

Health impacts of air pollution

THE GAME



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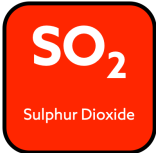


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1. THE STORY

You are working with a group of scientists interested in understanding how air pollutants affect the health of humans.

Your goal is to find the **links between different air pollutants and ill-health**, so we can all **take action** to minimise air pollution and improve health.



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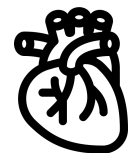
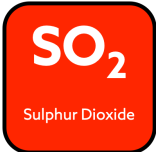
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2. THE AIM

Guess the health impact on your opponent's card, by asking them **three yes or no questions**.

Ask questions based on the information given on your cards.

If you guess correctly you earn the points on the top of the card. After **three rounds**, the player with the most points, wins.



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3. HOW TO PLAY

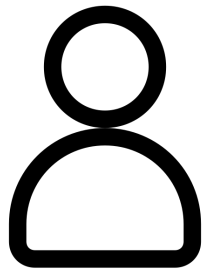
Play in pairs.

Each player gets their own deck of cards.

Shuffle the chance cards and lay them face down.

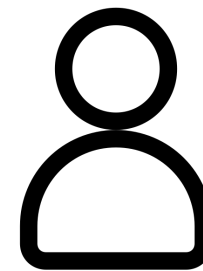
The game ends after **three rounds**.

Each round entails:



Player 1

THREE yes or no questions
ONE guess at health impact
ONE chance card (optional)



Player 2

Remove the correctly "guessed cards" from play after each round.



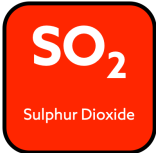
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4. ASKING QUESTIONS

- 1- Lay your deck of **cards on the table face up**.
- 2- On the cards, **read the information** about the air pollutants, their sources, and the body parts affected.
- 3- Use this information to ask **three questions** that require a YES or NO answer. See what questions you can ask next.
- 4- You then have **one chance to guess** the health impact. Get it right and win the points.
- 5- Feeling lucky? Pick one chance card from deck. Some will add points others subtract to your score
This is optional.



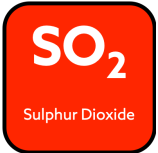
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5. ANSWERING QUESTIONS

- 1- Read the information** about the air pollutants, their sources, and the body parts affected on the cards.
- 2- Pick one card** and keep it hidden. Lay the other cards **on the table face down**.
- 3- Answer the three yes or no questions.** See what questions you can ask next.
- 4- Your opponent now has one chance to guess** your health impact.
- 5- They can also pick a chance card** from deck which will add or subtract points. This is optional.



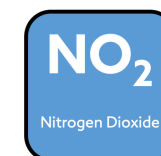
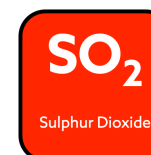
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6. QUESTIONS ALLOWED

Types	Example
Description of health impact	<i>Is it related with pain receptors? Does it affect your memory?</i>
Name of air pollutants	<i>Is it linked with sulphur dioxide (SO₂)?</i>
Sources of air pollutants	<i>Is the source of pollution road traffic?</i>
Body parts	<i>Does it affect your brain? Does it affect your airways?</i>
Others questions	<i>Is it short-term? Is the air pollutant in a pink box?</i>



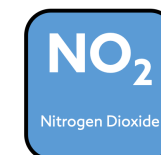
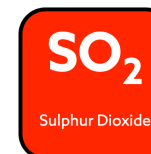
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7. QUESTIONS NOT ALLOWED

Types	Example
Name of health impact	<i>Is it COPD?</i> <i>Does it start with the letter H?</i>
Questions with no yes or no answers	<i>What are the air pollutants in your card?</i> <i>What are the sources of air pollution?</i>



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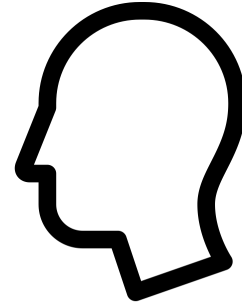


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Health impact

Headache

Affects
your
Head



Short-term
impact
1 POINT

Headaches happen when **pain receptors** in your head **are triggered**, often due to **irritation of blood vessels**. There are over 200 different types of headaches.

Possible air pollutant(s) and their sources



Volatile Organic Components (VOCs) can be found in **everyday products** such as **paints and glues**.

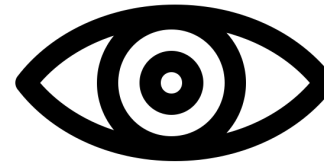


Carbon Monoxide (CO) is release into the atmosphere by **vehicles running on petrol**.

Health impact

Eye irritation

Affects
your
Eyes



Short-term
impact
1 POINT

An eye irritation is a response to an inflammation or **reaction to an allergy**.

Your eyelids become red and itchy and **your eyes get watery**.

Possible air pollutant(s) and their sources



Volatile Organic Components (VOCs) can be found in **petroleum fuels** and **paint thinners**.

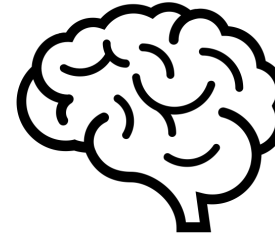


Ozone (O₃) is **created in the presence of sunlight**, by chemical reactions between other pollutants.

Health impact

Stroke

Affects
your
Brain



Long-term
impact
3 points

A stroke occurs when the **blood supply** to part of your brain **is interrupted or reduced**, preventing brain tissue getting oxygen and nutrients.

Possible air pollutant(s) and their sources



Thermal power stations, which burn coal to generate electricity, emit **nitrogen dioxide (NO₂)**.

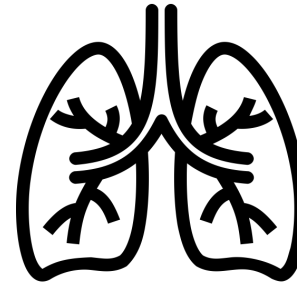


The **incineration of household waste** releases vast amounts of **sulphur dioxide (SO₂)** into the air.

Health impact:

COPD

Affects
your:
Lungs



**Long term
impact**
3 points

Chronic obstructive pulmonary disease (COPD) is a lung condition, where you **can't exhale** the way you usually would, and causes **trouble breathing**.

**Possible air pollutant(s)
and their sources**

SO₂

Sulphur Dioxide

Industrial processes to **extract metals from ores** can release **sulphur dioxide (SO₂)** into the atmosphere.

PM_{2.5}

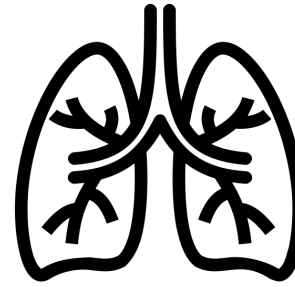
Particulate
matter 2.5 µm

Agricultural burnings and pesticides release **particulate matter (PM_{2.5})** into the atmosphere

Health impact: **Asthma** **attack**

During an asthma attack the muscles around the airways contract. The **airways** produce more mucus and **become swollen and inflamed**, making it harder to breathe.

Affects your: **Lungs**



Medium-term impact
2 POINTS

Possible air pollutant(s) and their sources



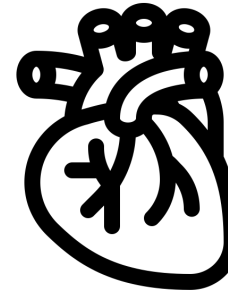
Sand and ash are examples of **particulate matter (PM_{2.5})** suspended in the atmosphere. They originate from **natural processes**.



Ozone (O₃) can be produced indoors by **photocopying machines and laser printers**.

Health impact: **Heart failure**

Affects
your:
Heart



**Long-term
impact**
3 points

Heart failure happens when the heart **no longer supplies enough blood flow** and oxygen to other organs. In some cases this leads to tiredness and shortness of breath.

Possible air pollutant(s) and their sources



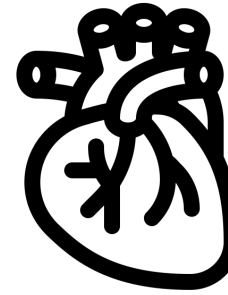
Road traffic is the principal outdoor source of **nitrogen dioxide (NO_2)**.



Cigarette smoke and secondary smoke are examples of sources of **carbon monoxide (CO)**.

Health impact: Cardiovascular disease

Affects
your:
Heart



**Long-term
impact**
3 points

Cardiovascular disease describes **conditions which affect the heart or blood vessels**. It can be linked with high blood pressure, blood clots or the build up of fatty tissue on arteries.

Possible air pollutant(s) and their sources



Nitrogen dioxide (NO_2) can be produced indoors by **unflued gas burners and cookers**.



Diesel is commonly used to **fuel public transport** releasing **particulate matter ($\text{PM}_{2.5}$)** into the air.

Health impact:

Premature birth

Babies who are born before 37 weeks are known to be premature. They are **often underweight with weak immune** systems and their organs might not be fully developed.

Affects:

New borns



Medium-term impact
2 POINTS

Possible air pollutant(s) and their sources

SO₂

Sulphur Dioxide

Fuel used to power **airplanes** releases **sulphur dioxide (SO₂)** into the atmosphere.

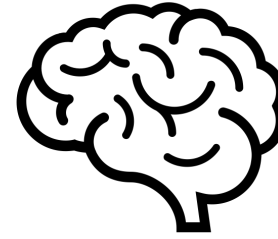
PM_{2.5}

Particulate matter 2.5 µm

Diesel is often used to **fuel public transport** releasing particulate matter into the air.

Health impact:
**Alzheimer's
disease**

**Affects
your:
Brain**



**Long-term
impact
3 points**

Alzheimer's disease is an ongoing **decline of brain functionality**.

It can affect memory, thinking skills and other mental abilities.

**Possible air pollutant(s)
and their sources**



From land-clearance to building structures, the **construction industry** is a source of emission of **particulate matter**.

CHANCE CARDS



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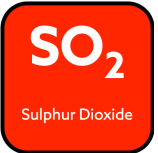
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CHANCE CARD

You live in a place where it's common for people to burn coal to heat their homes.

This increases the levels of sulphur dioxide (SO_2) and particulate matter (PM) in the air indoors.

- 2 POINTS



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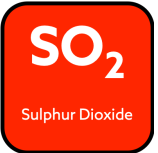
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CHANCE CARD

You live in a region surrounded by high mountains.

This geography prevents the wind from blowing away trapped air pollution.

- 2 POINTS



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CHANCE CARD

You own a car rental business which uses vehicles running on diesel.

You are interested to upgrade to electric vehicles. However there are no government incentives to purchase cleaner vehicles. You decide you can't afford the upgrade.

- 2 POINTS



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CHANCE CARD

Your local community centre is a building with poor thermal insulation.

It's very hot during the summer and very cold during the winter.

It takes many electric radiators to keep it warm inside.

- 2 POINTS



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CHANCE CARD

The urban waste produced in your town is still being incinerated using old technologies such as poor temperature control and poor waste management.

This process not only increases air pollution but also contaminates nearby land and water.

- 2 POINTS



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CHANCE CARD

Your school recently installed solar panels to help generate electricity.

This reduces their need to burn fossil fuels and therefore the levels of carbon dioxide (CO_2) and nitrogen dioxide (NO_2) released into the atmosphere.

+ 2 POINTS



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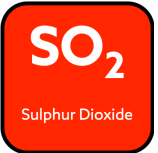
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CHANCE CARD

You live in a city where people are encouraged to use public transport powered by cleaner energy.

There are parts of the city where polluting vehicles are not allowed to enter.

+ 2 POINTS



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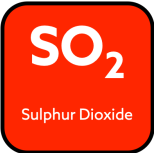
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CHANCE CARD

You help your family keeping your house well-aired.

You open your windows regularly to avoid the build-up of indoor air pollutants such as dust, mould and VOC_s.

+ 2 POINTS



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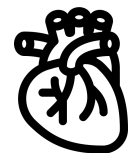
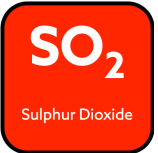
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CHANCE CARD

A **Clean Air Zone** has been created around your school. Engines are turned off when waiting and drop-off/pick up points are moved away from school entrances.

This is an example of an 'active' solution which helps reduce air pollution levels in and around your school

+ 2 POINTS



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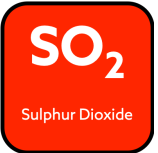
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CHANCE CARD

Your teacher gets you involved in a citizen science project (such as sending in your home vacuum dust to mapmyenvironment.com).

Collaboration via citizen science improves your awareness of air pollution and mitigation (control) measures.

+ 2 POINTS



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CHANCE CARD

You and your family avoid non-essential vehicle use, especially during morning and afternoon peak rush hours.

This reduces traffic volume, congestion and journey times, and so helps to reduce air pollution.

+ 2 POINTS



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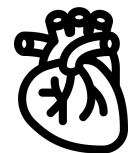
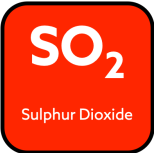
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CHANCE CARD

In your neighbourhood there are green barriers, such as hedges, along the boundary between the main road and the houses

This is an example of a 'passive' solution which reduces air pollution levels in and around your home.

+ 2 POINTS



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CHANCE CARD

You try to eat less meat and more locally produced fruit and vegetables.

This helps cut down emissions from transportation and energy needed to get the food on your plate.

+ 2 POINTS



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