

Air quality and health: an introduction

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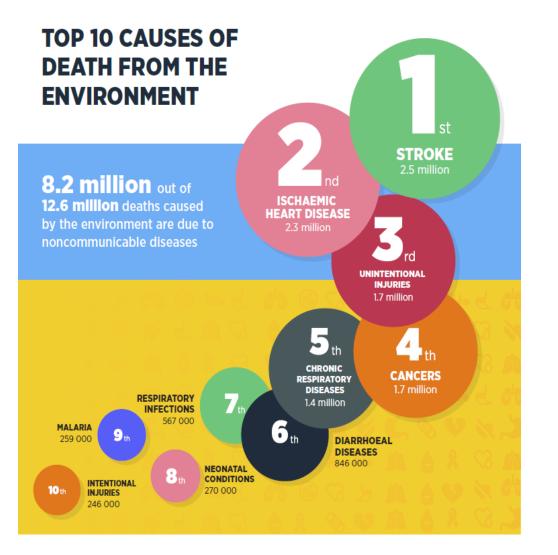
Rimini, 5 November 2024



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**European Region** 

## **Environmental burden of disease**





- Globally, 23% of all deaths are linked to environmental conditions
- Every year, at least 1.4 million Europeans still die prematurely because of polluted environments.
- This is at least 15% of Europe's total deaths.
- 50 million heathy life years are lost in the European Region due to environmental hazards.







Noncommunicable diseases - NCDs - heart and lung diseases, stroke, cancer and diabetes are THE BIGGEST KILLERS WORLDWIDE



Unhealthy diet	Tobacco use	Air pollution
Harn use of a	A Phy alcohol inac	sical



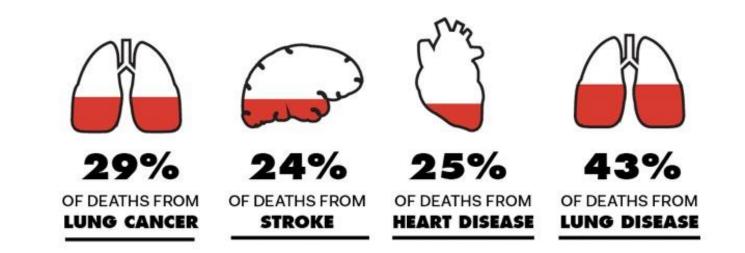
## 1 in 8 deaths



worldwide from air pollution, mainly from NCDs

# THE INVISIBLE KILLER

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



Population attributable fraction (PAF) for mortality attributable to the joint effects of household and ambient air pollution in 2016





## **Ambient and household air pollution**

#### In the WHO European Region in 2019:

# **97%** of the population

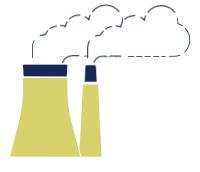
were exposed to PM<sub>2.5</sub> concentrations above the WHO air quality guidelines. 569000 premature

**deaths** can be attributed to ambient air pollution.



Key risks to hea

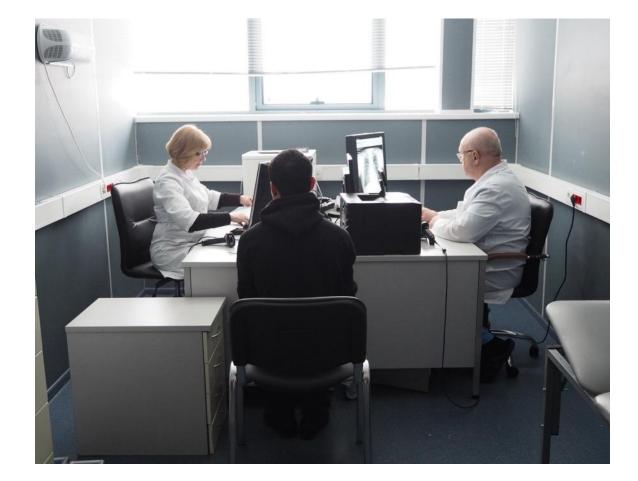
can be attributable to household air pollution.





## Air pollution and health





- Around 7 million premature deaths are attributable to the joint effects of ambient and household air pollution and of these, more than 550 000 happen in the WHO European Region.
- Air pollution is now recognized as the single biggest environmental threat to human health, along with climate change.
- Air pollution affects:
  - NCDs,
  - cardiovascular and respiratory diseases,
  - lower respiratory tract infections,
  - preterm birth,
  - and other causes of death in children and infants.

## The updated WHO Air Quality Guidelines: a new tool to support action and save lives





- Since the last 2005 global update, there has been a marked increase in the quality and quantity of evidence that shows how air pollution affects different aspects of health.
- There are also now clearer insights about sources of emissions and the contribution of air pollutants to the global burden of disease.
- For that reason, and after a systematic review of the accumulated evidence, several of the updated AQG levels are now lower than 15 years ago.
- New features include new AQG levels for peak-season O<sub>3</sub> and 24-h NO<sub>2</sub> and CO, as well as new interim targets.

#### Table 0.1. Recommended AQG levels and interim targets



Pollutant	Averaging time		AQG level			
		1	2	3	4	
PM <sub>2.5</sub> , µg/m³	Annual	35	25	15	10	5
_	24-hour <sup>a</sup>	75	50	37.5	25	15
PM <sub>10</sub> , µg/m³	Annual	70	50	30	20	15
	24-hour <sup>a</sup>	150	100	75	50	45
Ο <sub>3</sub> , μg/m³	Peak season⁵	100	70	_	_	60
	8-hour <sup>a</sup>	160	120	_	-	100
NO <sub>2</sub> , µg/m³	Annual	40	30	20	-	10
	24-hour <sup>a</sup>	120	50	-	-	25
SO <sub>2</sub> , µg/m³	24-hour <sup>a</sup>	125	50	_	_	40
CO, mg/m³	24-hourª	7	_	_	-	4



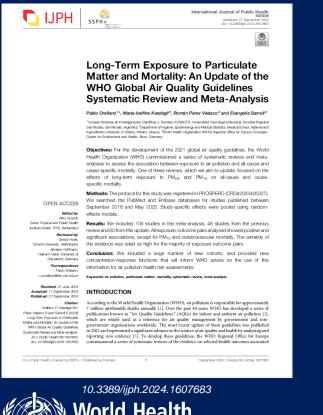
<sup>a</sup> 99th percentile (i.e. 3–4 exceedance days per year).

<sup>b</sup> Average of daily maximum 8-hour mean  $O_3$  concentration in the six consecutive months with the highest six-month running-average  $O_3$  concentration.

## New evidence syntheses on long-term exposure to air pollutants

PM<sub>2.5</sub>, PM<sub>10</sub> & mortality 106 studies (46 AQG, 60 new)

#### Higher estimates for most of associations

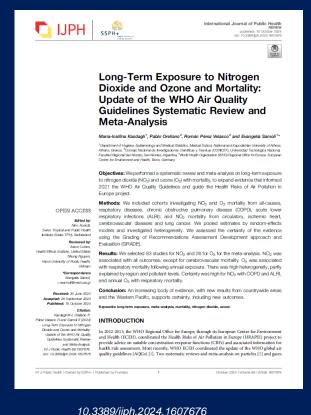


#### NO<sub>2</sub>, O<sub>3</sub> & mortality

90 studies (45 AQG, 45 new)

Higher estimates for many of the associations

New significant, positive associations for  $NO_2$  and circulatory, IHD and lung cancer mortality



## PM<sub>2.5</sub>, NO<sub>2</sub> and morbidity

Not considered in AQG (only short-term exposures)

List A (reliable quantification):  $PM_{2.5}$  – asthma in children, COPD, IHD, stroke, hypertension, lung cancer;  $NO_2$  – asthma in children and adults, ALRI in children)

List B+ (quantification with uncertained by Byganization to the company of the co

Concentration—response functions for health risks assessment of long-term exposure to air pollution reacco realized WM- Joseph V, Socker's' (area known, Zarama Josenok Andersen, Healther Harlow, cophie Camp, Dean Loncer, Ferpado Mudue, Sykia Medine', Roman Perez Velascor, Healther Velator's, isivei Zhang, Michai Krzyzanowski <sup>2</sup> Bedground: Air pollution hark assessment (HAA has been hpically conducted for al cause and cause-spocific morellit based on concentration-response hurdred, CH4 (area maintoin), and and an analyze the sector of the se	concentration—response functions for health risks     seessment of long-term exposure to air pollution     response forsatilety of the approximation of	Choices of morbidity out	Comes and
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Classification of Diseases, 10th revision codes, aga ranges, and suggested concentration ranges are also specified to ensure correls- tions year deplication in m FRA. No specific may way prior for conce bocavity of the lack of relevant systemic to revise. <b>Conclusion:</b> The suggestions formulated in this study, including CIFE satisfant from the settlebe systematic eviews, can assist in conducting reliable IFAe and contribute to evidence-based doctains-making in public health and environmental policy. Future mascert should contribute to update and refine these suggestions as new evidence become analable iand mithodologies evolu-		Intend Transch Dourd, 17 Fahrens buy, Fonktomerki Tamashi, nakapartar, Danie, Dahataria, Tay, Hang, Hanki Dahatari, Manakapartar, Come, Dahataria, Tayaka Dahatari, Tayaka Janaka (1952), Pakabah, Pernyknik, "Dahatari of Jabanica Janaka (1952), Pakabah, Pernyknik, "Dahatari Jahatari Jahatari (1952), Pakabah, Pernyknik, "Dahatari Jahatari Dahatari Jahatari Jahatari Dahatari Jahatari Jahatari Dahatari Jahatari Ali Kalah Capatari Dahatari Ali Kalah Capatari Dahatari Ali Kalah Capatari Dahatari Ali Kalah Capatari Dahatari Kalahatari Jahatari Kalahatari Kalahatari Jahatari Kalahatari Kalahatari Jahatari Kalahatari K	What this rands adds: This study desimes reliable concentration-response function (GR4) io ranobidity outcomes the applied in health rak asses means (HRA) of the optime exposure of a pollution. It folds in the optime exposure of the optime exposure of the outcome of the optime exposure of the expense reviews and meta-analyses providing the CR48, and conflict and the optime exposure of the expense review and meta-analyses providing the AURs, and conflict in the optime exposure of the analyses area of the expense of the expense of the expense of the expense of a star of the expense of the optime expense of the expense of the expense of the optime expense of the expense of the expense of the expense of the expense of the expense magnet he available evaluation of the expense of the exp



European Region



## **Comparison between SR/MAs for PM (2020 and 2024)** (examples for selected mortality causes)

- - - /

Pollutant	Outcome (mortality)		Current systematic review			Chen and Hoek [4]			
		N	RR (95% CI)	Certainty of the evidence	N	RR (95% CI)	Certainty of the evidence		
PM <sub>2.5</sub>	All-cause	53	1.095 (1.064–1.127)	High	25	1.08 (1.06, 1.09)	High		
	Circulatory	42	1.127 (1.102-1.152)	Mod.	21	1.11 (1.09, 1.14)	High		
	IHD	34	1.143 (1.102-1.186)	High	22	1.16 (1.10, 1.21)	High		
	Cerebrovascular	28	1.146 (1.101-1.192)	Mod.	16	1.11 (1.04, 1.18)	High		
	ALRI	12	1.204 (1.095-1.325)	High	4	1.16 (1.01, 1.34)	High		
	Lung cancer	26	1.093 (1.053-1.135)	High	15	1.12 (1.07, 1.16)	High		
	Respiratory	28	1.136 (1.079-1.197)	High	17	1.10 (1.03, 1.18)	Mod.		
	COPD	19	1.138 (1.080-1.198)	High	11	1.11 (1.05, 1.17)	High		
PM <sub>10</sub>	All-cause	28	1.081 (1.052-1.110)	High	17	1.04 (1.03, 1.06)	High		
	Circulatory	26	1.080 (1.042-1.120)	High	15	1.04 (0.99, 1.10)	Mod.		
	IHD	16	1.055 (1.019-1.092)	High	13	1.06 (1.01, 1.10)	Mod.		
	Cerebrovascular	15	1.049 (0.973-1.131)	Mod.	9	1.01 (0.83, 1.21)	Low		
	Lung cancer	17	1.101 (1.052-1.152)	High	13	1.08 (1.04, 1.13)	High		
	Respiratory	21	1.122 (1.076-1.169)	High	13	1.12 (1.06, 1.19)	High		
	COPD	7	1.215 (1.027-1.438)	High	5	1.19 (0.95, 1.49)	Mod.		

N, number of estimates; RR, pooled relative risks; 95% CI, 95% confidence interval; IHD, ischaemic heart disease; ALRI, acute lower respiratory infection; COPD, chronic obstructive pulmonary disease; Mod., moderate.

## **Budapest Declaration**

**7<sup>th</sup> Ministerial Conference on Environment & Health** 5–7 July 2023

**Budapest Declaration** and its **Road Map to 2030** aim to accelerate progress and action towards addressing health challenges related to

- climate change
- environmental pollution
- Ioss of biodiversity

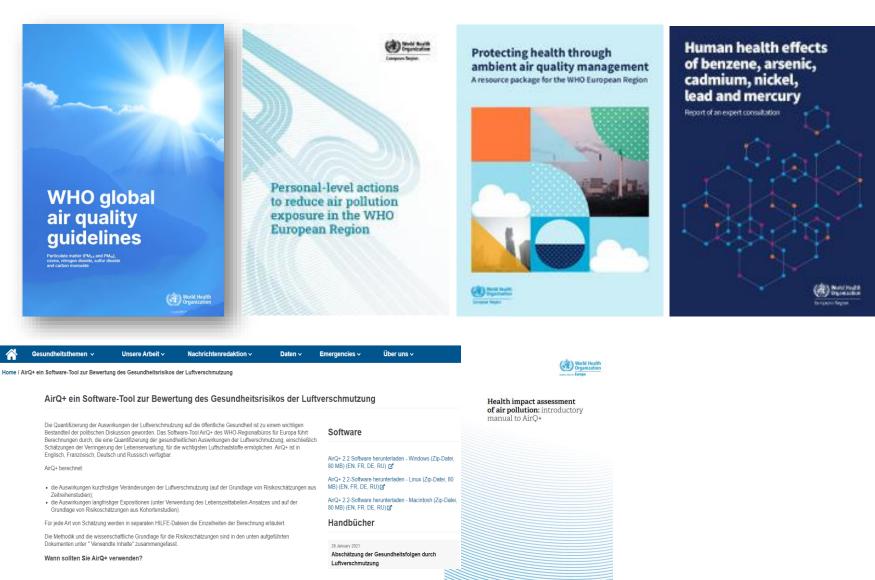
while recovering from the COVID-19 crisis.





## **Supporting implementation of the Air Quality**

- Resource package tools and instruments for AQ management
- Public health messages and personal interventions to reduce exposure to air pollution
- Update of the methods to assess health risks of air pollution in Europe (HRAPIE 2)
- Science-policy dialogues in Member States
- UNECE LRTAP Convention TFF meetings & workplan
- Capacity building



## Thank you

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### https://www.who.int/europe/health-topics/environmental-health



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