

UNIVERSITI TEKNOLOGI MARA

**INVESTIGATING RELATIONSHIP BETWEEN
TRAFFIC DENSITY AND PARTICULATE
MATTER CONCENTRATIONS**

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Project submitted in fulfilment of the requirements for the degree of
Bachelor in Environmental Health and Safety (Hons.)

Faculty Of Health Sciences

January 2023

ACKNOWLEDGEMENT

In the name of Allah, The Most Gracious, The Most Merciful.

Assalamualaikum and Alhamdulillah, all praise to Allah S.W.T The Supreme Lord of the Universe. Peace and blessing to Nabi Muhammad S.A.W., all prophets and their families. I praise Allah S.W.T. for the strength and His blessings in completing my study.

Thousands of thanks and love to my parents Mr. Mohd Aminuddin Bin Amir and for their support and encouragement through thick and thin of my study. My deepest gratitude and appreciation to my dearest supervisor, Dr. Siti Rohana Bt Mohd Yatim and Dr Samsuri Bin Abdullah who spent their time and efforts in guiding and advising from the beginning till the end of my research journey. Not to forget, I would like to thank all the lecturers in Department of Environmental Health and Safety, Faculty of Health Sciences who always share their thoughts, knowledge and advice throughout my study in UiTM Puncak Alam. Only God can reward all of you with goodness.

My sincere thanks and appreciation go to all the staff from the department and laboratory who gave their full cooperation and assisted me in many ways throughout my study. A special thanks to my friends from HS243 who always give me support and motivation while completing my study. May our friendship last forever. Lastly, I would like to thank everyone who involved directly and indirectly in this study. Thank You.

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ABSTRACT

Air pollution have been shown in many studies to cause many health adverse effects. The researcher aims to investigate the relationship between traffic density and particulate matter concentrations which is conducted by the roadside in Gong Badak, Terengganu. The road is situated near public amenities such as food stalls, kindergarten and homestay. The sampling is conducted for 4 hours from 8.00 a.m. to 12.00 p.m. using Dust Trax TM DRX Aerosol Monitor 8534. The study aims to determine the trend of particulate matter concentrations at study areas and to establish relationship between number of motor vehicles and concentrations of particulate matter. The distribution trend across all PM_{10} , $PM_{2.5}$, PM_1 is almost the same which is low at 8 a.m. and slowly increasing and peak at 10 a.m. and start to decrease at 11a.m. During the study period, the overall average (mean of 4 hours of data) concentrations of PM_1 (ultra-fine), $PM_{2.5}$ (fine) and PM_{10} (coarse) were 0.054 mgm^{-3} , 0.055 mgm^{-3} and 0.064 mgm^{-3} , respectively. The mean of $PM_{2.5}$ concentrations ($55 \text{ }\mu\text{gm}^{-3}$) were higher than the daily National Ambient Air Quality Standards, while the PM_{10} concentrations ($64 \text{ }\mu\text{gm}^{-3}$) are lower than the NAAQS (NAAQS: $PM_{2.5}= 35 \text{ }\mu\text{gm}^{-3}$ & $PM_{10} =150 \text{ }\mu\text{gm}^{-3}$). However, results show a weak correlation between concentration of particulate matter and number of motor vehicles with R values 0.154, 0.157 and 0.152 for PM_{10} , $PM_{2.5}$ and PM_1 , respectively. In conclusion, the distribution trend across all PM_{10} , $PM_{2.5}$, PM_1 is almost the same which is low at 8 a.m. and slowly increasing and peak at 10 a.m. and start to decrease at 11a.m. Meanwhile the relationship between traffic density and concentration of particulate matter results show that the concentration of particulate matter has a positive but weak relation with the number of motor vehicles. Future studies can do on relationship of traffic density and concentration of particulate matter in other part of Malaysia to give a better understanding about traffic related pollution in Malaysia.

Keywords: *air pollution, particulate matter, traffic pollution*

CHAPTER 1

INTRODUCTION

1.1 Background Of Study

Air pollution is defined as the presence of one or more pollutants in the atmosphere at concentrations and durations that exceed natural limitations. Ozone (O₃), airborne lead (Pb), carbon monoxide (CO), Sulphur oxides (SO_x) and nitrogen oxides (NO_x) are examples of such chemicals. Because of its capacity to permeate lung tissue and trigger local and systemic consequences, particulate matter (PM) with less than 2.5µm has recently been the focus for outdoor air pollution investigations (Sweileh et al., 2018). The city's urbanization and the expanding development in the surrounding areas have substantially enhanced the people' quality of life. This, however, has resulted in a rise in pollutant emission sources such as traffic vehicles and industrial activities (C. C. Lee et al., 2020).

Air pollution have been shown in many studies to cause many health adverse effects. Short-term exposures to PM_{2.5}, NO₂, and O₃ were shown to be strongly related to asthma mortality (Liu et al., 2019). At lower levels of exposure, PM_{2.5}, NO₂, and O₃ can cause airway inflammation, which is regarded to be a significant feature of asthma. It has been proposed that NO₂ and O₃ exposure might also increase airway hyperresponsiveness, which is another feature of asthma. Furthermore, PM_{2.5}, NO₂, and O₃ exposures have been connected to oxidative stress, which has been linked to severe asthma (Liu et al., 2019).

Even on days with mild air pollution, the health of vulnerable and sensitive persons might be impacted. Short-term air pollution exposure is linked to COPD (Chronic Obstructive Pulmonary Disease), cough, shortness of breath, wheezing, asthma, respiratory disease, and high hospitalization rates (a measurement of