From evidence to actions: evolution of WHO air quality guidelines

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From evidence to action: synthesizing air quality evidence relevant to public health

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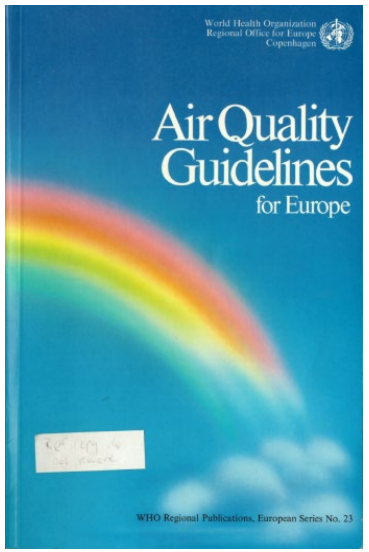
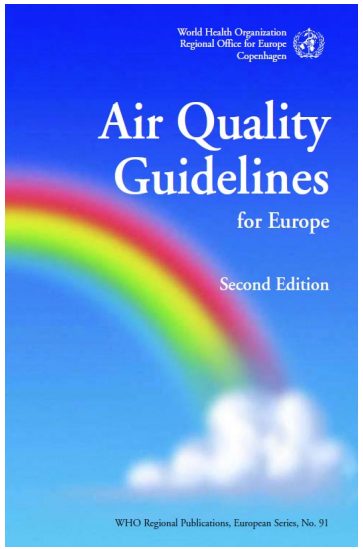
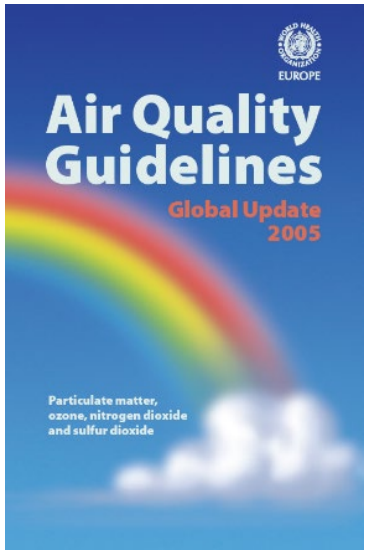
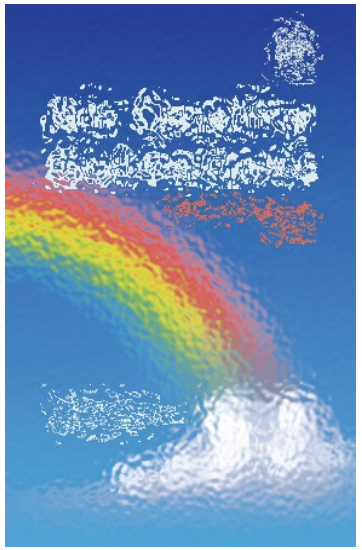
WHO Air Quality Guidelines





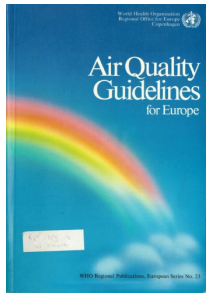


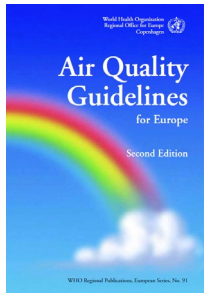


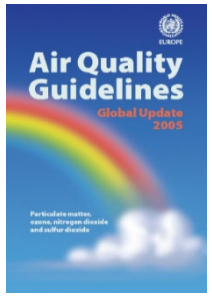
1987 *2000* *2006* *since 2016*

- Robust public health recommendations
- Support informed decision-making
- Intended for worldwide use
- Comprehensive assessment of the evidence

Evolution of WHO Air Quality Guidelines

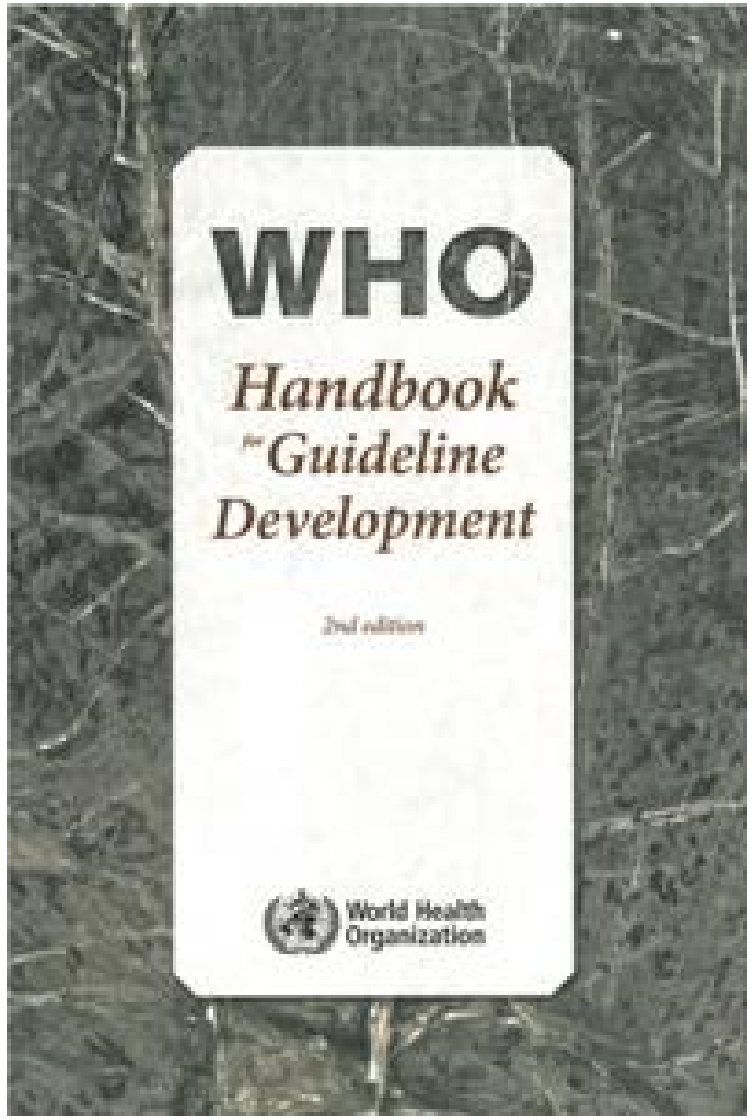






- Accumulated scientific evidence and formulation of guidelines
- Use of WHO AQGs to protect public health; environmental equity
- Importance of risk communication
- Introduction of interim targets to facilitate implementation
- Consideration of indoor air pollutants
- Evolving approach to evaluating evidence and developing guidelines

https://www.euro.who.int/__data/assets/pdf_file/0019/331660/Evolution-air-quality.pdf



Stage/primary contributor	Step
Planning	
WHO Member State, WHO country office or public/private entity	Request guidance on a topic
WHO technical unit	Determine if a guideline is needed; review existing WHO and external guidelines
	Obtain approval for guideline development from the director of the relevant technical unit at WHO
	Discuss the process with the GRC Secretariat and with other WHO staff with experience in developing guidelines
	Form the WHO guideline steering group
	Identify sufficient resources; determine the timeline
WHO guideline steering group	Draft the scope of the guideline; begin preparing the planning proposal
	Identify potential members of the GDG and its chair
	Obtain declaration of interests and manage any conflicts of interest among potential GDG members
WHO guideline steering group and GDG	Formulate key questions in PICO format; prioritize outcomes
WHO guideline steering group	Finalize the planning proposal and submit it to the GRC for review
GRC	Review and approve the planning proposal
Development	
Systematic review team	Perform systematic reviews of the evidence for each key question
	Evaluate the quality of the evidence for each important outcome, using GRADE as appropriate
WHO guideline steering group	Convene a meeting of the GDG
GDG	Formulate recommendations using the GRADE framework
WHO steering group	Draft the guideline document
External review group	Conduct external peer review
Publishing and updating	
WHO guideline steering group and editors	Finalize the guideline document; perform copy-editing and technical editing; submit the final guideline to the GRC for review and approval
GRC	Review and approve the final guideline
WHO guideline steering group and editors	Finalize the layout; proofread
	Publish (online and in print as appropriate)
WHO technical unit and programme manager	Disseminate, adapt, implement, evaluate
WHO technical unit	Update

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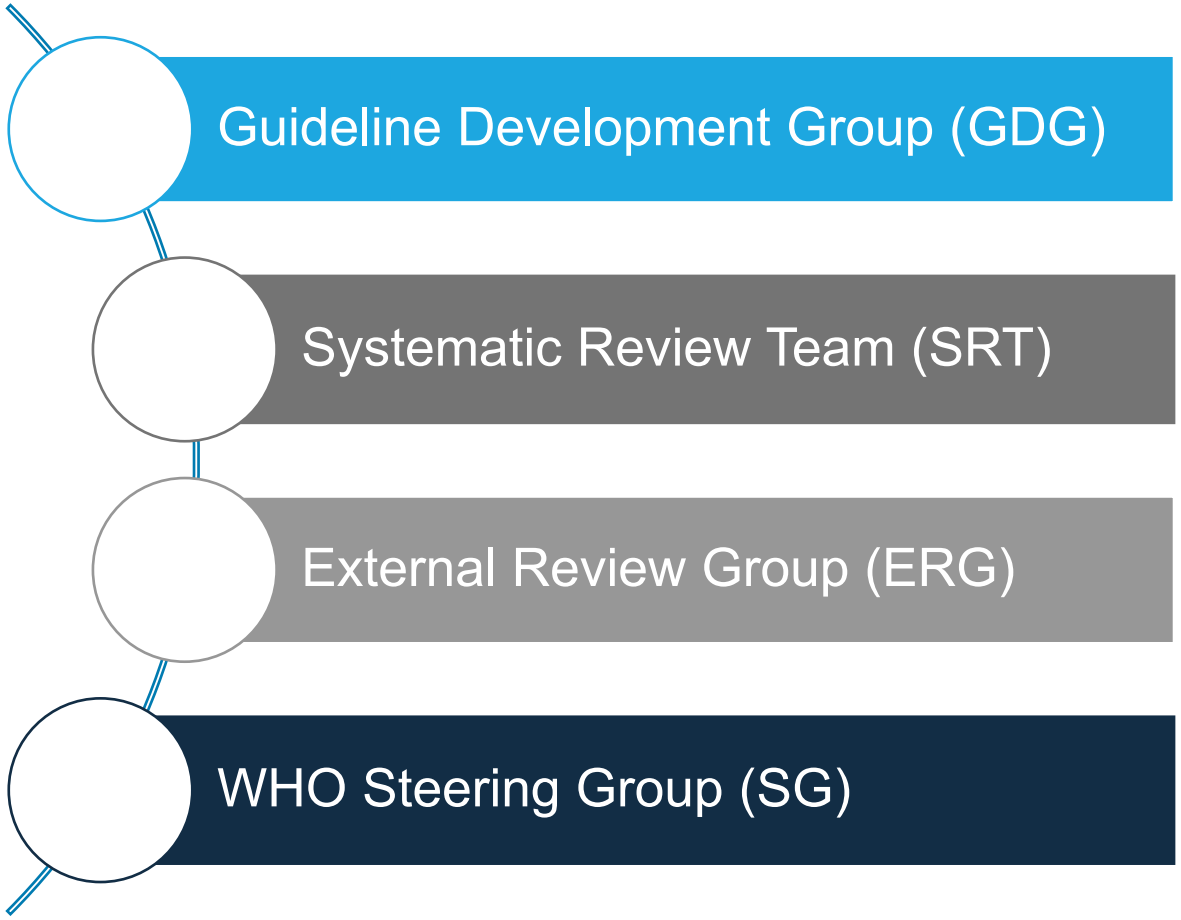
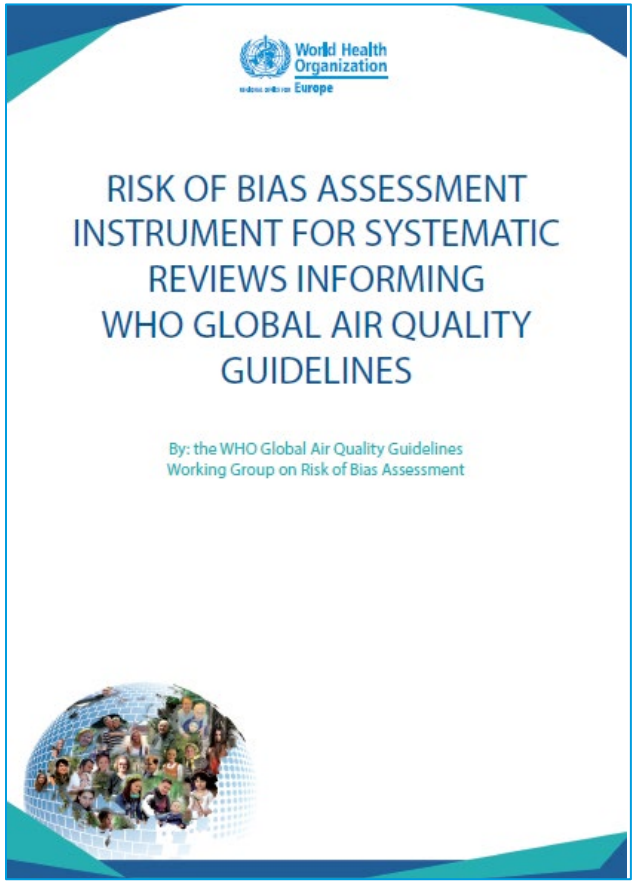
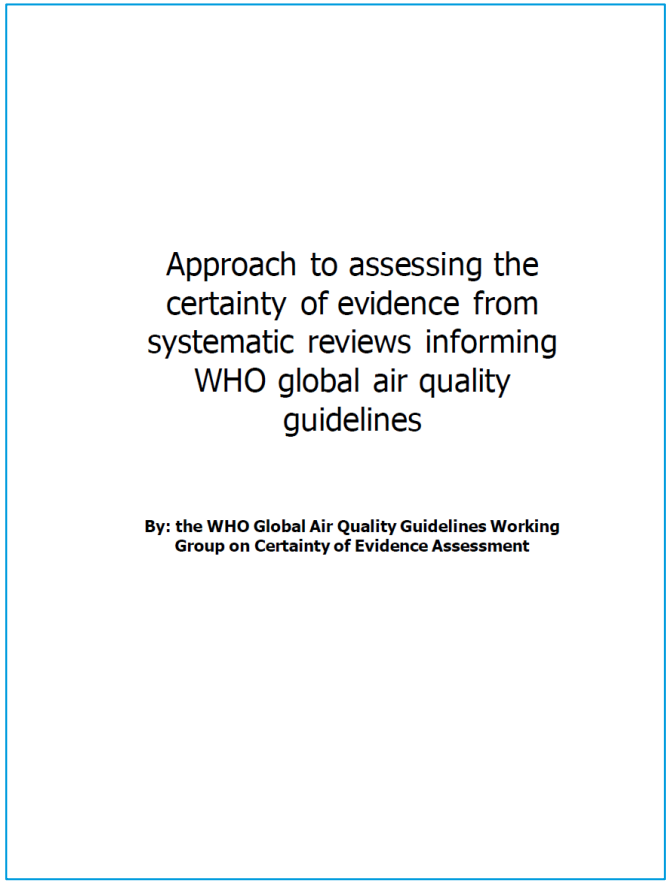
Guideline development process



1. Systematic review of evidence
2. Grading the evidence
3. Developing recommendations

Methodological developments





https://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications/2020/risk-of-bias-assessment-instrument-for-systematic-reviews-informing-who-global-air-quality-guidelines-2020
https://ars.els-cdn.com/content/image/1-s2.0-S0160412020318316-mmc4.pdf

GRADE: Grading of Recommendations Assessment, Development and Evaluation

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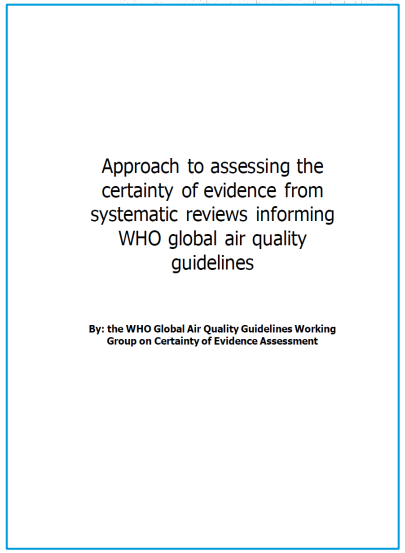
- Developed to standardize the approach to judging the certainty of the effects of interventions
- Enhances the comparability of the judgements, when all assessors consider the same arguments underpinning their certainty in a similar manner
- The factors for downgrading and upgrading the certainty are developed to guide expert judgement
- For each factor, a rationale for its importance and guidance to elaborate good reasons for downgrading or not downgrading is provided
- The certainty of the evidence can be graded as high, moderate, low or very low

GRADE adaptation in the context of an update of WHO Air Quality Guidelines

- Designed to assess the certainty of the evidence from the SRs commissioned to inform the update of WHO Air Quality Guidelines
- Not aimed at assessing the strength of evidence for causal inference by considering all relevant strands of evidence
- To guide SRT on how to use the GRADE criteria for observational studies of exposure
- Aimed to rate the certainty of the effect estimates



GRADE adaptation for the evidence reviews to inform WHO Air Quality Guidelines

Start the rating of the certainty of the evidence for observational studies as moderate certainty evidence

Reasons for downgrading

- study limitations: downgrade one or two levels
- indirectness: downgrade one or two levels
- inconsistency: downgrade one or two levels
- imprecision: downgrade one or two levels
- publication bias: downgrade one level

Reasons for upgrading (one level)

- large magnitude of effect size
- all plausible confounding shifts the relative risk towards the null
- concentration−response gradient

Extensively discussed at the GDG meetings, pilot tested by the SRT and improved iteratively

GRADE adaptation for the evidence reviews to inform WHO Air Quality Guidelines – main challenges and lessons learnt

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- The hypothetical “golden standard” for GRADE of a random assignment of exposures - while conceptually useful, largely an unachievable counterfactual in practice
- Different concepts, definitions and expectations among different disciplines – for example, the measure of a quality exposure assessment in epidemiology and exposure assessment science
- A challenge of integrating and summarising the evidence originating from different lines of research
- A challenge of combining implementation and methodological developments

Systematic reviews of evidence

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Short-term exposure to O_3, NO_2 and SO_2 and asthma

Long-term exposure to O_3 and NO_2 and all-cause and cause-specific mortality

Long-term exposure to PM and all-cause and cause-specific mortality

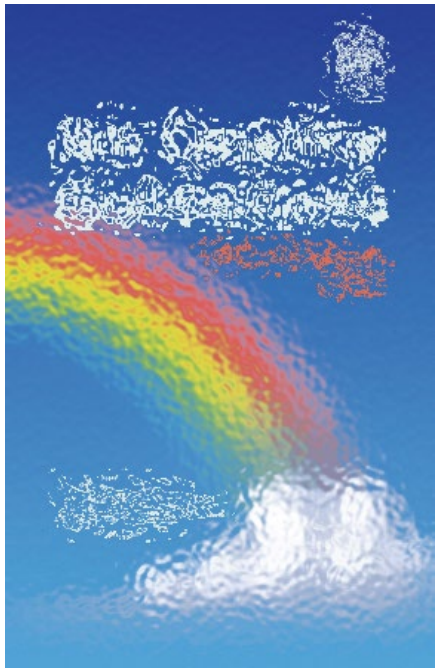
Short-term exposure to SO_2 and all-cause and cause-specific mortality

Short-term exposure to CO and ischaemic heart disease

Short-term exposure to PM, NO_2 and O_3 and all-cause and cause-specific mortality

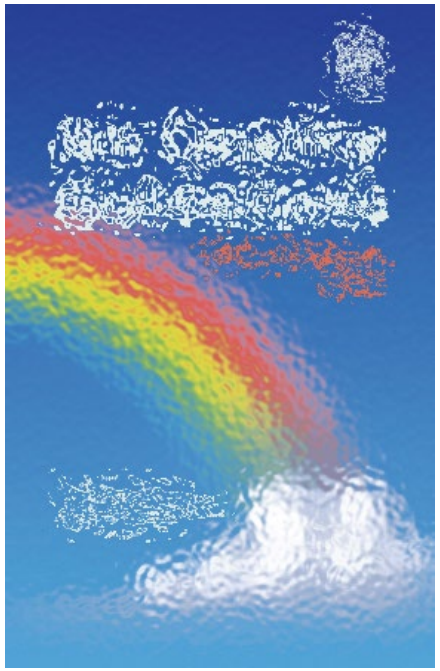
https://www.sciencedirect.com/journal/environment-international/special-issue/10MTC4W8FXJ

Update of the WHO Air Quality Guidelines



- Develop recommendations in the form of numerical concentration values and, where possible, with an indication of the shape of the CRF for PM_{10}, $PM_{2.5}$, NO_2, O_3, SO_2 and CO, for relevant averaging times and in relation to critical health outcomes
- Develop a qualitative recommendation / statement on desert dust
- Develop recommendations for PM components and ultrafine particles (UFPs), if feasible
- Propose interim targets to support monitoring and implementation

Updated WHO Air Quality Guidelines



- Recommendations in the form of numerical concentration values for PM_{10}, $PM_{2.5}$, NO_2, O_3, SO_2 and CO for relevant averaging times and in relation to critical health outcomes
- Interim targets to support implementation and monitoring
- Good practice statements for:
  - desert dust
  - black carbon
  - ultrafine particles

Grateful acknowledgment of the experts involved:

- Guideline Development Group, in particular members of Working Groups
- Systematic Review Team
- Methodologists
- External Review Group
- WHO staff

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Thank you for your attention

http://www.euro.who.int/en/health-topics/environment-and-health