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The Effect of Air Pollution on the Human Health

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Abstract

As more people move into metropolitan areas, pollution levels rise and become a serious problem in many of the world's most populous cities. Air pollution events may cause mild to severe pain, interruption of normal activities, broad public concern, disease, and even death in the worst cases. The World Health Organization (WHO) has published an unparalleled collection of air quality data, and it shows that pollution levels in many places have reached critical levels, posing risks to people's health. Epidemiological research shows that people's health is being negatively impacted by air pollution in New Delhi, particularly in the areas of MukandPur (N), Sher Pur (NE), Kondali (E) and Bihari Pur (NE), where pollution levels are highest due to traffic & urbanisation. There is a substantial correlation between elevated levels of air pollution and the prevalence of eye disorders and acute respiratory ailments. Although there is a link between air pollution and acute illnesses, that link is less for chronic diseases in New Delhi. Therefore, there is a pressing need to improve traffic flow in New Delhi's business districts. Consequently, there is a strong sense of urgency in implementing control and preventative measures to better air quality in the general population.

Keywords: air pollution; pollutants; health effects; diseases, Human Health.

1. INTRODUCTION

Although natural processes (eruptions of volcanoes, forest fires, and so on) may contribute to air pollution, it is human activities that are the primary culprit. Accidental releases of hazardous chemicals to the environment are one thing, but many air pollutants are emitted by factories and other activities, and they may have negative impacts on people and the environment. Any chemical that has the potential to damage people, animals, plants, or objects is considered to be an air pollution. When it comes to human beings, an air pollutant may be the direct or indirect cause of an increase in mortality or severe disease, or it may offer an ongoing or prospective threat to human health. Scientific evidence from clinical, epidemiological, and/or animal research showing a link between exposure and health consequences is used to determine whether or not a chemical constitutes a danger to human health. Risk, as applied to human health, refers to the likelihood that undesirable health consequences may be experienced.

Protection against Because of the negative impacts that pollution has on human health and the natural world, it is a huge worldwide problem. Air pollution, water pollution, soil contamination, etc., are only a few examples of the many types of environmental pollution that may occur. Toxic substances in the air, such as dust, mist, smoke, and dyes, are collectively referred to as "air pollution," which may have negative effects on living things. Many pollutants in the air may be harmful to people, plants, and animals and can also decrease vision (lifetime). These originate from both organic processes and anthropogenic actions. Pollutants are substances that are either not normally present in the air or are found in unusual places and higher amounts than usual. How people respond to air pollution varies according to a number of factors, including the kind of the pollutant, the duration of exposure, the person's current health, and their genetic make-up. People are more likely to be affected by air pollution on hot, smoggy days. Motorized transportation is predicted to continue rising over the next several years, which may have a negative impact on air quality. Similarly, research has linked poor air quality to significant negative consequences on public health.

The toxicological effects of air pollution on people and the planet have made it a pressing issue in recent decades. Pollutants comes from a wide variety of sources, from the single cigarette out of a pack, to natural causes like volcanic activity, to the massive amounts of pollution released by car and truck engines, and other industrial processes. Accordingly, millions of lives are lost year throughout the world due to air pollution's long-term impact on the development of illnesses including respiratory infections and inflammations, cardiovascular dysfunctions, and cancer. Air pollution has been linked to male infertility, according to new research.

2. LITREATURE REVIEW

Kaur, Rajveer & Pandey (2021) In the previous several decades, global citizens have expressed grave worry about climate change and air pollution. This analysis was conducted out of worry for the people living in Indian cities where climate change and air pollution pose serious threats to public health. Extreme weather (such as heavy downpours, very high temperatures, floods, and droughts) in rapidly growing cities is a threat to human health. Rising temperatures and more intense heat waves as a consequence of climate change have made city dwellers uncomfortable and contributed to a variety of health problems. Air pollution levels in most Indian megacities are discussed as well, with an emphasis on the alarming rise to levels much beyond government guidelines. It has been determined what proportion of aerosols and PM concentrations are harmful to human health, and the negative effects of breathing in these particles have been addressed. In addition, the effects of breathing polluted air during the COVID-2019 lockdown in Indian cities have been examined. Air pollutants (such as aerosols) impact Earth's temperature both directly (by absorption and scattering) and indirectly (by adding greenhouse gases to the atmosphere) and the connection between climate change, air pollution, and urbanizations has been established (by altering the cloud properties and radiation transfer processes). Therefore, policymakers may use the information gleaned from this analysis to better understand which areas are most at risk from air pollution and where action needs to be taken to reduce emissions. Human health may be protected against air pollution and climate change in Indian cities by regularly monitoring the two.

Rampone, S., (2021) There are several cities where massive amounts of pollution are spewed into the air every day. Physicochemical circumstances may cause these emissions to react with one another, leading to the production of new pollutants like ozone. There is a risk to human health from the buildup of contaminants that results. Among the most significant environmental risks today is urban pollution. Objectives: Using Artificial Neural Networks and Genetic Programming, this study seeks to connect tumor data reported by the Local Health Authority of Benevento,
Italy, with that of pollutants discovered at air monitoring stations. Multiple pollutants, including benzene, NO2, CO,
PM10, PM2.5, O3, and PM2.5, may be tracked by these stations (C6H6). In this study, we treat pollution data from 2012-2014 with the assumption that it may have medium-term impacts on human health; however, tumor data from local hospitals are from 2016-2018. There is a strong association between the number of lung cancer cases and the levels of pollution and ozone in the air, according to the findings. Extensive research has shown that PM10, NO2, and O3 play the largest roles in negatively impacting human health, and the explicit genetic programming knowledge representation enables for this to be quantified.

Dandotiya, Banwari. (2019). As a result of urbanization and increased industrialization, air pollution has emerged as a critical problem in cities around the globe, especially in the past few decades. Since city dwellers spend more time inside, unrestrained air pollution is a greater threat to them than to those living in more rural areas. Increased mortality and hospitalizations from respiratory and cardiovascular disorders have been linked to exposure to air pollution. This section of the book discussed the causes and consequences of air pollution in India's major cities. Increased gaseous and particle air pollution is a problem in most Indian cities.

Cincinelli (2019) Air pollution is one of the major problems of our day because of the havoc it causes to the environment and the health of the general public and individuals via rising rates of illness and death. Many types of pollution contribute significantly to human illness. Particulate Matter (PM), which is made up of particles with a varied but extremely tiny diameter, is inhaled and may lead to lung and heart illness, problems in reproduction and the central nervous system, and even cancer. Though ozone in the stratosphere helps block dangerous UV rays, breathing in too much of it may be bad for your health, and the same goes for your heart and lungs. Furthermore, air pollutants that are detrimental to people include nitrogen oxide, sulfur dioxide, volatile organic compounds (VOCs), dioxins, and polycyclic aromatic hydrocarbons (PAHs). Excessive inhalation of carbon monoxide may cause immediate poisoning. Heavy metals, when absorbed by the human body, may cause either acute poisoning or longterm toxicity. Chronic obstructive pulmonary disease (COPD), asthma, bronchiolitis, lung cancer, cardiovascular incidents, central nervous system dysfunctions, and skin disorders are only some of the ailments caused by the aforementioned chemicals. Finally, natural catastrophes and climate change brought on by human-caused pollution have a role in shifting the geographic range of many infectious illnesses. National and international institutions must confront the rise of this danger and suggest lasting solutions; public awareness combined with a multidisciplinary approach by scientific professionals is the only way to solve this issue.

3. METHODOLOGY

Two business and two residential locations served as monitoring sites for air contaminants in this investigation. Each day of sampling consisted of a full twenty-four hours. Every sampling location had two samples taken every month, once in the first half and once in the second. Completed in under three months in cold weather.

501 people were surveyed in the designated regions. Shopkeepers, peddlers, auto rickshaw drivers, and others in the community were polled to collect data on the prevalence of various diseases and conditions affecting the eyes, skin, and heart, as well as the incidence of respiratory issues such as cough, dry cough, cold, runny nose, nose block, bronchitis, wheezing, pneumonia, and asthma. Age, sex, employment, income, where respondents live, what they eat, etc. were also gathered for analysis. Table 1 provides the total number of responses across all four locations.

Table 1: No. of respondents in different study sites

Sl. No.	Study site	No. of respondents
1	Mukand Pur(N)	138
2	Sher Pur(NE)	125
3	Kondali(E)	118
4	Bihari Pur(NE)	120

4. DATA ANALYSIS

Information about the state of the air may be found in Table

PM10, PM100, PM2.5, NOX, SO2 and CO average concentrations are shown. Mukand Pur (N), Sher Pur (NE) and Kondali (E) three locations, had RPM concentrations that were over the CPCB permitted levels, while neighborhoods Bihari Pur (NE) had shockingly high PM10 concentrations.

The prevalence of ocular disorders, respiratory illnesses both acute and chronic, and skin conditions were also gathered from the respondents. A large proportion of reports included information on several illnesses affecting a single respondent. Table 3 provides a breakdown, per study site, of the prevalence of various illnesses as reported by respondents questioned for this research.

Table 3 shows a comparison between commercial locations (high concentrations of air pollutants) and residential areas (low concentrations of air pollutants) regarding the average percentage of disease occurrence (APDO). It demonstrates that the APDO is much greater in commercial areas, with higher concentrations of air pollutants, than in residential areas, with the exception of the chronic ones, bronchitis and asthma. Since automobile traffic is the primary contributor to air pollution in business districts, relieving congestion there is an obvious priority.

Similar results were revealed in a 1996 investigation of Mumbai's air pollution and its impact on residents' health conducted by the Indian Institute of Technology–Bombay and the Central Pollution Control Board.

10 Respondents living in high-pollution regions (18.4%) had the highest prevalence of chronic cough, followed by those in medium-pollution zones (10.2%) and those in low-pollution zones (6.9%).

Table 2: Ambient air quality in different areas of New Delhi in the year -2021(mean values)

S.No.	Stations	Pollutants in µg/m^3					
		PM10	PM100	PM2.5	SO_2	NO2	CO
1.	Mukand Pur(N)	119.33	168.67	66.08	14.62	31.32	364.25
2.	Sher Pur(NE)	120.75	160.75	57.25	15.21	33.15	370.67
3.	Kondali(E)	127.25	148.08	49.08	15.11	38.14	410.50
4.	Bihari Pur(NE)	317.58	470.25	131.17	20.51	48.85	784.33

Table 3: illness trends in commercial and residential locations.

Diseases	APDO* in commercial areas with high level of air pollution (%)	APDO* in residential areas with low level of air pollution (%)
Eye problems	43	14
Cough	45	30
Sneezing	26	14
Nose block	20	12
Wheezing	19	12
Dry cough	13	3
Running nose	13	7
Bronchitis	8	5
Asthma	3	2
Skin diseases	7	1

*APDO – Average Percentage Disease Occurrence

Table 4 displays the correlation between air pollution levels and illness rates as measured by the magnitude of the correlation coefficient (R). According to the value of the coefficient of correlation (R), Table 5 displays the level of relationship between the various air contaminants and the prevalence of illness.

Tables4 and 5 indicate definitively that all the air contaminants tested associated substantially with ocular and acute respiratory diseases, with the exception of runny nose. However, there is a weaker link between motor vehicle air pollution and chronic illnesses such bronchitis, asthma, and skin problems. This seems sense, given that other variables almost certainly contribute to the development of chronic illnesses over time.

Table 4: Air pollution and disease: the correlation coefficient (R).

Diseases	Ambient air pollutants			
	RPM	SPM	NO_x	SO_2
Eye problems	0.94	0.98	0.99	0.97
Cough	0.85	0.90	0.91	0.86
Dry cough	0.90	0.96	0.96	0.94

Sneezing	0.87	0.94	0.94	0.92
Nose block	0.98	0.99	0.99	0.99
Running nose	0.58	0.70	0.71	0.67
Wheezing	0.99	0.98	0.98	0.97
Bronchitis	0.71	0.77	0.77	0.71
Asthma	0.77	0.66	0.65	0.63
Skin disease	0.54	0.66	0.67	0.71

Table 5: Classification of air pollution and health effects according to the R-value.

Sl. No.	Degree of association (R)	Diseases associated with RPM	Diseases associated with TSPM	Diseases associated with NO_x	Diseases associated with SO_2
1	Excellent (R > 0.9)	Eye problem Nose block Wheezing	Eye problem Dry cough Sneezing Nose block Wheezing	Eye problem Cough Dry cough Sneezing Nose block Wheezing	Eye problem Dry cough Sneezing Nose block Wheezing
2	Very Good (0.8 < R ≤0.9)	Cough Dry Cough Sneezing	Cough	-	Cough
3	Good (0.7 < R ≤ 0.8)	Bronchitis Asthma	Bronchitis Runny Nose	Bronchitis Runny Nose	Bronchitis Skin disease
4	Fair (R < 0.7)	Runny Nose Skin disease	Asthma Skin disease	Asthma Skin disease	Runny Nose Asthma

5. CONCLUSIONS

Epidemiological research shows that the residents of New Delhi, India, are being adversely affected by air pollution from vehicles, particularly in the area of Bihari Pur. There is a substantial relationship between the presence of air pollution and the prevalence of eye disorders and acute respiratory ailments. Acute illnesses are more strongly linked to air pollution in New Delhi than chronic ones. As a result, there is a pressing need to improve traffic flow in New Delhi's business pockets.

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