**Assessment of Impacts of Particulate Air Pollutants on Respiratory Health of School Children in Kathmandu Valley**

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**Background**

Vehicular emissions as well as other pollutants degrading air quality is a global concern today. This is one of the greatest challenges and key environmental issue in Asia-Pacific region, with the growth of the megacities. The adverse health impacts resulting from small increases in concentrations of the worst pollutant, particulate matter (PM), are quite significant. These effects are especially severe in infants and children. The effect of particulate matter in the health of the people is one of the most important impact of air pollution that have been identified as the key problem as shown from various studies in developed countries. The impact of air pollutants and its adverse effect on children’s health could be harmful till their adulthood. Developed countries are concerned about outdoor air pollution more than they do for indoor air pollution. Developing countries like Nepal are at double jeopardy; as the problem of outdoor as well as indoor air pollution is growing fast. As most lung alveoli are formed postnatal, changes in the lungs continue through adolescence and the developing lungs of children are more vulnerable to the adverse effects of air pollution than adult lungs. As child health is an essential indicator for the overall assessment of country health status, this study is expected to provide a basis to understand the effect of air pollutants on human health.

**Methods**

The study had two components: i) baseline survey and ii) health impact assessment both following quantitative methods and carried out in one year from July 2011 to June 2012. A baseline survey was conducted in 7 schools of different locations in Kathmandu valley among 1184 children using a structured questionnaire, modified ISAAC (The International Study of Asthma and Allergies in Childhood) questionnaire. For the second component correlational study was done to assess the health impact in two schools among 137 students out of 507. After the baseline survey St. Xavier’s school (urban roadside) and Santaneshwor Vidya Mandir (Semi urban residential) were taken for the second component where children of age between 10 to 15 years were assessed daily for their lung function by measuring morning peak expiratory flow rate. Meanwhile, data for particulate matter (PM 2.5) was also recorded daily for both schools by viii using a personal monitor (dust trak). Weather data was achieved from the Department of Hydrology and Meteorology. Data obtained from these procedures were entered in Microsoft Excel and analyzed using Statistical Package for Social Science 16.0 version

**Results**

Nearly 70 percent of the children from St. Xavier’s school (school 1) and 85 percent of the children from Santaneshwor Vidya Mandir (school 2) were in the age group 13 to 15 years. Rest of them in both the schools was from the age group of 10 to 12 years. Male children were nearly 60 % in both the schools. The mean age of the children was almost similar just above 13 without any significant difference. Mean height and weight of the children were significantly different in the two schools. The mean concentration of Particulate Matter 2.5 was 203.14(±75.01) and 137.69 (±44.52) in school 1 and 2 respectively and the difference is statistically significant (p =0.04). The mean Peak Expiratory Flow Rate was higher for school 1 with statistically significant difference (p < 0.05, 95% CI 39.61 – 126.17). The mean Peak Expiratory Flow Rate level between the two sexes of school 1 was significantly different (p=0.01, 95% CI 10.52- 80.36), the value being higher for the male children. The Peak Expiratory Flow Rate level of the total students of school 1 is found to be varying on certain days with the changing levels of Particulate Matter concentration which was seen to be varying between the values of 100µg/m3 and nearly 340µg/m3. The Peak Expiratory Flow Rate levels of younger (10-12 years) children seem to be correlating with the changes in Particulate Matter 2.5 concentrations in the initial days and later days of the assessment. Similarly, the Peak Expiratory Flow Rate levels of female children also seem to be correlating with the variation in daily Particulate Matter concentrations on few days. The daily Peak Expiratory Flow Rate levels of 20 students taken from the semi urban school is in the inverse relationship with the changes in Particulate Matter concentrations for most of the days in later half except for few days.

**Conclusions**

There is an association of lung function with the particulate matter in the atmosphere. It shows that the impact is more pronounced in the younger age groups and female children. Hence, the intervention needs to be focused to protect the most vulnerable groups from the increasing pollutants. The cross sectional component of this study conducted in the larger group as a baseline study before the impact assessment study hints that the burden of fine particles on the respiratory health could be huge and thus requires further investigation.

**Keywords:** particulate air pollutants; impact; respiratory health; school children.