



# What is Particulate Matter?



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## Particulate matter (PM):

Particulates are tiny bits of dust, soot or liquid which are too small to see. When you breathe these in, they can sometimes go deep into your lungs and the smallest can even pass into your bloodstream.

It is one of the most harmful of all air pollutants.



# Different Sizes of Particulate Matter

## PM10

- Coarse particles with diameter of 10 to 2.5 microns that can be breathed in
- Occurs near roads, dusty industries and agricultural farming
- It can bypass the body's natural defences in the nose and throat and enter the lungs

## PM2.5

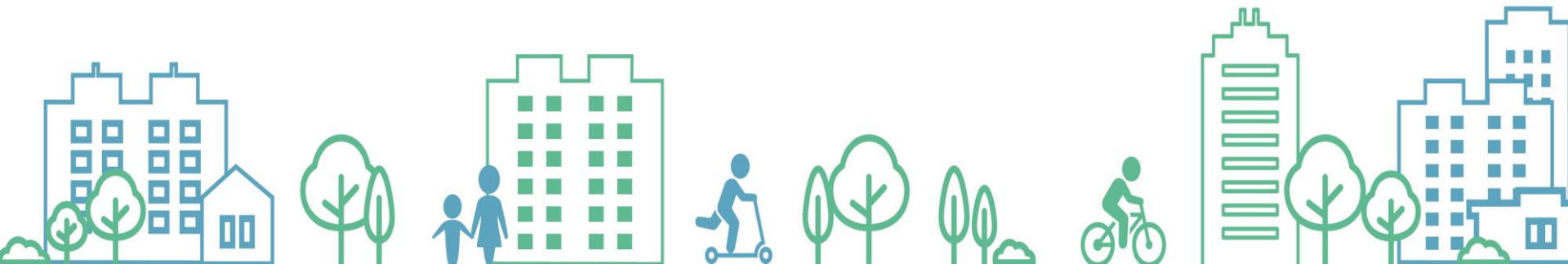
- Fine particles with a diameter of 2.5-0.1 microns - 30 times smaller than a human hair
- Can remain in the air a long time and travel long distances
- Comes from power plants, some industries and vehicles
- It can be breathed into the lungs and pass into the bloodstream



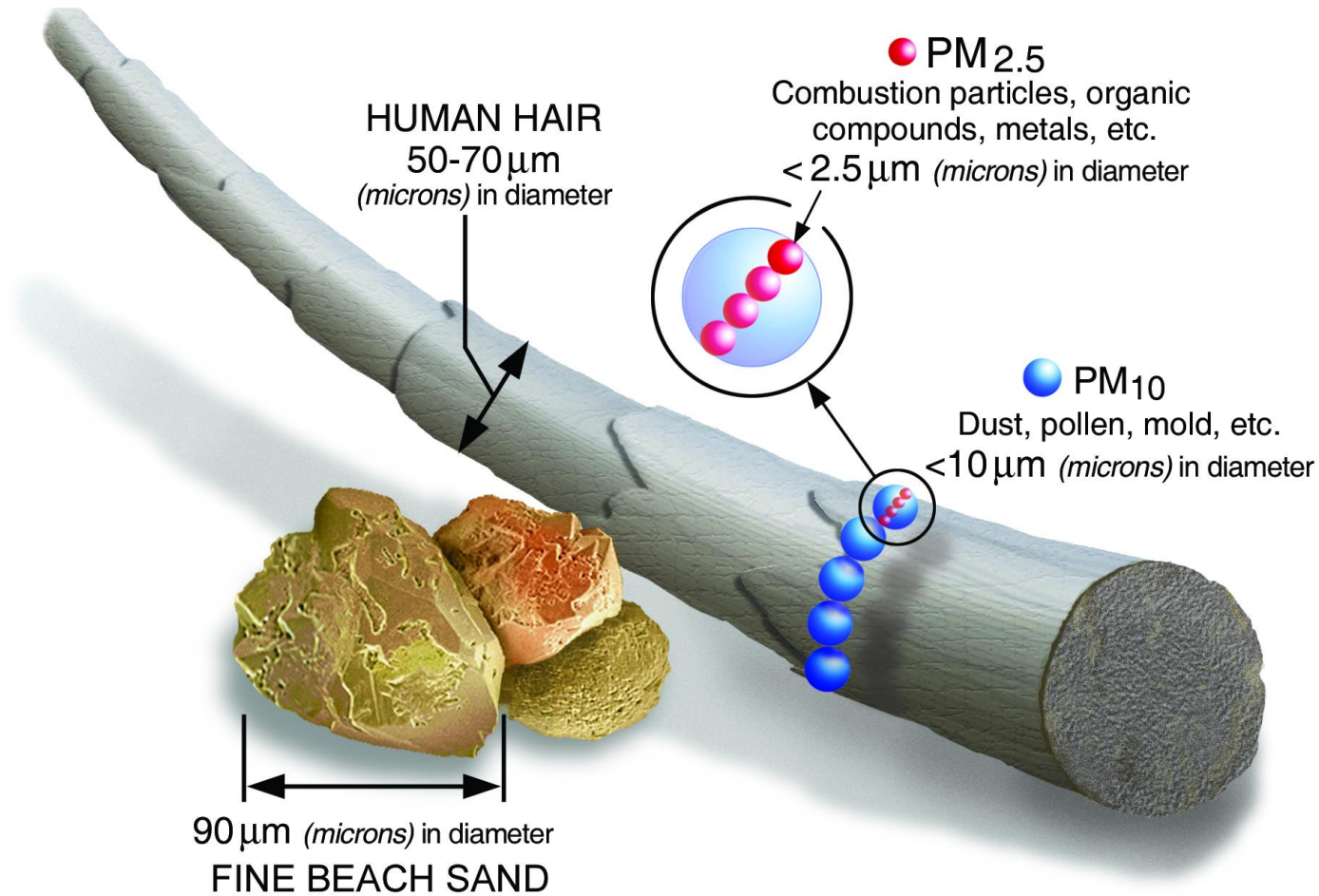
# Different Sizes of Particulate Matter

## Also, there is PM1

- Ultra fine particles with diameter smaller than 0.1 microns
- Made of ions, hydrocarbons and metals
- It can be breathed into the lungs and pass into the bloodstream
- It is talked about less than PM2.5 and PM10
- Governments around the World are trying to reduce levels of PM2.5 and PM1 in the air we breathe

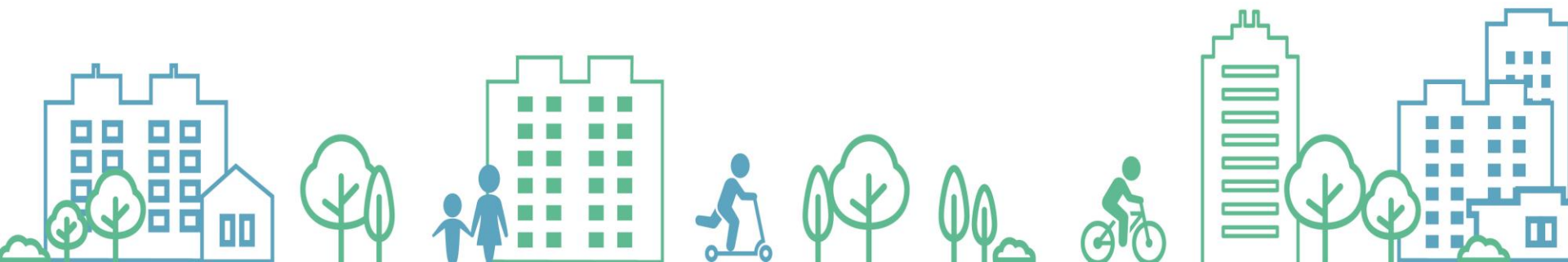


# Particulate Matter Measurements





Particulate matter – PM<sub>2.5</sub> & PM<sub>1</sub> is small enough to be inhaled and can affect human health.



# Regulations

World Health Organisation (WHO) Guidelines:

Fine particulate matter (PM<sub>2.5</sub>)

5  $\mu\text{g}/\text{m}^3$  annual average

15  $\mu\text{g}/\text{m}^3$  24-hour average

Coarse particulate matter (PM<sub>10</sub>)

15  $\mu\text{g}/\text{m}^3$  annual mean

45  $\mu\text{g}/\text{m}^3$  24-hour mean



# Where does it come from? Sources

PM can come from natural sources and by human activity. It can occur both indoors and outdoors depending on what causes it:

- Wildfires
- Dust Storms
- Volcanic Eruptions
- Sea Spray
- Natural PM in biological sources
- Vehicle Emissions
- Industrial
- Power generators
- Burning wood, candles and incense
- Stoves, heaters, fires and chimneys
- Tobacco smoke

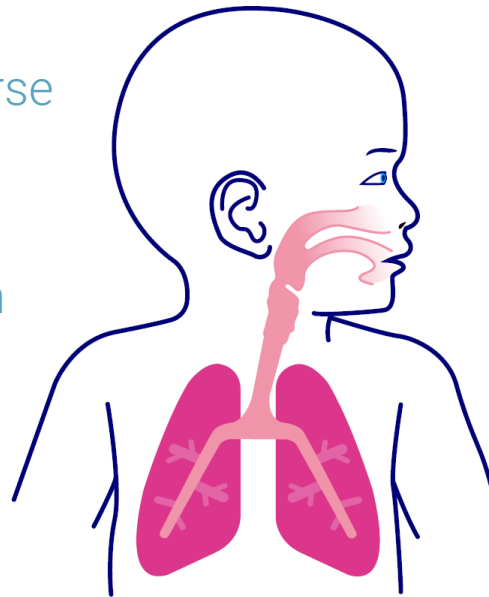




What does particulate matter do to our bodies?  
(Short term)

It can make asthma worse

It can cause tightness in  
your chest



It can make you feel dizzy

It can make your eyes itch

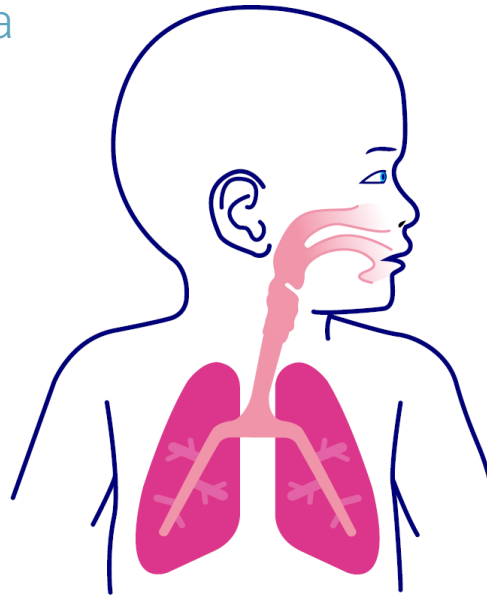
It can make you cough,  
wheeze and sneeze

***How many children have asthma  
in your class?***

# What does particulate matter do to our bodies? (Long term)

It can make your asthma worse or cause asthma

It can cause the lungs to not work as well



Cause heart conditions and make existing conditions worse

Cause lung disease and make existing conditions worse

# Who is Most at Risk from Exposure to PM

## Children

Children's lungs are still developing

Children spend more time doing activities outdoors

## Older people

Older people have an increased chance of heart or lung conditions

Many have heart and lung conditions they are unaware of

## People with existing heart or lung diseases

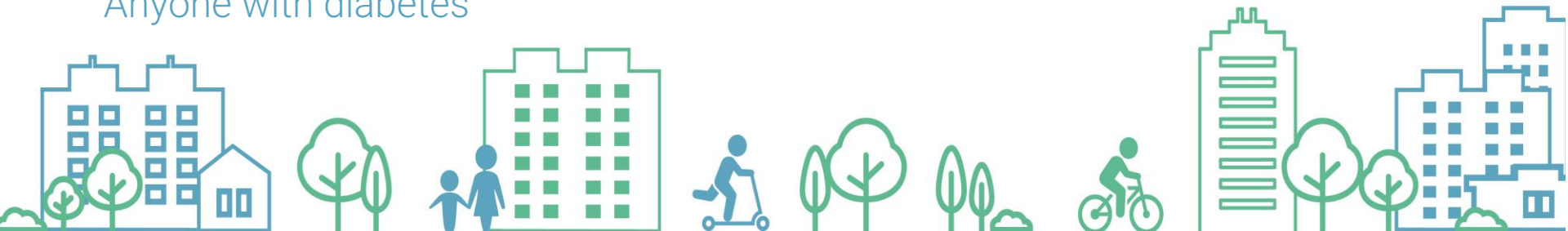
Particle pollution makes these diseases worse

## People who exercise or work outdoors

You breathe faster and deeper when you are exercising

People who work or spend lots of time outdoors in areas with high PM<sub>2.5</sub> pollution breathe in more particles

## Anyone with diabetes



# Environmental Impacts of Particulate Matter

PM<sub>2.5</sub> can be carried over long distances by wind and then settle on ground or water. Depending on what the particles are made of this settling may:

- make lakes and streams acidic
- change the nutrient balance in coastal waters and large lakes
- deplete the nutrients in soil
- damage sensitive forests and farm crops
- affect the diversity of ecosystems
- contribute to the effects of acid rain
- PM can stain and damage stone and other materials, including important objects like statues and monuments.



# Very bad air pollution events in history

## 1930: Meuse River Valley, Belgium

- High concentration of pollutants during cold, damp weather
- Main sources of the PM were Zinc smelter, sulfuric acid factory and glass manufacturers
- 60 deaths were recorded

## 1948: Donora, Pennsylvania

- Like the Meuse River Valley pollution
- Main sources were iron and steel factories, zinc smelting and an acid plant
- 20 deaths were recorded

## 1952: London, UK

- Killer smog (smoke and fog)
- Main source was coal fires in people's homes
- 4,500 deaths were recorded during the week of the smog in December

