AnthroSchools Homework Resource

**Curriculum and Exam Board**: A-level AQA

**Subject**: Geography

**Topic**: 3.2.4 Population and the environment (3.2.4.3 Environment, health and wellbeing: Air quality and health)

Resource Tasks

1. Read an article on impact of air pollution
2. Document your community’s contribution to air quality
3. Read an article about air pollution in London
4. Discuss strategies for tackling pollution in your local area

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| Learning outcomes |
| Students will be able to describe and explain links between environmental variables such as climate, topography, air quality, water quality and health. |
| Students will be able to describe and evaluate strategies adopted to tackle air pollution. |

Key Skills Developed in Resources

* Critical questioning of information and sources of information
* Online research
* Comprehension of academic articles
* Evaluating and presenting findings from research
* Collect, analyse and interpret information from secondary sources

Task 1: Read a geographical text on the impact of air pollution on Human Health and take notes

**Estimated time:** 15 minutes

Urban areas have far poorer air quality compared to rural areas. Particulate air pollution, measured with the unit ‘PM’ (particle matter), is a mixture of solid and liquid droplets within the air. Photochemical pollution is defined as air pollution that contains ozone and reactive chemical compounds formed when sunlight reacts with the nitrogen oxides and hydrocarbons in the air.

There are five types of pollutants:

**Particulate matter (PM)-** PM10 refers to the suspended particles that are only 10 micrometers (µM) in size, it is a unit of measurement. Primary Particulate Matter (PM2.5) refers to the suspended particles released directly in to the atmosphere that are only 2.5 micrometers (µM) e.g., dust, black/elemental carbons etc.

**Ammonia (NH3)**

**Volatile Organic Compounds (VOCs)**

**Carbon Monoxide (CO)**

**Sulphur oxides (SO2 & SO3)**

**Carbon dioxide (CO2)**

**Ozone (O3)**

**Nitrogen Dioxide (NO2)**

*You now need to read the following article about air pollution in the South Korean city Suwon. Pay attention to the different types of pollutants and their sources.*

The Impact of Air Pollution on Human Health in Suwon City (2013)

by Sang Jin Jeong”

Air pollution levels in many Asian cities, including Korea, remain well above WHO guideline values. In Korea, the annual mean PM10 should not exceed 50 μg/m3 (limit values set in 2005), and it is requested to reduce PM2.5 exposure in urban areas below 25 μg/m3 by 2015 (legally binding value). The Seoul metropolitan area is composed of many satellite cities, which have high population and vehicle densities.

Scientific evidence shows that ambient air quality is one of the major environmental issues related to human health. The aim of this paper was to provide quantitative data on the short-term impact of air pollution on the mortality and morbidity of people living in Suwon city. There are some studies that have conducted health impacts of the air pollution in Seoul, Korea. However, there are few studies of the health effects on air pollution conducted in satellite cities of the Seoul Metropolitan area. For this reason, we investigated the health effects of air pollution in Suwon city, one of the highly populated satellite cities of Seoul.

Daily concentrations of PM10, O3, NO2, and SO2 were used to assess human exposure and health effects, in terms of attributable proportion of the health outcome, annual number of excess cases of mortality for all causes, and cardiovascular and respiratory diseases. Among the four considered air pollutants, PM10 had the highest health impact on the 1,118,000 inhabitants of Suwon city, causing an excess of total mortality of 105 out of 4,254 in a year. Sulfur dioxide had the least health impact. Ozone and nitrogen dioxide each caused 42.7 and 81.3 excess cases of total mortality in a year.

The approach proposed by the WHO provided quantitative data on the impact of PM10, SO2, NO2 and O3 on the health of people living in a certain area. The results of this study are generally consistent with those of other health impact studies that used AirQ software. Therefore, the results of this study are comparable to other city studies. Even though the magnitude of the health impact estimated for the city of Suwon is lower than for the two municipalities in an industrialized area of Northern Italy, and the capital city of Iran, the impact of air pollution on human health for people living in Suwon city reveals a considerable amount in this study; there still remains the need for action to reduce the health burden of air pollution.

*Now write down five key points from the article*

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Task 2: Document how your community contributes to the air quality of your local area.

**Estimated time:** 60-90 minutes (20-30 minutes per day)

In this task, you will need to **document and evaluate** the practices in your community that contribute to the local air quality for three days. You may need to do some independent research.

A good starting point is the UK government’s website which tracks air pollution in different areas.

Click [here](https://uk-air.defra.gov.uk/) to discover the air pollution forecast for your area.

Alternatively, you can copy and paste this link into your browser:

<https://uk-air.defra.gov.uk/>

You have **two options** for how you can document your findings:

**1) Photo documentation:**

Collect a minimum of three photographs a day that showcase an activity or object in your local community that is contributing to air pollution. This can be buses, a factory/power plants, cars, cleaning liquids, cigarette smoke or anything else you observe.

Once you have captured your images, annotate each image with the following information:

* What activity/object is being shown?
* How frequently does this activity/object contribute to air pollution?
* What kind of pollutants does this activity/object release in to the environment? (You may need to do some independent research)

**NOTE:** Avoid including other people/their property in the images you capture. If you cannot exclude them, make sure that you get their permission BEFORE capturing the image and explain its purpose/

**2) Logbook:**

If you don’t want to take photographs, you can also create a logbook with a minimum of three entries a day, noting an activity or object in your local community that is contributing to air pollution (e.g., buses, a factory/power plants, cars, cleaning liquids, cigarette smoke etc.)

Accompany each entry with the following information:

* A description of the activity/object
* How frequently does this activity/object contribute to air pollution?
* What kind of pollutants does this activity/object release in to the environment? (You may need to do some independent research)

Task 3: Read a geographical text on the dangers of air pollution and discover existing strategies to manage air pollution in London

**Estimated time:** 10 minutes

Now that you have documented some sources of pollution in your local area, read the following article about the environmental and health impacts of air pollution.

This information has been sourced from:

Environmental and Health Impacts of Air Pollution: A review (2020)

by Ioannis Manisalidis, Elisavet Stavropoulou, Agathangelos Stavropoulos and Eugenia Bezirtzoglou”

The interactions between humans and their physical surroundings have been extensively studied, as multiple human activities influence the environment. Human activities have an adverse effect on the environment by polluting the water we drink, the air we breathe, and the soil in which plants grow. Although the industrial revolution was a great success in terms of technology, society, and the provision of multiple services, it also introduced the production of huge quantities of pollutants emitted into the air that are harmful to human health. Without any doubt, the global environmental pollution is considered an international public health issue

There are many pollutants that are major factors in disease in humans. Among them, Particulate Matter (PM), particles of variable but very small size, penetrate the respiratory system via inhalation, causing respiratory and cardiovascular diseases, reproductive and central nervous system dysfunctions, and cancer. Despite the fact that ozone in the stratosphere plays a protective role against ultraviolet irradiation, it is harmful when in high concentration at ground level, also affecting the respiratory and cardiovascular system. Furthermore, nitrogen oxide, sulfur dioxide and Volatile Organic Compounds (VOCs), are all considered air pollutants that are harmful to humans. Carbon monoxide can even provoke direct poisoning when breathed in at high levels.

Diseases occurring from the mentioned substances include principally respiratory problems such as Chronic Obstructive Pulmonary Disease (COPD), asthma, bronchiolitis, and also lung cancer, cardiovascular events, central nervous system dysfunctions, and cutaneous diseases. Last but not least, climate change resulting from environmental pollution affects the geographical distribution of many infectious diseases. The only way to tackle this problem is through public awareness coupled with a multidisciplinary approach by scientific experts; national and international organizations must address the emergence of this threat and propose sustainable solutions.

If you would like to find out what measures the government has introduced around the city to clean up London’s air, click [here](https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality). Alternatively, you can follow this link:

<https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality>

*Now write down five key points from the article*

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Task 4: Use your findings to discuss strategies for tackling poor air quality in your community

**Estimated time:** 45-60 minutes

Now that you have read about air pollution and gathered information about air pollution in your local area, you will need to find out what is happening in your local area to tackle it.

For this task, choose **ONE** of your documented days for this task to focus on.

To discover more about what measures are being put in place to tackle poor air quality in your community click [here](https://www.london.gov.uk/in-my-area), simply enter your postcode when prompted.

Alternatively, you can copy and paste this link into your browser:

<https://www.london.gov.uk/in-my-area>

You will need to conduct independent research into what is happening to tackle air pollution in your local area

Step 1: **Examine** and **evaluate** the existing strategies implemented in your community

1. Describe the implemented strategies to tackle the impact of each activity you have documented (e.g. Ultra Low emission zones to combat road traffic). Take note of where strategies have not been implemented.

1. Do you think the strategies will be successful at improving air quality in the long term? Make sure you answer this for each strategy you mention and **justify** your answer.

Step 2: **Determine** which additional strategies you would put in place and **explain why**

1. Where strategies have not been implemented to tackle your documented activity, or those you think are ineffective, **discuss** which strategies you would put in place.

1. If you are satisfied with all the implemented strategies you have discussed, please **suggest** one additional strategy of your own. **State your reasoning** and what aspect of air pollution the strategy would tackle.