

HPQ Report:

Which Disease Caused By Air Pollution - Coronary Heart Disease Or Lung Cancer Has The Worst Effect On People In Living In London?

Contents Page:

Introduction:	2
What this report is about and what I aim to do:	2
What I hope to develop as I write this report:	2
Why I chose this topic and some things I have learnt from my research:	2
What is air pollution is, how does it affect climate change, the environment and people:	2
How does air pollution affect London?	3
How are Lung Cancer and Coronary Heart Disease caused by air pollution?	4
Symptoms of Lung Cancer and Coronary Heart Disease.	5
Treatments for these diseases. Their disadvantages, advantages and side effects.	6
Conclusion of argument:	7
Summary of what I have done well and what I can improve on.	7
Evaluation of argument	7
What can the government do in order to help reduce air pollution and the amount of people who get coronary heart disease and lung cancer?	8
Sources used for my research and report:	8

Introduction:

What this report is about and what I aim to do:

This report considers how air pollution affects all people in London and what the consequences are of all of us inhaling these pollutants. I aim to evaluate how air pollution causes coronary heart disease and lung cancer and assess the actions one can take to prevent worsening air pollution. To do this, I have the intention to include how serious each disease is, mortality rates, treatments and their side effects and the symptoms of my chosen diseases. Succeeding this, I will then compare the two diseases. To conclude, I will determine which disease is worse for the people living in London.

What I hope to develop as I write this report:

Whilst writing this report, I hope to develop my essay writing and structure skills; be able to write in a formal manner and improve my evaluation capabilities. Furthermore, I would like to enhance my perseverance and determination skills and expand my vocabulary.

Why I chose this topic and some things I have learnt from my research:

Prior to this report, I had little knowledge on how the human race is endangered by air pollution. However, through my research I have managed to enhance my understanding on how air pollution negatively impacts those who live in London, which shocked me when I perceived the truth. One of the reasons as to why I chose this topic is that the medical side interests me to a great extent and I feel it to be necessary to know about how our own activities are hindering our health. Most importantly, I would like to know what air pollution is and what it does to our human bodies.

What is air pollution is, how does it affect climate change, the environment and people:

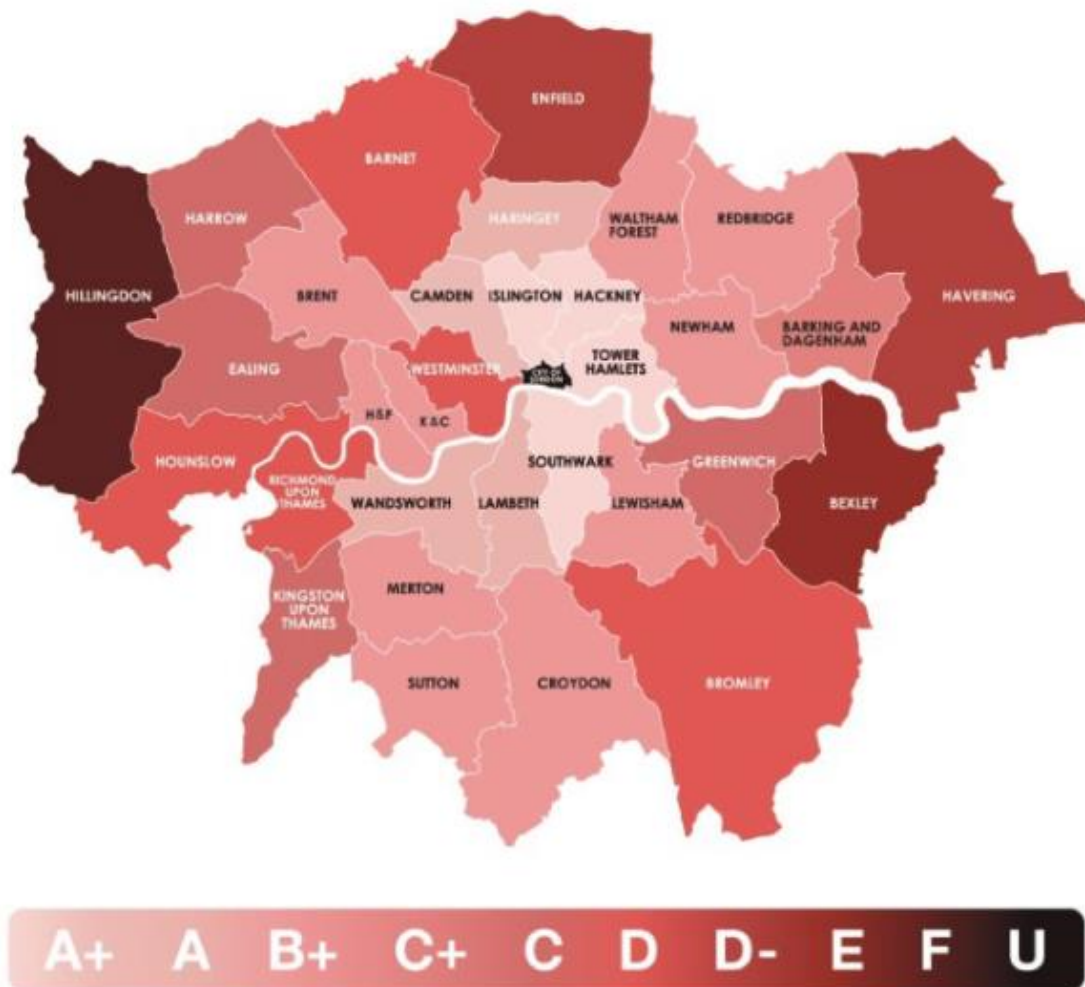
Air pollution is a mixture of many chemicals and pollutants which get trapped in the Earth's atmosphere.

On inhalation, these pollutants penetrate deep into our lungs, then the bloodstream and into the heart. As a result of this, many diseases are caused by air pollution. These diseases range from asthma to chronic obstructive pulmonary disease. In fact, long-term exposure to pollutants consequently leads to the possibility of every organ in the body to be negatively impacted. Similarly, short-term exposure to pollutants such as Nitrogen Dioxide can lead to irritation and coughing which could be severe.

Today, air pollution is classed as one of the greatest environmental dangers that the people in the UK face. This is evident as air pollution is responsible for almost 28,000 to 36,000 annual deaths in the UK ("Source 16"), 9,600 of these being premature deaths, just in London. Whilst air pollution is the reason for many illnesses and diseases, the two that I have decided to focus on are: coronary heart disease and lung cancer.

How does air pollution affect London?

In London, the places with the most air pollution can be shown in the map and table below:



Position	Borough	Score	Grade
1	City of London	-75	U
2	Hillingdon	-16	F
3	Bexley	-8	E
4	Havering	-5	D-
5	Enfield	-5	D-
6	Bromley	-3	D
7	Hounslow	-3	D
8	Richmond upon Thames	-3	D
9	Barnet	-3	D
10	City of Westminster	-2	D

Above shows us how Hillingdon and the City of London are the most polluted areas in London.

When we exclude the number of deaths from CoronaVirus, we can see that the average number of deaths from 2018-2022 in Hillingdon was 2050. ("source 27") This is a very high number of deaths which could indicate that air pollution has something to do with these deaths. In fact, most of these deaths were caused by cancers or circulatory diseases. Both lung cancer and coronary heart disease are under these two categories. This makes it evident to one that air pollution is the cause for many deaths. For example, 26.3% (total of 537 deaths) were due to circulatory disease and 26.7% of these deaths are from cancers which is an overall number of 545 deaths.

However, in some places such as the Tower of Hamlets which have a low concentration of air pollution there are still high cases of coronary heart disease. This could suggest that air pollution is not the overall cause for this disease. Other causes could be smoking, a bad diet, excessive alcohol intake and lack of regular exercise.

How are Lung Cancer and Coronary Heart Disease caused by air pollution?

Coronary heart disease is an illness that is caused by the blockage of arteries that supply blood to the heart. Coronary heart disease is one of the most common heart diseases that causes heart attacks in the UK today. According to the British Heart Foundation - a trusted charity that raises money and awareness for heart conditions- coronary heart disease was one of the biggest causes of death for men and women in 2019. ("Source 7")

As mentioned above, the inhalation of air pollution results in pollutants travelling into your bloodstream, then into the lungs and into the heart. The pollutant that travels into the bloodstream and causes coronary heart disease is called fine particulate matter ($PM_{2.5}$). This is a pollutant that the European Environment Agency discovered to have caused 307,000 premature deaths in the EU member states. Unfortunately, fine particulate matter is small enough to easily enter the bloodstream and therefore significantly damage the heart.

Analogously, lung cancer is also caused by $PM_{2.5}$ due to this pollutant's minuscule size. From this, one can infer the deadliness and danger of this specific pollutant which permeates our air.

Whilst both diseases share the same pollutant, there are a few differences between the causes. For example, the Francis and Crick Institute presents one with the information that $PM_{2.5}$ enters the bloodstream. This then encourages and helps the growth of cells which contain cancer-causing mutations in the lungs. Over time, this leads to the development of lung cancer.

In fact, the lead scientist of the Francis and Crick Institute - Professor Charles Swanton - said 'cells with cancer-causing mutations accumulate naturally as we age but they are normally inactive. We've demonstrated that air pollution wakes up these cells encouraging them to grow and potentially form tumours.' ("Source 3")

Contrastingly, the harmful contaminant that causes coronary heart disease causes blood vessels to narrow and blocks arteries. This could stop the flow of blood to the heart and brain.

This starts to form an argument of which disease is worse for the people living in London. This is due to the fact that tumours in the lungs are 'normally inactive' and how air pollution only 'potentially forms tumours'. From this knowledge, one can infer that coronary heart disease is more likely to happen than lung cancer. This is because the pollutants will almost certainly enter the bloodstream on inhalation and travel to the heart, damaging blood vessels in the process. This seems more likely to happen rather than tumours suddenly becoming active. One can then theorise that people who breathe in air pollution are at a higher risk of getting coronary heart disease rather than lung cancer.

An alternative opinion to this is that surely a theory can not answer the question, which many people will agree with. However, statistics prove that whilst 300,000 deaths in 2019 were from lung cancer ("Source 3") and coronary heart disease was the leading cause of death in that year. ("Source 7")

Nevertheless, these statistics are for deaths globally, not for people living just in London. They also take into account other causes, not just air pollution, once again backing up this alternative opinion that a theory can not always answer a question to a great extent.

Symptoms of Lung Cancer and Coronary Heart Disease.

Both lung cancer and coronary heart disease have a range of symptoms yet they are all very different. For coronary heart disease, the symptoms are: chest pains, shortness of breath, physically being sick, pain in various places and finally feeling faint or fainting.

Contrastingly, the lung cancer symptoms can be classed as more severe. This is due to the fact that they range from wheezing to coughing up blood. Most of the symptoms are: coughing for a long period of time; chest pains ; shortness of breath; feeling continuously tired and weight loss with an unknown cause.

This may lead some people to believe that lung cancer is worse for people living in London due to the gravity of the symptoms of this disease. The symptoms of coronary heart disease can be viewed as having a smaller severity than the lung cancer diseases. This is because, other than chest pains the symptoms are similar to those of COVID - 19 and the flu. These seem minor compared to losing weight for no apparent reason due to the understanding that weight loss can lead to physical and mental health being negatively influenced to a certain extent. Coughing up blood also seems much worse compared to a symptom such as being sick or fainting. Therefore some people may believe lung cancer is worse for people living in London due to its symptoms.

A contrasting opinion is that if the symptoms of coronary heart disease are similar to COVID-19 or the flu, the disease can easily be mistaken for one of these other illnesses. This could lead one to believe that they do not have coronary heart disease but some other minor

disease. This then means that they may leave the disease which could get worse without them knowing straight away, meaning people in London may be at a higher risk if this is the case.

Treatments for these diseases. Their disadvantages, advantages and side effects.

Lung cancer and Coronary Heart Disease have a variation of different treatments in order to help the diseases leave the human body. For example, treatments of coronary heart disease include: an angioplasty; surgery; specific drugs; lifestyle changes and in severe conditions, possibly even a heart transplant or an artificial heart transplant.

An angioplasty is a type of treatment which includes the use of stents and balloons. A stent is a type of tube that will hold the artery open in order for the blood to be able to go through. There are different types of stents. There is a closed stent and an expanded stent. Stents lower the risk of a heart attack and work for a long time. A disadvantage of a stent is that there could be impediments during the surgery and also the danger of having an infection due to the operation. Finally, there is also the fact that people could develop thrombosis after the surgery. This is a blood clot that forms around the stent.

A heart transplant is when a donor's heart is inputted into a patient's body. An artificial heart transplant is when a mechanical heart is placed into the sufferer's body, replacing the heart that was damaged due to coronary heart disease. An artificial heart is one which has a mechanical device inside which pumps blood around the body. This is because the patient's heart is now too weak to do this after experiencing the trauma of coronary heart disease. A heart transplant is used for the same reason. A disadvantage of a heart transplant is that it is extremely hard to find a donor that has a certain type of heart that will not be rejected by one's body. However, artificial hearts are less likely to be repudiated by the body's immune system. Another disadvantage is discomfort may be experienced in one's body when having an artificial heart. Also, blood does not flow very smoothly and naturally through an artificial heart which could lead to strokes and blood clots, something that these treatments are there to try and stop.

Treatments for lung cancer also have a wide variety of advantages and disadvantages. Some treatments of lung cancer include: chemotherapy; biological therapies; surgeries which include a lobectomy, wedge resection and pneumonectomy.

Chemotherapy is a cancer treatment which has many side effects. These include short term and long term effects. Several short term effects encompass anaemia, bleeding, changes in the skin and hair, weight loss, vomiting and infection. The short term and possibly long term can also have mental impacts, for example chemotherapy can cause depression and anxiety which can be hard to fix and sometimes even worse than physical effects. The long-term effects can be seen as much worse than the short term. This is because they include a range of impacts such as hearing loss which will change a person's life forever; kidney problems; nerve damage which could then result in paralysis and finally neuropathic pain. This is where you feel pain from places in the nervous system. The pain that one may experience from

neuropathic pain could be rather burning, tingling or stabbing pains. The disadvantages of this treatment outweighs the advantages to a great extent. In fact the treatment has only a few advantages which include it possibly healing the disease and the fact that it is painless.

This makes one believe that lung cancer is worse for people living in London. Whilst the treatments for coronary heart disease can be painful and horrible to experience, it is evident that the treatments for lung cancer are much more severe and have more severe side effects.

Conclusion of argument:

Summary of what I have done well and what I can improve on.

In this report, I have achieved expanding my knowledge about what air pollution does to people living in London. I have also written in a formal manner, shown my ability to write and structure a report and understand how to reach a deadline in time. Finally, I believe I have answered my question in great detail.

One thing that I would do differently is improve my time management skills due to the fact that this was one of my weaknesses. I mainly did my writing in the last two weeks, instead of adding bits throughout as I did my research which would have been more effective. I would also plan my subtitles and order of the report before I started writing because I did not do this adeptly. This was another one of my faults which I could have improved on.

As a summary of my report, air pollution is a harmful combination of chemicals and pollutants which cause a number of diseases. One of the worst pollutants is called fine particulate matter which continues to cause many deaths and diseases. Two diseases that it causes are lung cancer and coronary heart disease. Fine particulate matter causes these diseases in different ways even though each way negatively impacts the body.

Furthermore, I learnt how coronary heart disease is a major cause of death in the UK and more deaths are caused by coronary heart disease than lung cancer. However, coronary heart disease has flu-like symptoms whereas lung cancer has more serious symptoms. Lung cancer also has more severe treatments but treatments for coronary heart disease also have many difficulties.

Evaluation of argument

When I filled out my project proposal form and started the initial project, I always believed that coronary heart disease was worse for people living in London due to the fact that it affects a major organ. However, after my research I now believe that lung cancer is worse for people living in London.

I have come to this conclusion because whilst coronary heart disease does have a higher death rate for people in the UK, I think people with lung cancer suffer more. I can justify with many facts that I have discovered from my research. This is because lung cancer has worse

symptoms than coronary heart disease. For example weight loss and coughing for a long time. Lung cancer also includes treatments that have severe side effects which can change a person's life forever, both mentally and physically.

One may refute my opinion due to the fact that the heart is the most important organ in the body. Furthermore, in the UK 1 in 10 men die from this disease whilst 1 in 18 women die from it as well because it is the leading cause of death in the UK.

In conclusion, I believe that lung cancer - a disease that can be caused by air pollution - has the worst effect on people living in London whilst some people may argue that coronary heart disease is worse because it affects a major organ and also has symptoms.

What can the government do in order to help reduce air pollution and the amount of people who get coronary heart disease and lung cancer?

Some ideas that I have come up with that the government can do to reduce the amount of air pollution in London include: making factories stop using fossil fuels. Whilst it would be hard for factories to immediately stop using fossil fuels, the government could use their authority to order these factories to reduce the amount of fossil fuels they use and start using more environmentally friendly types of energy resources such as renewable energy. If the government did this, then we would be able to cut our carbon emissions significantly.

The government can also raise awareness and educate young people. By educating the younger generations about how to prevent getting these two diseases in any way that they can. It will also help the younger generations to be more inspired to stop air pollution which will help people if they can prevent more air pollution entering the atmosphere as it will help less people get coronary heart disease and lung cancer. Therefore, I believe that the government should be doing more to help prevent this disease.

Sources used for my research and report:

Reliability evaluation shown in recording my sources

Source 1

Written in 2022 by the World Health Organisation

[https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health#:~:text=Household%20air%20pollution%20exposure%20leads,\(COPD\)%20and%20lung%20cancer.](https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health#:~:text=Household%20air%20pollution%20exposure%20leads,(COPD)%20and%20lung%20cancer.)

Source 2

Written in 2022 by European Environmental Agency
<https://www.eea.europa.eu/themes/air/health-impacts-of-air-pollution#:~:text=Both%20short%2D%20and%20long%2Dterm,asthma%20and%20lower%20respiratory%20infections.>

Source 3

Written in 2022 by The Francis Crick Institute
https://www.crick.ac.uk/news/2022-09-10_scientists-reveal-how-air-pollution-can-cause-lung-cancer-in-people-who-have-never-smoked#:~:text=Led%20by%20Professor%20Charles%20Swanton,which%20carry%20cancer%2Dcausing%20mutations.

Source 4

Written in 2016 by the National Library of Medicine
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4740163/#:~:text=For%20instance%2C%20the%20level%20of,room%20visits%20and%20hospital%20admissions.>

Source 5

Written in 2018 by New York State Department of Health
https://www.health.ny.gov/environmental/indoors/air/pmq_a.htm#:~:text=Studies%20also%20suggest%20that%20long,lung%20cancer%20and%20heart%20disease.

Source 6

Last reviewed in 2022
Written by the British Heart Foundation.
<https://www.bhf.org.uk/informationsupport/risk-factors/air-pollution#:~:text=When%20you%20breathe%20in%20poor,making%20them%20narrower%20and%20harder.>

Source 7

Last reviewed in January 2023
Written by the British Heart Foundation
<https://www.bhf.org.uk/what-we-do/news-from-the-bhf/contact-the-press-office/facts-and-figures>

Source 8

Written in 2017 by The National Extension College
https://www.nec.ac.uk/wp-content/uploads/2019/03/A-Level_Biology_sample.pdf

Source 9

Written in 2009 by the Physicians for Social Responsibility
<https://psr.org/wp-content/uploads/2018/05/air-pollution-effects-cardiovascular.pdf>

Source 10

Last Reviewed in March 2022 and written by the NHS
<https://www.nhs.uk/conditions/coronary-heart-disease/>

Source 11

This was written by Aaron McDonald on the 21st of October 2019

<https://www.bhf.org.uk/what-we-do/news-from-the-bhf/news-archive/2019/october/air-pollution-spikes-cause-hundreds-more-cardiac-arrests-and-strokes-in-the-uk-research-shows>

Source 12

Written by H Ross Anderson, Elizabeth S Limb, J Martin Bland, Antonio Ponce de Leon, David P Strachan, Jonathan S Bower in 1991.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC475092/pdf/thorax00316-0078.pdf>

Source 13

Published on April 6th 2017

GCSE 9-1 Biology AQA Revision and exam practice - scholastic.

This is a book so it does not have a link

Source 14

It was written on the 17th of August 2021 by The Un Environmental programme

<https://www.unep.org/news-and-stories/story/seven-things-you-should-know-about-household-air-pollution#:~:text=Household%20combustion%20emits%20more%20than,climate%20change%20after%20carbon%20dioxide.>

Source 15

This was last updated in August 2021 and was written by Cancer Research.

<https://www.cancerresearchuk.org/about-cancer/causes-of-cancer/air-pollution-radon-gas-and-cancer/how-can-air-pollution-cause-cancer>

Source 16

This was written by London councils

<https://www.londoncouncils.gov.uk/node/33227#:~:text=Air%20pollution%20has%20a%20negative,year%20to%20the%20health%20service.&text=There%20are%20different%20effects%20depending%20on%20the%20length%20and%20intensity%20of%20exposure.>

Source 17

This was last updated on February 28th 2022 so it is quite recently written. It was written by the Office for Health Improvement and Disparities

<https://www.gov.uk/government/publications/air-pollution-applying-all-our-health/air-pollution-applying-all-our-health#:~:text=to%20day%20practice.-,Why%20we%20focus%20on%20the%20health%20effects%20of%20air%20pollution,and%2036%2C000%20deaths%20every%20year.>

Source 18

This was last reviewed in 2019 and written by the NHS

<https://www.nhs.uk/conditions/heart-transplant/waiting-list/#:~:text=Because%20of%20the%20lack%20of,and%20blood%20group%20becomes%200available.>

Source 19

This report does not say when it was written as part of it is updated frequently, however not the report I was reading. It was written by IQ air.

<https://www.iqair.com/uk/england/london> -

Source 20

It was written by Lynne Elridge, MD and medically reviewed by By Reza Samad,MD
It was last updated on October 15th 2022

<https://www.verywellhealth.com/lung-transplant-cancer-option-2249299#:~:text=While%20a%20new%20lung%20may,cause%20more%20disability%20or%20pain>

Source 21

Last Reviewed on November 1st in 2022 and written by the NHS
<https://www.nhs.uk/conditions/lung-cancer/treatment/>

Source 22

Medically Reviewed by Lauren Castiello and written by Carly Vandergriendt on April 14th 2021
<https://www.healthline.com/health/cancer/is-chemotherapy-painful#side-effects>

Source 23

This was written in 2021 by London's Poverty Profile
<https://www.trustforlondon.org.uk/data/population-age-groups/>

Source 24

Last reviewed in August 2022 and written by The British Heart Foundation
<https://www.bhf.org.uk/-/media/files/research/heart-statistics/bhf-cvd-statistics---uk-factsheet.pdf>

Source 25

Last Reviewed on the 25th October 2022 and written by Centres for Disease Control and Prevention
https://www.cdc.gov/cancer/lung/basic_info/symptoms.htm

Source 26

Written by Josh Jackman and last updated on November 15th 2022
<https://www.theecoexperts.co.uk/blog/most-polluted-london-boroughs#:~:text=The%20City%20of%20London%20and,Polluted%20Boroughs%20%2D%20The%20Eco%20Experts>

Source 27

Written in October 2022 by Hillingdon London, it is the Hillingdon Pharmaceutical Needs Assessment 2022.

Hillingdon Pharmaceutical Needs Assessment 2022

<https://www.hillingdon.gov.uk › media › pdf › App...>