

## **Exposure to aerosol pollution and reported respiratory symptoms among school children in segments of urban and rural settings in Sri Lanka**

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### **ABSTRACT**

Health effects of air pollution exposure have become a growing concern as an ill-effect of rapid urbanization in several regions of Sri Lanka. Evidence suggests that exposure to particulate matter and other aerosols such as SO<sub>2</sub> and NO<sub>x</sub> have increased in urbanized areas in Sri Lanka. But the evidence to show the association between health effects and air pollution among school children is not adequate presently.

In this cross sectional descriptive study, we present the micro-level picture of aerosol pollution using a validated self administered questionnaire survey and compare the results against exposure to aerosols. Symptoms and the medical diagnosis information were collected from randomly selected probability proportionate samples of school children from grade 5 to 9 in a school at a urbanized area of Colombo (N = 304) and in a school at a rural area of a peripheral district (N = 178). Exposure levels were measured using passive air samplers in both schools. Moreover active sampling measurements of Total Suspended Particulate Matters (TSP), Sulfur Dioxide (SO<sub>2</sub>) and Nitrogen Dioxide (NO<sub>2</sub>) were collected in the school at urbanized area.

Aerosol exposure between urban school and rural school have shown significant different for SO<sub>2</sub> (p < 0.001) and NO<sub>2</sub> (p < 0.001). Average SO<sub>2</sub>

level in first floors of urban school is 74.13 and on second floors is 59.96( $p=0.05$ ). Different premises of urban school shows significantly different active exposure levels for  $SO_2$  ( $F=4.901$ ,  $p=0.028$ ) and TSP ( $F=15.363$ ,  $p<0.001$ ). Highest  $NO_x$ ,  $SO_2$  and TSP levels were reported at the gate area of the urban school.

Estimated univariate OR for cough, phlegm and wheezing among the urban school children were 1.33(CI=1.12-2.48), 1.66(CI=1.12-2.46) and 1.29(CI= 0.80-2.10) compared to the rural school. Standardized OR for cough by the cooking fuel was 2.40 and by the mosquito coil usage was 1.50. Standardized OR for phlegm by the cooking fuel was 2.13 and by the mosquito coil usage was 1.57.

The resulted associations might be overridden further by other house hold level risk factors. But the association between aerosol exposure levels at the school environment and health effects cannot take too lightly. Therefore the short- and long-term mitigation strategies are needed to reduce the exposure to such air pollutants at the school environment.

The outcome of this study has become conscious the necessity of policy implications and mitigation guidelines for planning the locations and infrastructure of the school environment.

**Key words** Total Suspended Particulates,  $SO_x$ ,  $NO_x$ , urban and rural air pollution, school children, health effects,