
household air pollution

Reduce the time spent close to the pollution source. Where possible, cooking outside would help to reduce your exposure.

Separate kitchen from the rest of the house, wherever possible, to reduce family exposure.

Keep the home and fuel dry.

Avoid tobacco smoke.



Explore possibilities of **using cleaner fuels and devices for cooking, light and heating your home** such as LPG and/or electricity.

If possible and safe to do so, **keeping children in another room, away from the source.**

Ensure better ventilation of indoor spaces through chimneys, windows and vents.

Avoid burning waste in the community.

Seek advice from your community leaders on how to access cleaner sources of energy for your home.

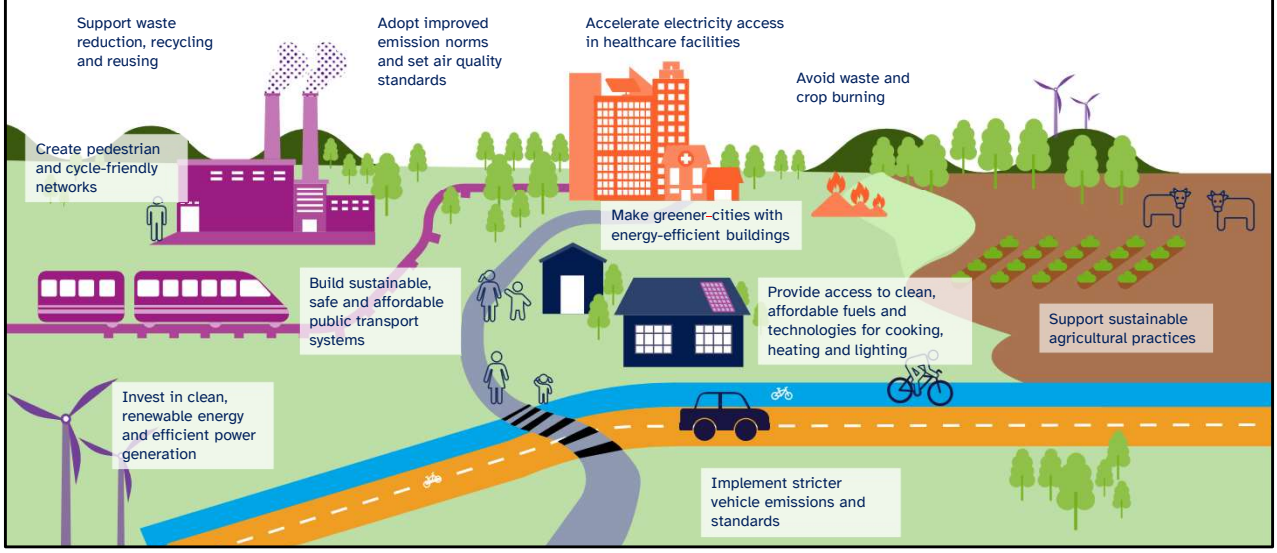
Share the knowledge base

- You can translate, print and display the air pollution and health WHO infographics in your clinic or community.
- You can share them via social media networks and platforms.
- Click on the link and search for “air pollution”.
- What else?

https://www.who.int/multi-media

You can translate, print and display the air pollution and health WHO infographics in your clinic or community. You can share them via social media networks and platforms. Click on the link and search for “air pollution”. More info: https://www.who.int/multi-media

Actions to reduce air pollution



This slide lists some of the training opportunities developed by WHO.

Basic training on environment, climate change and health
Environmental risks to health are responsible for about one quarter of the global disease burden. Decision makers need to be aware of the most important environmental exposures, exposure-disease links and available options and solutions for creating a healthier environments. Environmental health is integral part of disease prevention. This course provides an introduction to environmental health, covering key facts, figures and available interventions on the most important environmental risks including climate change, air pollution, water, sanitation and hygiene, chemicals and others.
It is an online course for practitioners and actors influencing policy change.

Air pollution and health: an introduction for health workers
All health workers would benefit from gaining knowledge and skills to protect individuals and communities from air pollution exposure. This self-paced online course examines the main health impacts of air pollution and which roles health workers can play to protect and promote people's health.
Target audience is health workers in clinical and public health settings.

Communicating on climate change and health: Toolkit for health professionals
While climate change is a big threat to health, implementing solutions to address climate change presents a huge opportunity to promote better health and protect people from climate-sensitive diseases. Communicating the health risks of climate change and the health benefits of climate solutions is both necessary and helpful. Health professionals are well-placed to play a unique role in helping their communities understand climate change, protect themselves, and realize the health benefits of climate solutions. This toolkit aims to help health professionals effectively communicate about climate change and health.

Note: a full lists of existing training resources developed by WHO and UN partners on health and environment is available at: https://www.who.int/teams/environment-climate-change-and-health/training
It aims to provide policy makers and health professionals with a wide array of capacity-building resources and tools to address various health risks.
This website will be continuously updated as new materials become available.

A comprehensive list for air pollution and energy trainings is available at: https://www.who.int/teams/environment-climate-change-and-health/training/air-pollution

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Key messages

- **The public health workforce and health and care workers in particular has a role to play in reducing exposure to air pollution,** both at the population and individual level, for the protection and promotion of people's health.
- **Identifying the individuals** who are most vulnerable and susceptible to the negative health effects of air pollution **can lead to reduced mortality and morbidity and improve well-being.**
- **Only a few clinical screening tools for air pollution risk assessment are available;** developing a clinical approach to air pollution as a major risk factor for NCDs is key.
- **The health workforce can use the health argument to advocate for clean air interventions and promote the collaboration** between all civil society relevant actors, political parties and institutions for policy implementation.
- **The health workforce must be aware of and prevent unintended effects of interventions** to reduce exposure to air pollution.
- **Air quality information tools are** commonly used for reporting and communicating air quality or air pollution in cities and sometimes regions; official air quality data should be publicly available and open access.
- **There is a need for clinical guidelines, medical schools and other health professionals' curricula** to address air pollution and health issues.
- **Health professionals can educate themselves, and train other colleagues and communities,** on air pollution and health.

- The health workforce have a role to play in reducing exposure to air pollution, both at the population and individual level, for the protection and promotion of health.
- Identifying the individuals who are most vulnerable and susceptible to the negative health effects of air pollution can lead to reduced mortality and morbidity and improve well-being.
- Only a few clinical screening tools for air pollution risk assessment are available; developing a clinical approach to air pollution as a major risk factor for NCDs is key.
- The health workforce can use the health argument to advocate for clean air interventions and promote the collaboration between all civil society relevant actors, political parties and institutions for policy implementation.
- The health workforce must be aware of and prevent unintended effects of interventions to reduce exposure to air pollution.
- The air quality index is a tool commonly used for reporting and communicating air quality or air pollution in cities and sometimes regions; where available, it can be used for educational purposes with patients and communities.
- There is a need for disease guidelines, medical schools and other health professionals' curricula to address air pollution and health issues.
- Health professionals can educate themselves, as well as train other colleagues and communities on air pollution and health.

Glossary

Air quality index: A tool commonly used for reporting and communicating air quality or air pollution in cities and sometimes regions.

Citizen science: A form of science that meets the needs and concerns of citizens, developed and endorsed by the citizens themselves.

Essential public health functions (EPHFs): usually seen as a list of minimum requirements for countries to ensure public health.

Health and care workforce: This is defined as "all people engaged in actions with the primary intent of enhancing health". This includes those health workers who provide health services (for example, physicians, nurses, midwives, dentists, pharmacists, community health workers, etc.) and those who support the health services and are critical for the functioning of the health system (for example, hospital managers, planners, IT specialists, biomedical engineers, etc.). In addition, it also includes all of those who provide direct personal care services in the home, in health care and residential settings, assisting with routine tasks of daily life, and performing a variety of other similar routine tasks (for example, health care assistants and home-based personal care workers).

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Glossary

Noncommunicable diseases (NCDs): A group of conditions that are not mainly caused by an acute infection, result in long-term health consequences and often create a need for long-term treatment and care. These conditions include cancers, cardiovascular disease, diabetes and chronic lung illnesses.

$PM_{2.5}$: Fine particulate matter air pollution of diameter ≤ 2.5 µm. This is the pollutant that is most strongly associated with adverse effects on cardiovascular health.

Public health workforce: This includes all individuals who contribute to the delivery of at least one of the essential public health functions as part of integrated services and systems. It comprises a heterogenous grouping of diverse occupations, from both the health and non-health sectors. It can be conceptually framed as three overlapping groups - core public health personnel, health and care workers, and personnel from occupations allied to health.

Susceptibility: Being at higher risk of negative health effects from air pollution for the same level of exposure.

Vulnerability: Being exposed to higher levels of air pollution due to external factors.

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Disclaimer

This module contains a large set of slides from which the presenter should select the most relevant ones to use in a specific presentation. These slides cover many facets of the problem. Present only those slides that apply most directly to the local or regional situation. Where relevant, you can adapt the information, statistics and photos within each slide to the particular context in which this module is being presented.

This module belongs to the Air Pollution and Health Training toolkit targeting health workers (APHT). It has been developed in collaboration with more than 30 experts from government agencies, WHO collaborating centers, non-state actors, including medical and environmental health associations, as well as academic institutions. The methodology used for development included a mapping of existing air pollution and health training opportunities targeting health workers which informed gaps and needs for a global set of materials. Experts identified through existing collaborations with WHO contributed on the definition of outline and populating the training modules with contents. Peer review and pilot test coordinated by WHO ensured the collection of feedback and input for finalization of the products.

WHO made all possible effort to ensure geographical and gender balance for the development of the training toolkit acknowledging limitations in terms of expertise, experience and overall feasibility.
You can use and have access to other APHT modules where relevant.
To see the full package visit: https://www.who.int/tools/air-pollution-and-health-training-toolkit-for-health-workers

For more information on WHO's work on air quality, energy and health, please visit: https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health

The role of the public health workforce

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