

Study and Analysis of Air Pollution Quality in Lucknow City

Saman Nusrat

Research Scholar, Shekhar College of Education, University of Lucknow, UP, India

Abstract

The assessment was made at nine locations (four of which are residential, four commercial and one industrial area) to check the ambient air quality of Lucknow city in April and May 2022. It was done in the major pollutants measured were respirable particulate matter. Micro-particulate matter (Q25), Sulphur dioxide, Nitrogen dioxide, and sound levels found 118.2 to 203.9 micrograms per month in 24 hours. Found at the level of cubic meters and its average level was 157.9 micrograms per cubic meter. The Q25 was found to be at the level of 65.0 to 130.1 micrograms per cubic meter in 24 hours and the average level was 92.8 micrograms per cubic metre. Average concentration of Ch1V and Ch25 National Ambient Air Quality Standard (100 micrograms per cubic meter for Q10 and p2s for was found to be greater than 60 micrograms per cubic meter). The concentration of small amounts of metals (Si and Chap) attached to particulate matter in the city is 5.45-15.16 nanograms per cubic meter respectively, between, on average, 10.60 nanograms per cubic meter for P and 0.86-3.54 nanograms per cubic meter, for an average splash of 2.22 nanograms per cubic meter, found. Concentration of Sulphur dioxide from 9.6 to 22.2 micrograms per cubic meter and nitrogen dioxide concentrations of 28.4 to 41.6 micrograms per cubic metre. Found in the middle. The average concentrations of Sulphur dioxide and nitrogen dioxide were found to be 14.1 and 35.7 micrograms per cubic metre respectively, which is the National Ambient Air Quality Standard (60 micrograms per cubic meter) were less than. The day's sound level was found to be between 63.8 and 82.8 decibels and nighttime between 60.8 and 75.9 decibels, which was higher than the standards. The present study shows that the levels of respirable particulate matter, gases and sound are gradually increasing as the air quality of pre-monsoon 2022. The survey was conducted after full WTPC unlock. Increasing population, food, transportation, livelihoods and increased living spaces are the major factors in increasing pollution in the city. Vehicles plying on the road, baking fire in hotels, crop combustion in the field, generators and emissions of industries are also in urban pollution. are contributors. Overall trends show that the level of air pollution in Lucknow city has increased. Due to the increase in the number of vehicles by 5.4% by 2022 in Lucknow city, there has also been an increase in fuel consumption proportionately and as a result, the level of air pollution in the city is gradually increasing.

Keyword: Air Quality, National Ambient Air Quality Standard Lucknow Air Pollution, PMM

Introduction

The reason for the origin of life on earth is the circle of gases around it which is called atmosphere. "The envelope of integral gases that surrounds the Earth is called the atmosphere; it extends to a height of hundreds of miles."

The word 'atmosphere' is derived from the Greek word atoms, which means vapor, but still it cannot be called a vaporosphere, because not all gases found in the atmosphere vaporize. Therefore, about the atmosphere, it is said that a sheet of gases that surrounds the earth is surrounded by the force of gravity, which is called atmosphere.

Our atmosphere is a mixture of many types of gases. Nitrogen (78.09%), Oxygen (20.99%), Argon (0.93%), Carbon dioxide (0.032%), Neon (18.0 ppm), Helium (5.2 ppm), Carbon monoxide (0.25 ppm), Ozone (002 ppm) in the atmosphere. Gases like Sulphur dioxide (0.001 ppm), nitrogen dioxide (0.001 ppm) etc. are found. The amount of oxygen in the atmosphere remains constant due to the oxygen released by the plants from the process of photosynthesis. But in the last 100 years, about 24 lakh tonnes of oxygen has been exhausted from the atmosphere and replaced by 36 lakh tonnes of carbon dioxide.

"Air pollution is that condition which adversely affects the health of man and his wealth. It affects different people in different ways. Its effect on the farmer is in the form of loss of his crop, on the house owner in the form of his clothes and on the general public in the form of deterioration of his health.

According to section 2 of the Air Pollution Control and Prevention Act, 1981, air pollution means-"the presence in the atmosphere of any air pollutant, whether solid, liquid or gaseous, and whose concentration in the atmosphere is such that it is not harmful to human beings or any other Air pollution that is harmful to living beings and to plants or to any property or to the environment.

When various gases and dust particles mix in the atmosphere due to human activities, they become

pollutants, and if their concentration becomes high then its consequences are disastrous. Human disturbances in the atmosphere prove to be more harmful than the pollutants present in the atmosphere. Some impurities are also found in the air due to natural activities. Thus, it is extremely difficult to obtain the purest form of air. Harmful gases such as Sulphur dioxide, hydrogen sulphide, carbon monoxide, methane, etc., continue to get into the atmosphere through natural processes like volcanoes, decomposition of vegetation, wild fires and storms. Humans do not have the ability to stop the pollution caused by these natural processes. The effects of these natural pollutants do not produce serious air pollution. Their effect is local and short-lived.

Humans have a greater impact in causing serious problems of air pollution. By this combustion of organic fuel, use of pesticides, fertilizers, weed killers for production and protection of crops, development of nuclear energy for peaceful and war work, trains, automatic vehicles, aircraft, ships, rockets, missiles, oil refineries, Conversion of raw materials into finished goods, cleaning of land, construction of roads, demolition and construction of buildings, manufacturing of chemical products, etc. Toxic gases are emitted into the atmosphere by all those manufacturing units in some form or the other. Complex reactions take place with the emitted gases and the gases present in the atmosphere. The processes resulting from solar radiation complicate the compounding of these gases. For example, peroxy-acetyl nitrate (PAN) is produced when the gas emitted from petrol-powered vehicles reacts with solar radiation, which is considered a major lethal pollutant. Air pollution is easily spread far beyond its source. This city crosses the boundaries of provinces, countries and continents and spreads throughout the globe. Deposits of DDT have been found in the liver and fat of Penguin birds found in the uninhabited icy continent like Antarctica, which proves this.

We all know that drinking dirty food makes us sick. Therefore, we avoid impure and contaminated food, water etc. Similarly, pure air is also necessary for life. We cannot stop breathing knowing that the air is polluted and breathing there is injurious to health. Air pollution is the study of pollutants, their atmospheric patterns and pollution levels. It also studies the ill effects on the health of humans, plants and animals. The work related to air pollution by geographers has been less in India but more in western countries.

Significance Of Study

Air pollution has become a major challenge in Lucknow due to multiplicity and complexity of sources. Despite the implementation of stringent abatement measures by the regulatory bodies, lucknow city has faced many air

pollution problems, especially particulate matter (Chd10 and Chd25). Traffic signals have been increased to control the movement of vehicles in the city. The urban population and economic demands have led to increased open cooking and street food stall activities to the emission loads related to cooking in the ambient air. there has been an increase in. Complexity of the source The major source of airborne particulate pollution is difficult to determine. Old buildings are being demolished in various areas of Lucknow and excavations are being done for the foundation building and it is a dust it is the major source. The kutchra and damaged roads are also a source of soil and road dust, though the state government has announced the cleanliness programme under the Swachh Bharat programmes. have taken many initiatives like, and yet there are huge garbage and garbage dumps in many residential areas of the city, which is a source of air pollution There are also sources. Unusable vehicles lying on the side of the road also add to the sources of pollution.

Therefore, it is necessary to understand the source and receptor relationship and to apply effective strategies for emission reduction. For assessment of air pollution of Lucknow city, CSIR-IITR has been conducting air quality surveys at 9 locations in Lucknow city since 1997 and regularly It is collaborating with the government's air pollution control programme by preparing air pollution data for identification of sources, inventory of emissions and public awareness is. In pre-monsoon 2022 (April to May, 2022), air quality survey was conducted at 9 locations in Lucknow which will enable industrial, residential and commercial areas. covers.

Conditions of the atmosphere

Atmospheric conditions play a major role in the dispersion of air pollution. study period (i.e. April-May 2022) The weather conditions in Lucknow city during the are shown in Fig. 1. The relative humidity in the city during the study period was between 25-75%, while the temperature was 24-34 degrees recorded between Celsius. between 23 and 25 May 2022 during the study period There was moderate rainfall, the maximum rainfall was recorded at 0.4 mm. Representing the direction and speed of the wind Windrose Fig. 1 shows that the dominant direction of the air flow (direction of arrival) from the east and its The latter is from east-southeast. The wind speed was found to be very slow for about 2-3% and Maximum wind speed was recorded at 4-5 m2sec.

Results of the survey

The detailed results of air quality monitoring during the pre-monsoon period

Respirable particulate matter

residential areas; In Aliganj, Vikas Nagar, Indira Nagar and Gomti Nagar, the concentration of P10 in 24 hours ranged between 78.2 and 182.2 micrograms per cubic meter and the average The concentration was 131.2 micrograms per cubic meter. business areas; The concentration of P10 in Charbagh, Alambagh, Aminabad and Chowkddha ranged between 106.0 and 268.5 micrograms per cubic metre and the average concentration was 176.8 Micrograms per cubic meter was industrial area; The average concentration of p10 in the U.M. was 189.6 micrograms per cubic meter.

A concentration of 24-hour pd10 was observed in Indiranagar in residential area ;142.2 micrograms per cubic metre and in commercial area Charbagh;203-9 micrograms per cubic metre gone. The national ambient air quality standards prescribed at 100 micrograms per cubic metre for all industrial, residential, rural and other areas; g. They were above the feet.

Micro-Particulate Matter; Pd2-50

residential areas; In Aliganj, Vikas Nagar, Indira Nagar and Gomti Nagar, the concentration of p 25- 25% between 24 hours is 43.4 to 111.3 micrograms per cubic meter and average with concentration was 72.2 micrograms per cubic metre. business areas; The concentration of P2.5 in Charbagh, Alambagh, Aminabad and Chowkddha ranges between 79.3 to 16.1 micrograms per cubic meter and the average concentration is 110.4 Micrograms per cubic meter was industrial area; The average concentration of peas in the U.M. was 104.7 micrograms per cubic meter.

Indira Nagar ;80-5 micrograms per cubic metre residential area and Dharbagh ;130-1 microgram An average maximum concentration of Ch2.5 was observed per cubic meter and commercial area in 24 hours. All values of Chd2.5 set for commercial residential rural and other areas. Fa were above 60 micrograms per cubic meter.

Sulfur Dioxide (V2)

Sulphur dioxide levels in residential areas (Aliganj, Vikas Nagar, Indira Nagar and Gomti Nagar) range from 8.6 to 15.1 micrograms per cubic metre and average concentration was 11.1 micrograms per cubic metre. The average concentration of Sulphur dioxide in commercial

areas (Charbagh, Alambagh, Aminabad and Czech) ranged between 10.4 and 23.1 micrograms per cubic metre And the average was 15.0 micrograms per cubic meter The average concentration of sulfur dioxide in the industrial area (AMAUSI) was 22.2 micrograms per cubic meter.

The figures of sulfur dioxide determined for all locations n.. Fae were significantly below 80.0 micrograms per cubic meter.

Nitrogen-Dioxide (NO2)

Nitrogen-dioxide concentrations of 23.1 to 48.4 micrograms per cubic metre in 24 hours in residential areas (Aliganj, Vikas Nagar, Indira Nagar and Gomti Nagar) The median and average concentrations were 34.9 micrograms per cubic meter. concentrations of Nitrogen dioxide in commercial areas (Charbagh, Alambagh, Aminabad and Czech) between 25.3 and 54.8 micrograms per cubic metre and The average concentration was 35.5 micrograms per cubic meter Nitrogen dioxide average concentration in industrial areas (AMAUCI) was 39.8 micrograms per cubic meter. All figures of Nitrogen dioxide determined for all monitoring locations n.. Fay 80.0

Micrograms were within per cubic meter.

Metals Found In Small Quantities

The concentration of Si in residential areas ranged between Aliganj (5.45 nanograms per cubic metre) to Vikas Nagar (15.16 nanograms per cubic metre) on average of 8.70 nanograms per cubic metre. In the commercial areas, from Chi Alambagh (9.92 nanograms per cubic meter) to Charbagh (14.60 nanograms per cubic meter) of nanograms per cubic metre, an average of 12.70 nanograms per cubic metre It was between. The value of 'Cy' in the industrial area of Amausi was 9.81 nanograms per cubic meter.

Also, the concentration of splashes in residential areas ranged between Gomitnagar (1.87 nanograms per cubic metre) to Indiranagar (3.54 nanograms per cubic metre) on average 2.35 nanograms per cubic metre. In the commercial areas, the splash was between Charbagh (0.86 nanograms per cubic meter) to Aminabad (3.50 nanograms per cubic meter) on average 2.0 nanograms per cubic meter in the industrial area The value of splash in Amausi was 2.53 nanograms per cubic meter.

Graph

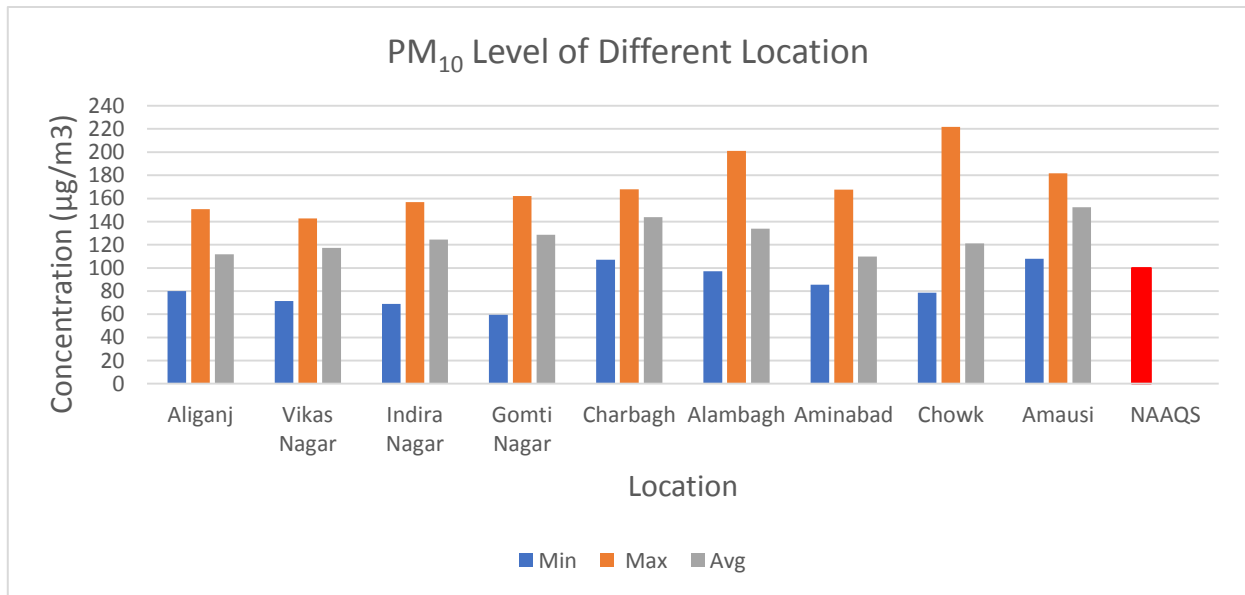


Figure 1: PM₁₀ Level of Different Location

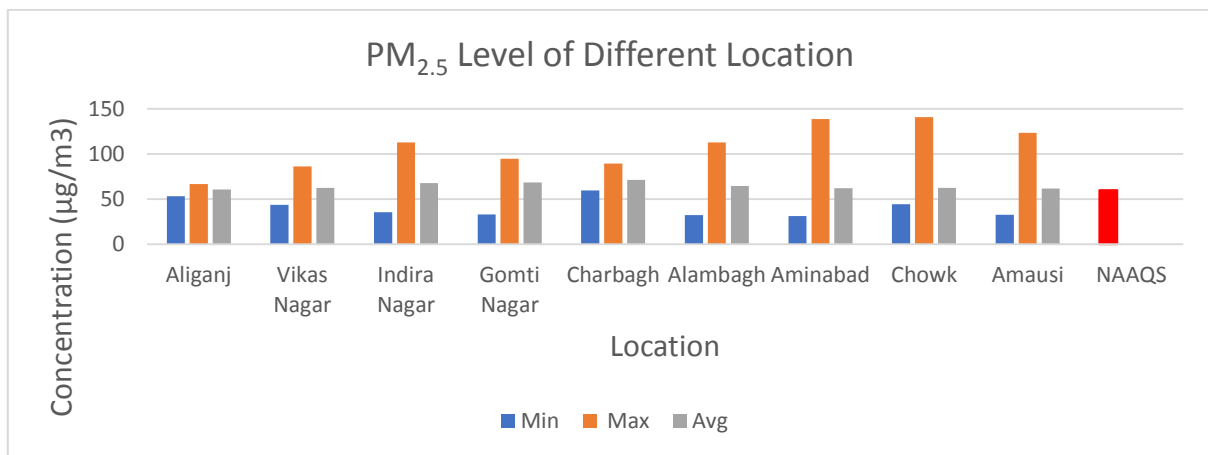


Figure 2: PM_{2.5} Level of Different Location

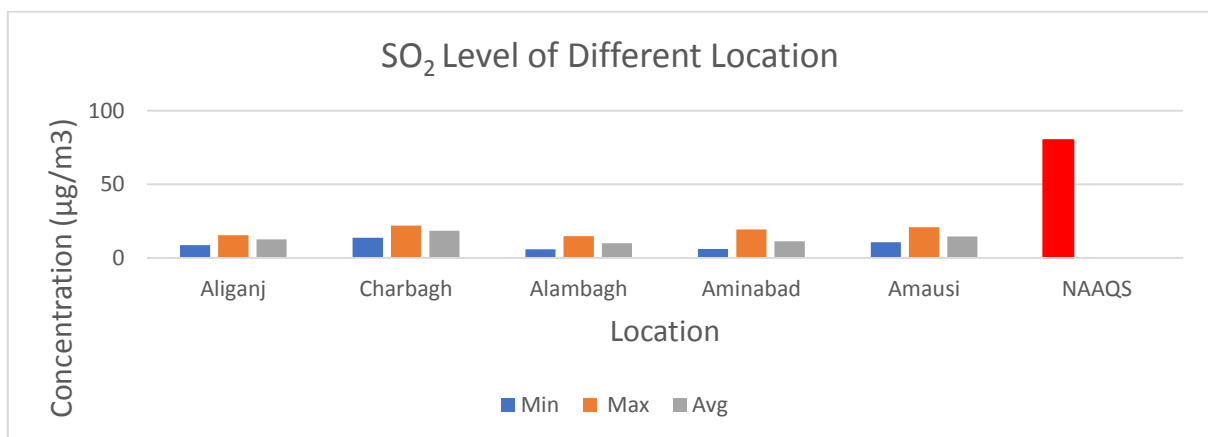


Figure 3: SO₂ Level of Different Location

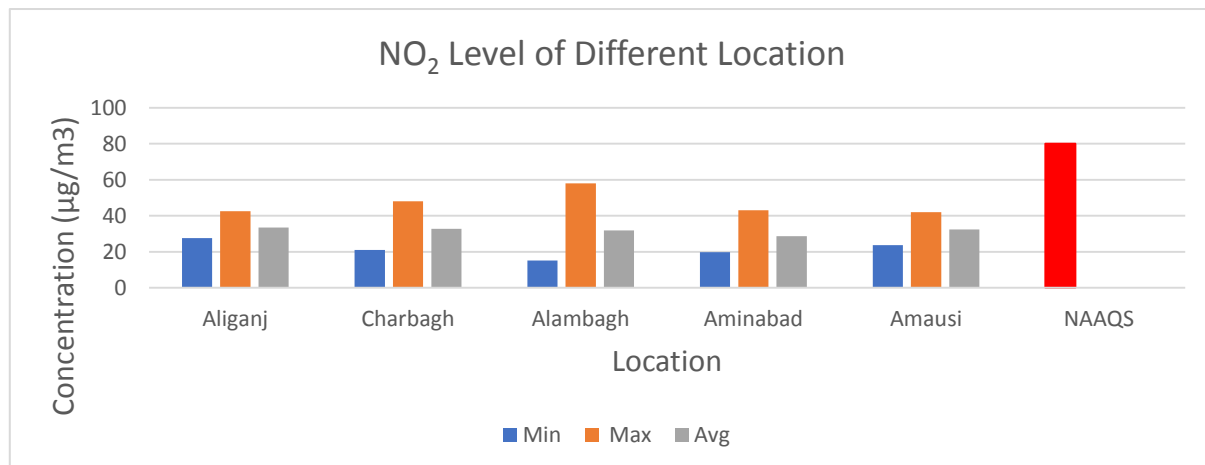


Figure 4: NO₂ Level of Different Location

Conclusion

Air pollution has been on the rise with rapid urban development and modernization recently and its impact on human health has become an important research topic. Currently many researchers have paid more attention to the relationship between air pollution and respiratory system disease. Chd2s (particles of less than 2.5 micrometers in diameter) penetrate deep into the lungs, causing irritation and erosion in the alveolar wall, and consequently hinder the function of the lung.

Given that Chd2.5 causes asthma and respiratory inflammation, endangers the lungs and even promotes cancer, human Its effect on the respiratory system cannot be ruled out. Studies in toxicology, epidemiology, and other related fields have shown that respiratory particles are related to the incidence of human diseases and mortality.

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