**Air Pollution in London**

**History of Air Pollution in London**

Air pollution is the contamination of air due to the presence of substances in the atmosphere that are harmful to the health of humans and other living things or cause damage to the climate. Air pollution is a pressing issue that affects the health and well-being of individuals worldwide. Among the many cities grappling with this problem, London is among the countries that have reported high cases of air pollution. London has suffered from illegal levels of air pollution since 2010.The volume of road transport omissions in London makes it one of the most polluted places in the UK. London air pollution levels are frequently found to break both UK legal and World Health Organization limits for nitrogen dioxide and limits for PM2.5. The city experiences high levels of pollution due to various factors, including traffic congestion, industrial emissions and domestic heating. The primary pollutants of concern in London are nitrogen dioxide, which are generated in London from urban transport and heating of homes and particulate matter (PM2.5 and PM10).

The dominant contribution to London’s historic air pollution was coal burning. Throughout the 18th and 19th centuries, the coal industry in the Great Britain expanded rapidly, driven not only by economic growth, but also by an expanding labor force and improved distribution networks such as railways and waterways. Increasing demand and falling coal prices lead to rapid increase in national coal consumption, rising from 20 million tonnes in 1820 to 160 million tonnes in 1900.

The decline in air pollution can be attributed to a complex mix of factors, including economic restructuring away from heavy industry, switching energy sources and increased environmental regulation. There are thought to be three primary developments which led to this decline. Firstly, by the late 1800s, improved connectivity and commuter links allowed London’s population to spread further into surrounding suburban areas, inevitably leading to an overall reduction in population density. Even if such changes did not lead to reduction in total emissions of pollutants, the dispersal and spreading of these population centers lessened the exposure in prime pollution hotspots.

Secondly, the United Kingdom introduced its Public Health Act for London in 1891.Under this new regulation, businesses in London which produced excessive smoke ran the risk of financial penalties if they did not adopt cleaner and more efficient energy practices, such as switching to less polluting coal sources and ensuring fires are adequately stoked. This put increasing [pressure on businesses to shift towards better and cleaner industry practice.

The third source of this decline was a notable shift in heating and cooking sources from coal towards gas. Uptake of gas cookers rose sharply in Great Britain during the 1800 and1900s. The Gas Light and Coke Company which was leading London supplier at the time noted that in 1892 only 2 percent of residents had a gas cooker. By 1911, this had increased to 69 percent. In terms of air pollution impacts, gas has much cleaner fuel relative to coal, meaning that such a large shift in heating and cooking sources may have contributed to the declining trend.

Throughout this period, London experienced frequent and severe fogs. Such fogs were often so dense that they halted railway journeys, interrupted general economic activities and also contributed to London becoming a breeding ground for crime. London averaged 80 dense fog days per year, with some areas recording up to 180 in 1885.Not only did air pollution incur a severe economic price, it also resulted in significant health costs. Air pollution deaths throughout this period rose steeply; in London, mortality from bronchitis increased 25 deaths per 100,000 inhabitants in1840 to 300 deaths per 100,000 in 1890. At its peak, 1-in -350 people died from bronchitis.

Four years after the Great London Smog, parliament passed the Clean Air Act, which made a substantial difference to urban air quality. Even so. Air pollution remains a serious environmental issue in the UK over half a century later. In April 2014, for example, there were warnings oof very high air pollution for many areas of England. High levels of pollution in London and other parts of south east of England were bad enough to cause sore eyes and sore throats and experts warned those with heart conditions and asthma to stay inside. Attempts to tackle air pollution through legislation have also continued. On 29 April 2015, the UK Supreme Court ruled that the government must take the immediate action to cut air pollution.

**Air Pollution in London Today**

London has become a central focus for understanding air pollution and its effects, efforts to combat the problem and the subsequent failure to do so. Air pollutants in the capital cause a range of health problems that are estimated to have shortened lives. London has seen its position in livability ranking drop behind major global cities, such as Berlin and Paris, which have already phased out many polluting vehicles.

The largest contributor to air pollution in London is road transport. Diesel vehicles are the greatest single source of some air pollutants, including around 40 percent of nitrogen dioxide emitted in capital. The combustion of diesel fuel releases harmful gases and particles into the air, contributing to poor air quality. The city has implemented several measures to tackle this issue, such as Low Emission Zone (ULEZ) and the congestion charge, which aims to reduce vehicle omissions and encourage the use of clear transport options. The Ultra Low Emission Zone has made a significant difference. Since its launch in 2019 by London mayor Sadiq Khan, the ULEZ has helped cut the number of older polluting vehicles on the road and helped to reduce harmful nitrogen oxides by 46% in central London and 21% in inner London. London’s road transport also negatively impacts the capitals economy through rising congestion. Assuming that no policy is put in place to manage increased demand, it is estimated that total passenger vehicle miles travelled will increase by 45 percent.

As much as diesel is a major pollutant in London, petrol is also a contributor to air pollution. Petrol cars are the cause of two thirds of the amount of nitrogen dioxide emissions When it comes to particulate matter, petrol cars are even worse than diesel, causing 16% and 13% of London’s emissions respectively. Petrol is less of an issue when it comes to public vehicles, which are largely diesel. Some of the policy proposals would affect petrol, such as fines on the dirtiest petrol cars in the ULEZ and a boost for cycle and electric vehicle infrastructure.

Industrial emissions also contribute to air pollution in London. This includes a wide range of activities like sewage treatment and construction, as well as some heat and power generation. Although the city has a decline in heavy industry over the years, there are still areas with high concentrations of pollutants due to industrial activities. Efforts are being made to regulate and control these emissions through stricter regulations and enforcement. According to research carried out, industrial and commercial sites are major sources of local particulate matter.

Domestic heating, particularly the burning of solid fuels such as wood and coal, also contributes to air pollution in London. The mayor of London has implemented initiatives to promote cleaner heating options and discourage the use of polluting fuels.

According to a study that was published in Scientific Reports, air pollution on the London Underground is frequently composed of ultrafine magnetic iron oxide particles that are smaller than 500nm. The London underground is a 11-line, 270-station train system that runs throughout Greater London and approximately 45% of the network is underground. According to earlier studies, magnetic iron bearing air pollution makes up to 50% of the particles in the London Underground.

Smoking also continues to be a contentious issue. For years, smoking continued to be promoted as fashionable and became extremely popular after the introduction of mass-produced cigarettes in the late 19th century. Smoking is also a cause of air pollution.

**Effects of Air Pollution in London**

Air pollution has a negative effect on a number of different aspects of human health. In London, 9,400 premature deaths are attributed to poor air quality and cost of between 1.4 and 3.7 billion a year to the health service. An influential study conducted by Kings College London in 2015 estimated that London particulate matter pollution contributes towards 3,500 premature deaths in London annually, while nitrogen dioxide contributes towards 5,900 premature deaths making a total health burden of 9,400 premature deaths per year. This presents a substantial proportion of the UKs estimated national health burden of 40,000 premature deaths annually, estimated by the Royal College of the Physicians in 2016. The economic cost of this loss of London life is estimated to be up to 3.7 billion.

There are different effects depending on the length and intensity of exposure. For example, short term exposure to nitrogen dioxide can irritate the airways and cause severe coughing and exacerbate existing respiratory illness. Long term effects can contribute to one developing a number of illnesses. It has also been shown to lead to stunt growth of children’s lungs. This is particularly worrying, as around one third of London’s schools have been found to be close to busy roads that suffer illegal levels of nitrogen dioxide. The effects of air pollution on human health are deeply concerning. Exposure to high levels of pollutants in London has been linked to respiratory problems, cardiovascular diseases and even premature deaths. Vulnerable groups, including children and elderly and those with pre-existing health conditions, face an increased risk of negative health impacts. The alarming rates of asthma cases and reduced lung function among London’s inhabitants further highlight the need to address this issue.

Signs from the short-term exposure typically resolve quickly, but long-term exposure is linked to serious illness and disease in multiple body systems. Children, elderly and people with ongoing illness are more vulnerable to air pollution than other groups. Urban population are also at greater risk due to concentration of population within cities. Short-term and long-term exposure to air pollution can cause, coughing, difficulty in breathing, irritation to eyes, nose and throat, headache, dizziness, fatigue, respiratory disease especially asthma and emphysema, cardiovascular damage, harm to liver spleen and blood, nervous system damage, cancer, birth defects and death.

Air pollution also harms foetal development during pregnancy and could could cause low birth weight, pre-term births and miscarriages, as well as low sperm count and motility. Further, the impacts of air pollution exposure continue well into old age, increasing the risk of stroke, dementia, cancer, multiple longer-term illness including respiratory and cardiovascular disease and early death. These air pollution affects the quality of life and have large cost of society through additional health and social care costs, as well as our ability to learn, work and contribute to the society. In London, lower socioeconomic groups are highly exposed to higher levels of indoor air pollution in their homes. Some of the factors contributing to this are, housing location and ambient outdoor levels of pollution. Bringing together the findings from a range of key studies, the review highlights the serious and life limiting risks of air pollution and how it affects multiple aspects of physical and mental health over the course of pregnancy and birth, child development, through to adulthood.

Wildlife can also experience the same negative effects of air pollution that humans do. Damage to the respiratory systems is the most common effects on animals, but neurological problems and skin irritations are also common. Plants and crops grow less when they are exposed to long-term air pollution. Ozone pollution harm plants by damaging structures called stomata, which are tiny pores on the underside of leaves that allows the plants to breath. Although some types of plants can protect themselves by temporarily closing their stomata or producing antioxidants, but others are particularly sensitive to damage. There are many other ways that air pollution affects living things, such as damaging habitat, water and food sources that plants and animals need to survive. It also causes stone foundations to become unstable and it is destroying ancient buildings and statues carved from marble and limestone.

All levels of particulate matter from all types of burning reduces the amount of sunlight that reaches the surface and even changes the appearance of the sky. When less sunlight is available for photosynthesis, forests grow at a slower rate and crops become less productive. Hazy skies not only reduce visibility, but also impact the weather and even the climate. Greenhouse gas pollution is also a cause of climate change. As a result, ecosystems are changing faster than plants and animals can adapt and many species are going extinct. Marine ecosystems are vulnerable to ocean acidification caused when carbon dioxide emitted into the atmosphere is dissolved into the sea water. Melting iron sheets, warming oceans and extreme weather conditions are examples of how climate changes caused by greenhouse gas pollution threaten the ecosystem.

Regarding the severity of the situation of air pollution in London, both the government and the public have taken proactive steps to combat air pollution in London. The government has implemented measures such as introduction of low emission zones, encouraging the use of public transportation and promoting the adoption of electric vehicles. Additionally, awareness of campaigns and educational programs have been initiated to inform the public about the detrimental effects of air pollution and encourage behavioral changes. Alongside governmental efforts, individuals can contribute to fighting air pollution by adopting sustainable practices. Using public transport, carpooling or cycling instead of relying on private vehicles can significantly reduce emissions. Furthermore, supporting renewable sources of energy and engaging in waste reduction practices can contribute to mitigating the overall environmental impact.

Despite all the above efforts, air pollution remains a significant challenge for London, with more that still needs to be done. London should continue to invest in more cleaner technologies and infrastructure while also focusing on expanding green spaces and promoting sustainable urban planning. Collaborative efforts with neighboring regions and countries are also crucial, as air pollution does not adhere to geographical boundary. In conclusion the air pollution crisis in London demands immediate attention and effective solutions. With traffic emissions being the primary contributor to the problem, the health implications for London’s residents are severe. However, through the combined efforts of the government and its citizens, progressive can be made. Encouraging sustainable practices, implementing stricter emissions regulations and investing in cleaner technologies are vital steps towards ensuring cleaner air for future generations. By recognizing the urgency of the situation, and taking decisive action, London can pave way for other cities worldwide in the fight against air pollution.