Indoor Air Pollution & its Assesment in Lucknow City-
The Second Largest City of North India

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Investigations were carried out during the summer season (March-June 2012) to observe the Quality of indoor air by monitoring the levels of some selected air pollutants at 15 different houses covering the urban areas of Lucknow city. Concentrations of CO, CO, PM10, PM2.5, SO2, and NO2 were monitored simultaneously in indoor and outdoor and I/O ratios were calculated. Regression analysis for I/O relationship was performed to assess the contribution of outdoor sources to indoor air quality. Air Quality Index (AQI) for indoor air was also calculated to have an idea about the quality of indoor air and its health outcomes. In collaboration with the medical college doctors of the city, we surveyed 197 persons to find out different diseases/symptoms being faced due to indoor pollution. Results of the study revealed that the average levels of PM10 and PM2.5 were above the permissible limits laid by WHO at densely populated and roadside sites with 189ug/m3 (indoor- 16ug/m3) and 227ug/m3 (indoor-182ug/m3) respectively. Correlation analysis showed positive results. At sites like Alambagh and Chowk, the indoor AQI ranged very alarming with the value of 302 and 209. Survey results also showed that 46% of urban people suffered from acute respiratory infections like bronchial asthma, headache, depression and dizziness and these people were mostly from Roadside colonies.

Key words: Indoor air quality, Air Quality Index, survey, Bronchial Asthma.

Introduction

In India, over the past two decades there has been a rapid increase in urbanization and industrialization in many cities. The urbanization process has both positive and negative effects on Indoor Air Quality in many cities of the world1. Hence there is an urgent need to know Indoor Air Quality issues, to share the latest information, to make people aware of the risks of Indoor Air Pollution and to let them know how to avoid it. Various regulations and guidelines have been imposed by local governments attempting to limit human exposure to potentially harmful particulate in environment (WHO-http://www.epa.gov/air/criteria.html and NAAQS-http://www.who.int/mediacentre/factsheets/fs313/en/index.html). But the standards are based upon exposure to pollutants measured outdoors. The problem is that in urban environments, people spend most of their time indoors – at home or at work2. Outdoor pollutant concentrations may not be reliable indicators of indoor and personal pollutant sources. Thus, for many people, the risk to health may be high due to exposure to air pollution indoors than outdoors3.

In addition, people who may be exposed to indoor air pollutants for the longest periods of the time are most susceptible to the effects of indoor air pollution like acute lower Respiratory infections4. Such groups include the young, the elderly and physically ill, especially those suffering from respiratory or cardiovascular disease4. Research indicates that more than 900 contaminants are present in indoor environment4. Burning of fuel in any form largely releases various kinds of unburned or waste product in the environments as Particulate Matter5,6. Some sources of indoor air pollution in homes are solvents used in cleaning, building materials, paint, radon, allergens, cooking, smoking, plastics, carpets, and biomass burning for fuel or cooking5,6. Indoor air pollutant levels are affected by trends in building design and construction practices, such as reduced ventilation rates, more tightly sealed buildings, and synthetic building materials and furnishings. Solvents involved in renovations and painting in homes have been associated with increased risk of general respiratory symptoms for children under 5 years4. Many can be respiratory and sensory irritants, carcinogens, developmental toxins, neurotoxins, hepatotoxins, and immunosuppressants, and may cause symptoms that manifest as sick building syndrome4. According to the WHO report, particulate matter (PM) affects more people than any other air pollutant. Even low concentrations of PM have been related to adverse health effects5. Very limited work has been carried out in relation to Air pollution from growing urbanization and its effect on human health in Lucknow city. Population and Pollution are strongly correlated to each other; if population increases so does the pollution 14. Population explosion, industrial growth and increase in vehicles are the main reason for air pollution nowadays 17. Lucknow is the capital of the most populated state of Uttar Pradesh, it is the second largest city in northern

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