# WHO Perspectives on Black Carbon: Guidelines, Evidence, and Future Directions

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# Good Practice Statement - BC/EC in 2021 AQG

## What's a Good Practice Statement?

A statement formulated when a guideline development group is confident that a large body of diverse evidence, which is hard to synthesize, indicates that the desirable effects of a particular course of action far outweigh its undesirable effects.


## Good Practice Statements for Black Carbon

1. Make systematic measurements of BC/EC. Such measurements should not replace or reduce existing monitoring of those pollutants for which guidelines currently exist.
2. Undertake the production of emission inventories, exposure assessments, and source apportionment for BC/EC.
3. Take measures to reduce BC/EC emissions from within the relevant jurisdiction and, where appropriate, develop standards (or targets) for ambient BC/EC concentrations.

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# Health Effects of Black Carbon: What We Know

- **Reviews of literature by the WHO (WHO Regional Office of Europe, 2012 & 2013)**
  - Evidence links BC particles with cardiovascular health effects and premature mortality, for both short (24-hour) and long-term (annual) exposures.
  - In studies that take BC and $PM_{2.5}$ into account simultaneously, associations remained robust for BC.
  - A valuable additional air quality metric for evaluating the health risks of primary combustion particles.

- **USPEA Integrated Science Assessment (USPEA, 2019)**
  - Effects on cardiovascular health similar to those of the earlier WHO reviews
  - Short-term EC/BC exposure is linked to respiratory effects, especially childhood asthma, though evidence on lung function is inconsistent, with patterns largely similar to $PM_{2.5}$.
  - Long-term EC exposure may affect children's lung development and asthma risk, but strong correlation with $PM_{2.5}$ makes independent effects uncertain.

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# New WHO Systematic Reviews

## Why a New Systematic Review on BC

- New evidence since 2018
- Health effects of BC from household air pollution (HAP) – gap in past reviews (WHO 2012, USEPA 2019)
- Limited health outcomes in previous reviews
- Rising interest in air pollution–climate policy synergies
    - BC = air pollutant + short-lived climate pollutant (SLCP) → key entry point

## Scope of Work of the New Systematic Review

- Metrics/measurements and exposure levels of BC (ambient and household air pollution)
- Effects and exposure–response relationships between BC exposure and a broad range of health outcomes
- Scoping review of current and past AQ policies/strategies for BC reduction, with focus on climate and health impacts and challenges to implementation
- Depending on results, meta-analysis to evaluate health effects of BC exposure (ambient and household air pollution)

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# Summary of Inclusion and Exclusion Criteria

| PICO | |
|---|---|
| **Population** | General human population of all genders and ages without geographical restrictions. |
| **Intervention/ Exposure** | Short-term and long-term exposure to ambient and household BC. Indirect measure of BC exposure (e.g., biomass vs. electric cookstove intervention, climate mitigation policies). |
| **Comparator** | Exposure to lower or no levels of BC in the same or in a reference population. |
| **Outcome** | All cause and cause-specific mortality, respiratory effects (both in children and adults, cardiovascular and cardiometabolic effects, birth outcomes, pregnancy outcomes, neurodevelopment outcomes (children), and neurocognitive outcomes (adults). |
| **Study Design** | Human studies include cross-sectional, cohort, case-control, and intervention studies.<br>Studies that report a quantitative measure of associations and a measure of precision. |

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# Inform Future Work

## Inform Future AQG

- Potential inclusion of quantitative (numeric value) recommendations for BC in future WHO Global Air Quality Guidelines updates.
- Potential inclusion of policies and interventions to reduce BC exposure in the updates of the WHO Guidelines for Indoor Air Quality: Household Fuel Combustion

## Inform WHO Tool Development and Revision

- Strengthen the health and climate impact assessments and economic analysis for the WHO policy decision supporting tools, e.g., AirQ+, CLIMAQ-H and BAR-HAP.

## Inform Policy Recommendations on Air Quality Management and Climate Mitigation

- Support implementation of WHO AQG with regard to BC.
- Highlight health co-benefits of reducing BC within air pollution control and climate mitigation strategies.
- Strengthen monitoring & reporting capacity in areas with high BC emissions.
- Inform global assessments of BC reduction scenarios, policies, and interventions.

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# Thank you

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