



## AMBIENT AIR QUALITY AT DIFFERENT LOCATIONS IN LUCKNOW CITY

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### Abstract

Urban air pollution is one of the major environmental problems faced by developing countries. Studies conducted in large Indian cities have shown that the concentration of ambient air pollution is at a level where it can have serious health effects. The fast growing city of Lucknow is also no exception to this. Urban air pollution is one of the major environmental problems faced by the developing countries. Studies in large Indian cities revealed that ambient air pollution concentrations are at such levels where it can cause serious health impacts. Lucknow, a fast growing city is not an exception to this. Researchers from the city studied various aspects of air pollution during the past decade has identified particulate matter as the main air pollutant in the city. Some studies of the indoor environment in homes have also identified particulate matter and related PAHs as major indoor air pollutants due to the diversity of cooking fuels from urban and adjacent rural areas. The objective of this review article is to analyze the status of city air pollution, associated environmental and health impacts and possible control measures from the available literature presented in studies on Lucknow.

**Keywords** - Air Pollution, Particulate Matter, Environmental Problems, Environmental and Health Impacts

### INTRODUCTION

Air pollution is a chemical, physical (e.g. particulate matter), or biological agent that modifies the natural characteristics of the atmosphere. The atmosphere is a complex, dynamic natural gaseous system that is essential to support life on planet Earth. Stratospheric ozone depletion due to air pollution has long been recognized as a threat to human health as well as to the Earth's ecosystems.

World wide air pollution is responsible for large numbers of deaths and cases of respiratory disease. Enforced air quality standards like the Clean Air Act in the United States have reduced the presence of some pollutants. While major stationary sources are often identified with air pollution, the greatest source of emissions is actually made up by mobile sources, mainly the automobiles. Gases such as carbon dioxide, which contribute to global warming, have recently gained recognition as pollutants by some scientists. Other recognizes the gas as being essential to life, and therefore incapable of being classified as a pollutant.

There are many substances in the air which may impair the health of plants and animal (including humans), or reduce visibility. These arise both from natural processes and activity. Substances not naturally found in the air or at greater concentrations or in different from usual are referred to as pollutants.

Pollutants can be classified as either primary or secondary. Primary pollutants are substances directly produced by a volcano from a volcanic eruption or the carbon monoxide gas from a motor vehicle exhaust.

Secondary pollutants are not emitted. Rather, they form in the air when primary pollutants react or interact. An important example of a secondary pollutant is ground level ozone, one of the many secondary pollutants that make up photochemical smog.

Some pollutants may be both primary and secondary: that is they are both emitted directly and formed from other primary pollutants.



## Literature Review

Most developing countries are facing the problem of air pollution due to the pressure of increasing population, transportation, industrialization and other activities. (**Chaudhari et al. 2015**).

Air pollution is one of the most prominent and serious public health and environmental concerns in most developed countries. The increase in the huge number of vehicles, industries, and manufacturing units has resulted in excessive assembly of pollutants in various cities across the country making air pollution a state of national emergency (**Mumtaz et al., 2017**).

Ambient air pollution has become a matter of serious concern, particularly in megacities and urban areas, and rapid industrial development with emissions from the transport sector has been recognized as major sources (**Banerjee et al., 2011**). Pollutants or pollutants can originate from natural sources as well as from human activities. Population growth, urbanization, economic development, transportation needs, and rapid increases in energy consumption are major driving forces of air pollution in large cities, especially megacities.

Urban populations are primarily exposed to high levels of air pollution, including metals, as well as fine and ultra-fine particles from vehicular emissions (**Sharma et al., 2006**).

Every city has its own characteristics which become the pull factor for its growth and development and developmental progress, if not checked it creates risk to the environment and health of the people (**Ahmad et al., 2015**).

Air pollution associated with these activities and its adverse effects on human health and well-being is a major environmental problem faced by all mega cities in India (**Sahu et al., 2011**).

The rapid increase in vehicles as well as human population is a matter of major concern, as they are responsible for the environment and human health. Air pollution is defined as the presence of one or more substances introduced by humans into the external environment, affecting the health and well-being of human systems and life in the environment (**Gupta et al., 2006**).

Air pollution is caused due to both gaseous pollutants (Oxide of nitrogen, Oxide of sulphur, Oxide of carbon) & particulate pollutants (Organic and Inorganic). Heavy metals are particulate inorganic pollutants released in the atmosphere through natural and man-made processes. Heavy metals are relatively dense and toxic at low concentration (**USEPA 1996**). Heavy metals can be transported from one place to another air through wind blow dust (**USEPA 1999**).

Several pollutant may be directly emitted by human activities where as the others may be formed in the air with the effect of sunlight, as in photochemical smog. The particles may range from carbonaceous sooty to heavy metal complex organic compound as well as nuclear fallout. They may have a periodicity which is especially manifested in the biological pollutants, including the airborne spores (**Sharma et.al. 2013**).

Pollutants released in the ambient environment interact with other existing pollutants and micrometeorological factors may form more intricate pollutants and that are more harmful to human health. A large number of urban people are at the edge of health risk due to adverse air quality (**Tiwari et. al 2014**).

Air pollution can cause several adverse effects health and building. Pollutants may cause several diseases such as respiratory diseases, including asthma, bronchitis, eyeirritation etc, to human being living in the surroundings of the industries. Thus we can see that both air and water pollution emerging from industries is very seriously concern to the human health and environment (**Gupta, et.al. 2006**).

Nitrogen dioxide (NO<sub>2</sub>) and carbon monoxide (CO) are good indicators of traffic exhaust emissions as they contribute most of the total emission. Epidemiological studies have shown that short-term exposure to NO<sub>2</sub> and CO is associated with increased cardiovascular mortality, including cerebrovascular diseases and ischemic heart disease. The increases in particulate matter have been shown to cause small, reversible decrement in lung function in normal asymptomatic children, and in both adults and children who have some form of pre-existing respiratory condition, particularly asthma. These changes were often accompanied, especially in adults, by increases in symptoms such



as chronic bronchitis or cough. This is associated with aesthetic and environmental impacts such as soiling of materials or smothering of vegetation. It may pose the greatest threat to human health because, for the same mass, they absorb more toxic and carcinogenic compounds than larger particles and penetrate more easily deep into the lungs. The respirable particles are responsible for the cardiovascular as well as respiratory diseases of human being because these particles can penetrate deep into the respiratory system, and studies indicates that the smaller the particle, more severe the health impacts (**Bahargava et.al. 2010**).

Lead (Pb) Prolonged exposure can cause damage to the nervous system, digestive problems, and in some cases cause cancer. It is especially hazardous to small children. Nickel is one of many carcinogenic metals known to be an environmental pollutant. Chronic exposure has been connected with increased risk of lung cancer, cardiovascular disease, neurological deficits, and developmental deficits in childhood and high blood pressure. There are several reports that high level of Pb can induce severe neurological and haematological effects on the exposed population especially children, where as Ni are known for inducing carcinogenic effects in humans through inhalation (**Berman et.al. 2008**).

## CONCLUSION

Lucknow is not an industrial city, but industries and small workshops scattered in industrial areas of the city are also contributing to air pollution to some extent. At past the process of metro rail section activities were affects the air quality of the area due to construction activities as well as traffic congestion.

A holistic review of previous studies indicates that PM<sub>2.5</sub> and PM<sub>10</sub> are one of the major causes of ambient air quality degradation in the city of Lucknow. Roadside density of heavy vehicles and construction activity, unpaved roads are the reason for increase of particulate matter in the atmosphere. Overall, the continuous accumulation of various types of pollutants and their exposure to humans requires urgent attention from policy makers and regulatory agencies.

These are some recommendation for improvement of the ambient air quality:

- Subsidized public mass transport (Metro, Monorail etc.) must be introduced/ strengthened to minimize use of personal vehicles.
- Public mass transport must be strengthened to minimize use of personal vehicle. Improvement in the traffic management.
- Encroachment should be removed for smooth flow of traffic.
- Increase use of fuel e.g. CNG.
- Restore foot path for pedestrians.
- Regular sweeping of roads to avoid re-suspension of soil dust.

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