



Asthma and Clean Air Lesson Plan 2020



What is Asthma?

Asthma is a common condition which causes inflammation of the airways. The airways are the small tubes that carry air in and out of the lungs.

Asthma causes the airways to become over-sensitive and react to things that wouldn't normally cause a problem, such as cold air or dust.

When the airways react to a substance, the muscles of the tube walls tighten up, making them narrow and leaving little room for air to flow in and out. The lining of the airways then gets swollen (just like your nose during a cold) and sticky mucus is produced which clogs up the breathing passages.

With so little space in the airways, it becomes difficult for air to move in and out and the chest has to work much harder to breathe. Tightening of the muscles around the airways can happen quickly; this is the most common cause of mild asthma symptoms.

Asthma facts



Proportion of children who experience asthma at some stage in their life.



Proportion of people in Ireland currently have asthma.

A large pink '8,000' is displayed. Below it, the text 'The number of asthma admissions to hospital every year.' is written.

The number of asthma admissions to hospital every year.

A large green '€472million' is displayed. Below it, the text 'The amount asthma costs the state per annum.' is written.

The amount asthma costs the state per annum.

A large red text 'one every six days' is displayed. The word 'one' is on the first line, 'every' is on the second line, and 'six days' is on the third line, all in a bold, sans-serif font.

The frequency at which people are dying as a result of their asthma.

Asthma symptoms can include:

- Cough - won't go away, occurs at night/ during exercise
- Wheeze (a whistling sound that occurs when breathing out).
- Chest tightness (tummy ache in younger children)
- Shortness of breath

What causes asthma?

We still don't know the exact cause of asthma, but we do know that:

- Genetic
- Onset- usually in childhood
- Allergies/allergic diseases- link
- Modern lifestyles
- Risk is increased by:
- Smoking during pregnancy
- Obesity/overweight
- Viral respiratory infections
- Poss. loss of symptoms but it never goes away
- Not infectious

How is asthma diagnosed?

There is no single test to diagnose asthma. A GP will diagnose asthma based on:

- Family history
- Pattern of symptoms
- Chest examination
- Peak flow/ lung function test (age dependant)
- Trial of asthma treatment

Asthma triggers

- Air Pollution
- Cigarette smoke
- House dust mite
- Medication
- Occupations
- Pets
- Pollen
- Spores
- Weather changes
- Colds and flu
- Emotions
- Exercise
- Food and drink
- Hormones

Is there a cure?

Asthma **cannot be cured** but it can be controlled through management of triggers and proper use of medication. Most young people with asthma should be able to live healthy, active lives with minimal symptoms.

Asthma Medication

Thankfully, symptoms can be relieved quickly with a reliever inhaler (usually blue). However, the swelling and mucus happen more slowly and need a different treatment. This usually is usually a preventer inhaler which is taken daily to allow the effect to build up over time.

The majority of people with asthma are prescribed a daily preventer inhaler to protect against an asthma attack and a reliever inhaler to use when symptoms occur. It is extremely important that preventer medication is taken regularly, as prescribed and even when asthma symptoms are not present.

Controller:

- Controls swelling & inflammation in airways.
- Effect builds up over period of time.
- Typically required to be taken daily, usually morning and evening- even when feeling well.

Reliever:

- Can take immediately when asthma symptoms appear.
- Reliever medication relaxes muscles surrounding narrowed airways.
- Airways open wider making it easier to breathe.

Using a Spacer makes taking inhalers easier and more effective.

Spacer devices:

- Volumatic
- Aerochamber
- Babyhaler

Other Medication:

- Combination inhalers
- Oral steroid tablets
- Medications:
- Always give medications as prescribed
- If child using a reliever more than twice a week- see a GP
- Access to blue reliever at all times is important
- Children should have their inhaler technique checked at every visit

Asthma Control

- Avoid triggers
- Ensure correct inhaler technique
- Take medication as prescribed
- Never ignore asthma symptoms
- Complete an Asthma Action Plan with your doctor

Signs of an asthma attack

If someone is having an asthma attack they will have one, or a combination of, any of the following symptoms:

- Cough
- Wheeze
- Shortness of breath
- Chest tightness
- Too breathless to finish a sentence
- Too breathless to walk, sleep or eat
- Lips turning blue



THE ASTHMA SOCIETY OF IRELAND

The Asthma Society of Ireland is the national charity dedicated to empowering Ireland's 380,000 people with asthma to take control of their asthma by providing them and their families with information, education, services, and support. We are focused on representing people with asthma and working to improve their health outcomes.

- Our **Mission** is to save lives and improve the lives of people with asthma.
- Our **Vision** is everyone with asthma living a full life, symptom free.

Why we are passionate about reducing air pollution levels in Ireland?

Our mission is to stop asthma deaths in Ireland. In 2017, 57 people died from asthma. Most of these deaths are believed to be preventable, and we are committed to ending asthma deaths in Ireland by 2030. Air pollution is often an invisible trigger for asthma symptoms and has been proven as a direct cause of asthma, particularly in children. Pollution in the air enters our body through our lungs and so is very difficult, if not impossible to avoid. Everyone has a right to breathe clean air free of pollutants.

Clean Air Campaign: Own Our Air

This campaign was created with the aim of making the air we breathe cleaner and safer for everyone.

Air quality was recently described by the World Health Organisation (WHO) as the world's largest single environmental health risk, and Ireland is no exception to this problem. While Ireland is largely within the limits set by the European Union for air pollution, it fairs poorly when measured against the stricter World Health Organisation guidelines. The Asthma Society considers clean air to be of fundamental importance to health outcomes for people with asthma in Ireland.

Our #OwnOurAir campaign champions the following changes to tackle air pollution at governmental and individual level:

- implementing the smoky coal ban nationwide
- reducing transport emissions by moving towards more beneficial modes like walking, cycling public transport and, additionally, making public transport cleaner in respect to air quality
- creating cigarette-free environments
- reducing emissions from industrial, agricultural and shipping sources
- reducing solid fuel use for home heating
- investing in green infrastructure planning and low emission solutions across transport, housing and energy sectors

According to the Environmental Protection Agency's report Air Quality in Ireland 2018 (which reports on air pollution issues in the previous), the burning of solid fuel is the biggest threat to good air quality in Ireland (followed by emissions from vehicle exhausts).

Levels of particulate matter – microscopic pollutants – in our air are of growing concern. They are particularly high during the winter months when people's use of solid fuels such as coal, peat and wood impacts on air quality and on health, especially in small towns and villages. This is also a time when people with asthma are already at higher risk of exacerbation of their condition and hospitalisation.

Activity

(Optional)

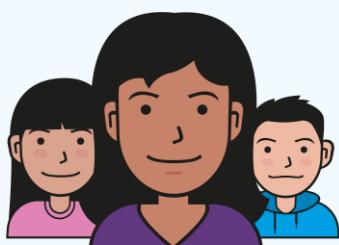
This activity gives you the opportunity to gain an awareness of how asthma affects *your* school:

- Compile a short survey to find out how many students in your class (or school) have asthma
- As a group, try to guess how many people are affected by asthma
- Give the survey out to all the classes in your year
- Use the information to get a percentage of students who have asthma
- Was your guess correct? Too high or low? Why was that?

Who we help



Ann



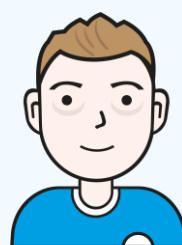
Grace



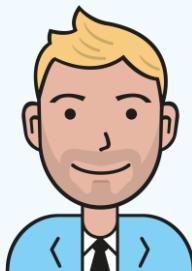
Claire



Daniel



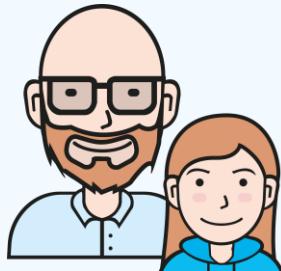
Jack



Kevin



Sophie



Tom

Aoife

If you wish to learn more about clean air and asthma, please head to our website at www.asthma.ie where a variety of school resources are available.

POLLUTANTS, SOURCES, AND THEIR LINK TO ASTHMA

Air pollution, even at low levels, has been proven to cause and worsen a number of respiratory diseases, heart conditions, and respiratory diseases.

The following section introduces different pollutants in our air that can have a direct effect on people with asthma. The sources of the pollutants or how they are formed is also explored. This information can help guide you and your school in choosing a pollutant or source of pollution to focus on during the action piece of the project. Information here can also be useful to the schools when producing their final social media posts.

Schools are not limited to focus on these pollutants or the sources mentioned specifically when working with the action part of the project and are free to explore further!

Nitrogen oxides

Nitrogen dioxide (NO_2) is one of two gases collectively known as NOx (nitrogen oxides) gases. The other is Nitrogen monoxide (NO).

Sources of nitrogen oxides

- vehicle exhausts
- emissions from coal burning
- appliances that burn fossil fuels
- cigarette smoke and secondhand smoke
- degraded nitrogen-containing fertilizer

Effect of NO_2 on asthma

Everyone's health is at risk when breathing in unsafe NOx levels, but specifically people with asthma. Long-term exposure can cause the development of asthma and increase the chance of respiratory infections. Short-term exposure, especially with high NOx concentrations, can irritate airways and cause inflammation in the respiratory system. For an asthma sufferer, this can increase intensity of coughing, wheezing or creating difficulty in breathing. Children, older people, and people with asthma are generally at greater risk for the health effects of NOx.

Sulfur Dioxide

Sulfur dioxide (SO_2) is a toxic, invisible gas with a strong and sharp smell. It reacts easily with other substances to form harmful compounds. For example, sulfuric acid is formed when SO_2 is mixed with water and air. Complex chemical processes follow, which eventually form acid rain.

Sources of Sulphur Dioxide

SO_2 can be released from both man-made (anthropogenic) and natural sources. For example it can be emitted from:

- volcanoes
- burning sulfur-containing fuels (coal, fuel oil, and gasoline)
- industrial processes such as extracting metal from ore

Effect of Sulphur Dioxide on Asthma

SO_2 can be a major irritant to the body, specifically the eyes, nose, and lungs. High concentrations of SO_2 can result in temporary breathing impairment. This is because when SO_2 is inhaled, it reacts with moisture in the airways to form sulfuric acid that can both be absorbed into the lining of the airways and can bond with particulate matter (PM) causing them to be carried through the alveoli throughout the body

Ground Level Ozone

Ozone naturally occurs in the earth's upper atmosphere (stratosphere) and forms a protective gaseous layer against the sun. It is made up of three oxygen atoms (O_3) and is known as 'good' ozone. Ground level (or tropospheric) ozone is known as 'bad' ozone and is a harmful pollutant that is majorly responsible for "smog". Some of it can be transferred downwards into the troposphere

Sources of Ozone

Tropospheric ozone is not 'emitted' but is instead created by chemical reactions when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources chemically react in the presence of sunlight.

It is therefore most likely to reach unhealthy levels on hot days in urban areas. Ground level ozone can easily be spread with wind so can affect rural areas also.

Effect of Ozone on asthma

Ozone can reduce lung function and damage lung tissue, making it hugely irritating to the lungs and airways. It is therefore a major trigger for people with asthma. High levels of tropospheric ozone can cause serious breathing difficulties and is proven to increase the likelihood of having an asthma attack.

Particulate Matter

Particulate matter (PM) or particle pollution is composed of solid and liquid particles suspended in the air. Many are so small that they can only be seen with an electron microscope. However some are large enough to be seen with the naked eye such as dust, dirt, soot, or smoke. PM is actually a mass measurement usually referred to through two size ranges:

- **PM₁₀**: diameters 10 micrometers and smaller (5-10 times smaller than the width of a hair!)
- **PM_{2.5}**: diameters 2.5 micrometers and smaller.

Sources of PM

These particles come in many sizes and shapes and can be made up of hundreds of different chemicals. Most particles form in the atmosphere as a direct, primary result of combustion but many others result from complex secondary reactions of chemicals such as organic compounds, sulfur dioxide and ozone. These are emitted from power plants, industries and automobiles. Some are emitted directly from a source, such as:

- construction sites
- unpaved roads
- fields
- fires (indoor fireplaces or bonfires)
- non-exhaust fumes

Effect of PM on Asthma

Particulate matter contains microscopic solids or liquid droplets that are so small that they can be inhaled and cause serious health problems. Some particles less than 10 micrometers in diameter can get deep into your lungs and some may even get into your bloodstream. Of these, particles less than 2.5 micrometers in diameter, also known as fine particles or PM_{2.5}, pose the greatest risk to health.

PM has been proven to affect people with asthma both from long-term and short term exposure. There is a correlation between developing asthma and long term exposure PM, specifically PM_{2.5}. Short-term exposure to PM, even over one or two weeks, can cause exacerbation of asthma symptoms increasing episodes of wheezing, coughing, shortness of breath, tightness of chest, difficulty talking, feelings of anxiety, and so on.

Carbon monoxide

Carbon Monoxide (CO) is a colorless, odorless gas that can be harmful when inhaled in large amounts.

Sources of carbon monoxide

CO is released when something is burned. Cars, trucks and other vehicles and machinery are responsible for a large amount of outdoor CO pollution. A number of items in your home can release CO such as:

- unvented kerosene and gas space heaters
- leaking chimneys and furnaces
- gas stoves

Effects of carbon monoxide on asthma

The primary effect of CO exposure at outdoor concentrations includes hypoxia meaning a depletion of oxygen levels in the body resulting in confusion, headache and nausea.

CO does not appear to affect asthma directly as it does not cause respiratory irritation or cause asthma to develop. However, people with asthma can be at a higher risk of CO poisoning than someone without a lung illness. Inhalation of high CO levels decreases lung function as the body becomes deprived of oxygen. This places a person with asthma at higher risk of poisoning as their lung function may already be reduced. CO poisoning should be considered to be a danger to all people.

If you wish to learn more about clean air and asthma, please head to our website at www.asthma.ie where a variety of school resources are available.