

UNIVERSITI TEKNOLOGI MARA

**A COMPARATIVE STUDY OF PARTICULATE
MATTER (PM_{2.5}) AND PULMONARY EFFECT
AMONG SCHOOL STUDENTS**

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ABSTRACT

A COMPARATIVE STUDY OF PARTICULATE MATTER (PM_{2.5}) AND PULMONARY EFFECT AMONG SCHOOL STUDENTS

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A comparative cross sectional study was done to assess the pulmonary effects due to exposure to ambient particulate matter (PM_{2.5}) among school students in selected rural area (Teluk Intan) (n=42) and compared with an urban area (Kuala Lumpur) (n=42). Ambient environment was measured by using environmental monitoring (EVM-7 series, Quest Technologies, Inc.). Adapted Questionnaires (ATS-DLD-78-A) were administered among the selected school children to obtain their medical history and respiratory symptoms. Pulmonary effects were assessed by using Vitalograph Spirometer 2120. The PM_{2.5} concentrations for daytime in the urban area was 37.53µg/m³ while for the rural area was 7.07µg/m³ which showed a significant difference (p=0.039). The night time measurements for PM_{2.5} in urban area was 31.88µg/m³ and for the rural area was 3.78µg/m³ with significant difference (p=0.019). FEV₁/FVC Predicted % variables showed significant difference (p=0.001) and the mean for urban area was 96.45 ± 20.02 while for rural area was 108.58 ± 8.49. The FEV₁ Predicted % mean was 73.06 ± 19.43 for urban and 83.77 ± 12.59 for rural area with a significant difference (p=0.004). Chi-square analysis for respiratory problems and other related symptoms experienced by study respondents showed significant difference with being breathless (p=0.004), eye irritation (p=0.033) and nose irritation (p=0.0001). There was a significant correlation for concentration of Particulate Matter (PM_{2.5}) with lung function performance identified on FEV₁/FVC Predicted % (p=0.004, r=-0.327) and FEV₁ Predicted % (p=0.032 r= -0.229). The analysis for the Chronic Daily Inspiration (CDI) of pollutants among school children in urban was 1.21mg/(kg-day) compared 0.26 mg/ (kg-day) to the rural area with a significant difference (p=0.0001). In conclusion, the school students in the urban area are exposed to higher concentration of fine particulate matter (PM_{2.5}) and showed a clear decrease in their lung function performances.

Key words: Particulate matter (PM_{2.5}), Respiratory symptom, Lung Function Performances

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CHAPTER 1

INTRODUCTION

1.1 Background information

Air pollution is a common form of pollution that occurs in Malaysia. It is a widespread environmental problem because it occurs at many scales such as indoor, local urban and regional and global. Michael *et.al.*,2003 studies over 160 million tons of pollution annually is emitted into the air from the United stated. Each year, outdoor air pollution causes tens of billions of dollars worth of direct damages in the United States including crop and livestock damages, cleaning cost to clothes and weathering statues and buildings. These situations also happened among Malaysian which also having problem with their daily activities like cleaning clothes. It also cause decrease in economic growth rate because more cost on water supply or electric supply to cleaning purposes.

Many part of Malaysia experience haze situation on August to October 1997(Patrick *et al*, 1997). The haze was then attributed by uncontrolled forest fire in Sumatera and south Borneo. Forest fire burning will produce particulate matter which can pollute our air. It also will cause short term or long term effect to human and ecology. Addition with global warming situation it will make the situation worst. The severity of the haze was monitored by Alam Sekitar Malaysia Sendirian Berhad (ASMA) using the Air Pollutant Index (API) and managed by department of Environment (DOE,2008)

Air quality statuses in Malaysia were monitored by using several parameters with consideration on several factor which might influenced the air quality such as wind flow or weather. Air Pollutant Index in Malaysia comprises of six criteria pollutant (DOE,