

## **Air Pollution in Nepal**

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The mad rat race among nations all over the globe for development has jeopardized the human race. Rapid progress in industrialization and mechanization has resulted in unlimited exploitation of natural resources. Thus, air pollution is a gift of industrial civilization. Lack of development of a culture of air pollution control has resulted in serious air pollution problems in the developing countries like Nepal. In our country, outdoor air pollution is a problem in the major cities like Kathmandu valley.

The main sources of air pollution in Kathmandu are industries and vehicles. Other minor sources are domestic cooking fuels, refuse burning and resuspended dust particles. A study done by the World Bank in 1993 estimated that the contribution of vehicle exhaust to Total Suspended Particulate was only 3.5 percent compared to contribution of Himal Cement Factory (36%), brick kilns (31%) and domestic fuel combustion (14%). However, the situation in Kathmandu is quite different now. Himal Cement Factory along with other different industries has closed for different reasons and many people use less polluting cooking fuels like kerosene and LPG instead of biomass. But in the mean time, the number of vehicles in the valley has increased threefold. The emission from the vehicles has therefore probably increased significantly, while emission from other sources has decreased over the past 10 years. As a result, vehicle is now the number one source of pollution in Kathmandu. The main reason for the high level of vehicular emission is the large number of poorly maintained vehicles on congested streets, poor quality fuels and lubricants, weaknesses in the emission inspection & maintenance system and a poorly managed transportation system.

World Health Organization (WHO) estimates that approximately 3 million people die each year due to air pollution in the world (World Bank 2003, 'Health Impacts of Outdoor Air Pollution'. South Asia Urban Air Quality Management Briefing, paper No. 11). According to the WHO, air pollution is responsible for increases in outpatient visits due to respiratory and cardiovascular diseases, hospital admissions and mortality.

The most common route for pollutants to enter the human body is by inhalation. So the most common effect of air pollution is development of respiratory

diseases. Air pollution can also have adverse impacts on other important systems such as cardiovascular system and central nervous system. Studies have shown that children, elderly and people with lung and heart diseases are more vulnerable to the health effects of air pollution. An analysis of hospital records from three major hospitals in Kathmandu indicates that the number of COPD patients admitted to hospitals has increased significantly in the last ten years. Hospital records indicate that the number of COPD patients is highest in the dry winter months when air pollution in Kathmandu is at its highest peak.

Recently, Ministry of Population and Environment has established an air quality monitoring system in Kathmandu valley consisting of six monitoring stations in Putali Sadak, Patan Hospital, Thamel, Bhaktapur, Kirtipur and Matsyagaon. These monitoring stations automatically collect 24-hour samples of air and the samples are analyzed for PM10. The data being generated from the six monitoring stations in Kathmandu gives a fairly good picture of the current status of air quality in the valley. Analysis of past data available from those monitoring stations revealed that Putali Sadak is the most polluted station followed by Patan Hospital, Thamel, Bhaktapur, Kirtipur and Matsyagaon. The seasonal variation in air pollution is especially high in Bhaktapur. In the two months between November 2002 and January 2003, the PM10 level in Bhaktapur rose by 178 percent. This is mainly due to that most of the valley's brick kilns are located around Bhaktapur and they start operating in November / December. In the mean time, wind in Kathmandu flows east towards Bhaktapur, carrying with it a significant amount of particles from Kathmandu. Due to the brick kilns and the westerly winds from Kathmandu, the air quality in Bhaktapur gets very much deteriorated in the winter season.

Vehicles are the main sources of air pollution in Kathmandu as the places with heavy traffic (Putali Sadak and Patan Hospital) are the most polluted and the pollution levels drop significantly on weekends and during 'bandhs' or strikes when there are fewer vehicles on the road.

Reduction of vehicle exhaust emission is the most effective measure to improve air quality of the valley.

Electric vehicles can play an important role in reducing emission loads in Kathmandu. Operating the existing trolley bus system can save approximately three tons of potentially carcinogenic particles from being released into Kathmandu's air every year. As diesel exhaust is very hazardous for human health and it is the main source of fine particles, diesel vehicles should be avoided to the extent possible.

Government should introduce economic tools, such as fuel tax, to discourage the use of diesel vehicles. Introduction of environment-friendly brick kilns can also significantly reduce the amount of pollutants in dry winter season. Public awareness campaigns are required to inform the people about the hazards of air pollution and what they can do to avoid or minimize air pollution.