

**UNIVERSITI TEKNOLOGI MARA**

**INDOOR AIR POLLUTANTS LEVEL AND ITS  
ASSOCIATION WITH LUNG FUNCTION AMONGST  
TOLL PLAZA WORKERS**

**BASYIRAH BINTI OMAR MOKHTAR**

**Project paper submitted in partial of fulfillment of the requirements  
for the degree of  
Bachelor in Environmental Health and Safety (Hons.)**


**Faculty of Health Sciences**

**JULY 2014**

## Declaration by Student

Project entitled Indoor Air Pollutants Level and Its Association amongst Toll Plaza Workers is a presentation of my original research work. Wherever contributions of others involved, every effort is made to indicate this clearly, with due references to the literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Mr. Hashim Bin Ahmad as Project Supervisor. It has been submitted to the Faculty of Health Sciences in partial fulfillment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

Student's Signature,



.....

(Basyirah Binti Omar Mokhtar)  
2011479144  
901031-08-5624

Date: 23 JULY 2014.....

## TABLE OF CONTENTS

ACKNOWLEDGEMENT	ii
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix
ABSTRAK	x
<b>CHAPTER ONE: INTRODUCTION</b>	
1.1 Introduction	1
1.2 Problem Statement	2
1.3 Study Justification	2
1.4 Study Objectives	3
1.5 Study Hypothesis	4
1.6 Study Conceptual Framework	5-6
<b>CHAPTER TWO: LITERATURE REVIEW</b>	
2.1 Definitions/Glossary/ Terminologies	7-10
2.2 Legal Provisions	11
2.3 Lung Function Performance	12
2.4 Past Studies on Traffic Related Air Pollution	13-15
2.5 Health Implications & Lung Performance Case Studies	16-19

## ACKNOWLEDGEMENT

First and foremost, praise and thankful to Allah S.W.T for His blessing and merciful that gives me the opportunity to complete my Final Year Project, '*Indoor Air Pollutants Level and Its Association with Lung Function amongst Toll Plaza Workers*'.

I would like to express my sincere gratitude to Head of Department Dr. K. Subramaniam, for his massive support, and to my very committed and helpful Research Supervisor Mr. Hashim Bin Ahmad, who have assist me in every step throughout the process to complete my research study successfully, and not to forget my gratitude to Mr. Vikram Mohan, from Physiotherapy Department, for his full support in guiding me to perform lung function test, in order to complete my studies.

I would also like to show my appreciation to PLUS Toll Plaza Management at Batu 3 Shah Alam, for their vital encouragement and support all the way through the process of data collection. Lots of appreciation to all the toll plaza workers who have participated as respondents in this study, and all the Laboratory Assistants for their kind cooperation all the way this study was done.

My special thanks to my family for all their encouragement and financial support, and to all my beloved friends who had gone through ups and downs together, thanks for all the support and guidance. In any circumstances, I could not forget to thank those who had directly or indirectly involved during this research.

## Abstract

### Indoor Air Pollutants Level and Its Association with Lung Function Amongst Toll Plaza Workers

Basyirah Binti Omar Mokhtar

**Background:** A cross-sectional study was done to assess indoor air pollutants level and lung function performance of the toll plaza workers based on their working shift as consequences of exposure to traffic pollution. Toll Plaza Batu 3, Shah Alam was selected as the study location. In order to associate the exposure and effects only manual toll collection lane workers were chosen as study respondents.

**Methodology:** Indoor Air pollutants concentration of Particulate matter, (PM<sub>10</sub>), Nitrogen Dioxide (NO<sub>2</sub>) and Sulfur Dioxide (SO<sub>2</sub>) were determined by using EVM7 (Quest). The level of these air pollutants were measured in accordance to Time weighted Average of 8 hours each based on 3 different shifts A, B and C, total of sixty (n=60) toll plaza workers in the manual toll collection lane are chosen as the sampler for air quality and health questionnaire. Out of the sixty respondents only forty five (n=45) of them were selected to perform lung function test based on the inclusive criteria. The association between pollutants level, demographic data, health status and lung function test were analysed by using SPSS version 17.0.

**Results:** The level of PM<sub>10</sub>, NO<sub>2</sub> and SO<sub>2</sub> complies with Schedule 1 Permissible Exposure Limit (USECHH), which the concentrations were different based on the work shift. Traffic Assessment shows there is no significant correlation of  $p > 0.05$ , between the pollutants level (PM<sub>10</sub>, NO<sub>2</sub> and SO<sub>2</sub>) with the number of vehicles. Moreover, there is a significant correlation between the highest sum of vehicles at shift B with the lung function test (FVC%). Furthermore, the significant association between the lung function test with the health symptoms, which all of the symptoms mentioned were positively correlated (p-value less than 0.01%) FEV<sub>1</sub>/FVC% with coughing symptoms, FVC% with wheezing symptoms and FEV<sub>1</sub>/FVC % with runny nose symptoms. Besides, it is found that the lung function performance were inversely proportional with the working years.

**Conclusion:** This study was conducted to quantify the concentration of air pollutants level (PM<sub>10</sub>, NO<sub>2</sub>, SO<sub>2</sub>), even though the results were still below the permissible exposure limit but there is some significant association in lung function performance and air quality and health related symptoms from a long term exposures of vehicles pollutants.

**Keywords:** *Indoor air pollutants, Lung Function performance, Traffic assessment, Health symptom*