Particulate matter is a mixture of very small solids and liquid droplets that float in the air. Some particles come from a specific source (such as a burning candle), while others form as a result of complicated chemical reactions.

While much is known about the health effects of exposure to particulate matter outdoors, the effects of indoor exposure are less well-understood. However, indoor exposure to particulate matter is gaining attention as a potential source of adverse health effects.

The National Academies of Sciences, Engineering, and Medicine recently convened a workshop to examine the issues.

WHAT’S IN THE AIR INDOORS?

Most Americans spend about 90% of their time indoors.\(^3\)

WHAT ARE SOME SOURCES OF PARTICULATE MATTER INDOORS?

- outdoor sources that enter indoors through heating, ventilation, and air conditioning systems; open doors and windows; and leakage through walls and roofs\(^1\)
- airborne allergens and bacteria in outdoor air and that come from people and their pets and plants indoors\(^2\)
- emissions from food as it’s cooking\(^3\)
- candles, incense, wood burning\(^3\)
- cleaning activities like dusting, vacuuming, and ironing\(^3\)
- desktop laser printers and 3-D printers\(^1\)
- gas and electric ranges and stoves\(^1\)
- mold that grows on indoor surfaces\(^2\)
- cigarettes, e-cigarettes, and other smoking materials\(^4\)
- chemical reactions between elements in the air and materials inside of buildings\(^5\)

HOW BIG IS PARTICULATE MATTER, AND WHY IS THE SIZE A CONSIDERATION?

PARTICULATE MATTER IS TYPICALLY CLASSIFIED INTO THREE SIZE CATEGORIES:

- Coarse particles are 2.5 to 10 micrometers in diameter (a strand of human hair is 60-120 micrometers wide\(^6\)).
- Fine particles are 2.5 micrometers in diameter or smaller.
- Ultrafine particles are 100 nanometers (0.1 micrometers) or smaller.

Fine and ultrafine particles may be small enough to pass through the throat and nose and enter deeper into the body.\(^7\)

WHAT ARE THE POTENTIAL HEALTH EFFECTS?

A body of epidemiologic research has shown associations between short-term and long-term exposures to particulate matter and a broad array of respiratory and cardiovascular effects.\(^8\) Results from scientific studies are converging to indicate that exposures both to fine and ultrafine particles may produce such adverse effects.\(^8\) The size and shape of inhaled particles influence where and how much mass will be deposited in various regions of the respiratory system.\(^7\)

WHAT ARE SOME WAYS OF ALTERING THE LEVELS OF PARTICULATE MATTER INDOORS?

The source of indoor particulate matter may be affected by:

- limiting indoor smoking\(^1,10\)
- using a correctly installed range hood when cooking\(^3,10\)
- avoiding burning candles and incense\(^3\)
- performing regular surface cleaning\(^10\)

Ventilation may reduce the levels of particulate matter generated indoors, but it increases the amount of outdoor-generated particulate matter that comes inside.\(^10\)

Filtration may lower the concentrations of particulate matter in indoor air.\(^2,10\)

To download the free workshop summary, visit nationalacademies.org/IndoorPM.

DISCLAIMER: This infographic summarizes information presented at a workshop. Statements and opinions are those of individual participants; are not necessarily endorsed by the National Academies of Sciences, Engineering, and Medicine; and should not be construed as reflecting any group consensus.

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