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**CROSS SECTIONAL ASSESSMENT OF
ATMOSPHERIC PM₁₀ DISTRIBUTION IN KANDY -
ITS CAUSES AND IMPACTS**

Thesis
by

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Abstract

Urban air pollution from road transport is a growing concern in cities all over the world. With the rising population and economic status, motorized transport will continue to increase in the coming years, further threatening air quality. Among urban areas of Sri Lanka, air quality in Colombo has already identified as harmful to human health especially due to high traffic congestion during peak hours. Atmospheric particulate matter emitted especially from fossil fuel combustion has found to be one of the most threatening air pollutants in the urban air and particulate matter (PM) less than 10 micrometer that is called PM₁₀ that can enter the human respiratory tract has recognized as an air pollutant that leads to respiratory tract problems in human.

With the primary objective of assessing PM₁₀ levels in Kandy city with its relation to traffic intensity, PM₁₀ concentrations were measured at a total of 25 sites in Kandy, the second most populous city in Sri Lanka surrounded by hills. A high-volume air sampler, sampling air at a flow rate of 1 m³/min, was used for this purpose. The influence of traffic intensity and meteorological conditions upon the PM concentration has also been analyzed. The study reveals that the PM₁₀ concentration in the atmosphere at the average breathing level have about 82% variance in common with the traffic intensity. No direct correlations were found among the concentrations of particulate matters and the meteorological conditions, such as atmospheric temperature, humidity or wind velocity.

A search for a correlation between the air pollutant levels measured by the high-volume air sampler and a personal air sampler, sampling air at a flow rate of 3 l/min, has also been carried out in this study with the view of utilizing the low cost, easy-to-transport personal air sampler to assess air quality across the nation. Correlations were obtained for colour indices assigned for filtered samples, based on the intensity of the grayness of the filter

paper given by aerosol black carbon of both the high-volume and the personal air samplers. The results suggest that personal air samplers could successfully be used to obtain the first estimation of the quality of air in relation to particulate matter pollution.

With the objective of finding out the degree to which traffic induced air pollution affects the lives of people in Kandy, the hill capital of Sri Lanka experiencing rapid development, a case control respiratory health survey was carried out among 12-16 year old adolescent schooling in and around the Kandy city, and its relation to traffic induced air pollution was investigated into in this study. Two study populations of about 450 students each were selected. One study population was from the city schools situated by the roads with high traffic intensity, and the other from village schools situated by the roads with low traffic intensity. Average traffic intensity by the city schools was 1356 vehicles/hr and it was 52 vehicles/hr by the village schools. Average level of PM_{10} taken as the measure of the air quality, was $55 \mu\text{g}/\text{m}^3$ in the city and $32 \mu\text{g}/\text{m}^3$ in the village. Data on respiratory illnesses were collected using answers given to a questionnaire by students. Statistical analysis of the results shows that there was a considerable difference in health pattern between children attending city schools and village schools. Some confounding factors such as exposure to black smoke at home environment, cigarette smoke, mosquito-coil smoke and firewood smoke and the family's socio-economic status etc. were also covered in the questionnaire. None of these factors, however, was found to have any significant influence on the difference in health pattern. According to the study results, it is highly probable that the traffic related air pollution has caused the observed difference in the respiratory related health of the students attending schools in the Kandy city and outside the Kandy city where the traffic intensity is insignificant.