

Original Article

SCREENING ON THE EFFECT OF POLLUTANTS TO ADULTS LIVING NEAR INDUSTRIAL AREAS IN KEDAH

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ARTICLE INFO

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Received:
December 2020
Accepted for publication:
April 2021

Keywords:

adults;
air pollution;
pollutants;
Kedah

ABSTRACT

This study aims to examine the effect of pollutants on adults living near industrial areas in Kuala Muda district, Kedah. There are a few causes of air pollution mainly being industries, transportation, aerosols, forest fires, and radiation. Above all, main contributors are industries and transportation as chemicals, gasses and toxins are released into the air that we breathe in. This will eventually cause effects to our environment and our health especially in short as well as long term. The general objective of the study is to explore the effect of pollutions from industries in Kuala Muda District. The specific objectives are to determine the symptomatic effect after exposure to pollutants, to identify the type of pollutants and lastly to determine the relationship between distance and source of exposure. The sampling method was random sampling which involved residents of Kuala Muda District with different age groups. The inclusion criteria is respondents from Kuala Muda District, Kedah whereas the exclusion criteria are respondents from different districts and respondents with age below 18 years old.

INTRODUCTION

Air quality greatly affects our daily lives yet astonishingly little did we know it may affect us in the long run if we are living in this not so clean environment. Factories, big or small do contribute significantly to the air quality that we live in. As air pollution is man-made, no matter how we try to save the earth that we so helplessly depend on, we still contribute some damage to it unknowingly. There are a few causes of air pollution mainly being industries, transportation, aerosols, forest fires, and radiation. Above all, the main contributors are industries and transportation as chemicals, gasses and toxins are released into the air that we breathe in. This will eventually cause effects to our environment and our health especially in the short as well as long term. The government and health authorities are doing the best they can to prevent this, and we shall play our part in saving our planet for the next generation.

Air pollution is one of the pollution that many of us are exposed to on a daily basis. Other types of pollution obviously will affect the population's health too, but air pollution is the type that we face regularly. There are numerous health problems impacted by air pollution such as respiratory and lung problems, difficulty in breathing, coughing, sneezing, headaches, migraines

and fatigue. These symptoms can be irritating but they are the long-term effects that we need to pay extra attention to as we are repeatedly being exposed to them. Furthermore, these can also greatly affect those with compromised immune, young children, the elderly or those with health conditions and thus they need to be worried for.

Air Quality During Pandemic COVID-19

Newly emerging virus which was discovered in late 2019 in China has wreaked havoc on the whole world. This coronavirus disease (COVID-19) has continued to spread worldwide and many countries have initiated lockdowns countrywide to prevent further morbidity and mortality associated with COVID-19. Due to the lockdown that has been implemented, there are few positive outcomes that have been noted, especially the air quality nationwide. Studies have been done in several tropical and subtropical countries, and an analysis that includes multiple angles have been performed. This analysis includes air pollution, analysis and evaluation for health effects as well as loss of economy during a lockdown. The countries are India, Brazil, Kenya, Iran, Mexico, Malaysia, Peru, Pakistan, Thailand and also Sri Lanka [3].

Moreover, the Department of Environment Malaysia (Jabatan Alam Sekitar Malaysia) has hourly basis data on the Air Pollution Index or API for before and after during lockdown (movement control order or MCO). This data has shown 68 air quality monitor stations for the fine particulate matter (PM_{2.5}). During a lockdown, the concentrations of PM_{2.5} showed the highest reduction for up to 58.4%. Multiple areas of the red zone (areas with more than 41 confirmed COVID-19 cases) have reduced the concentration variation up to 28.3% in PM_{2.5} [4].

For instance, monthly pattern values have shown that measured air pollutants concentrations for Langkawi, Kedah were elevated in the course of the southwest monsoon especially June to September because of activities of biomass burning. The source of air pollutants in the area was motor vehicles as indicated by NO/NO₂ ratio values which exceeded 2.2 as well as the high values of CO/NO_x ratio i.e. between 28.3 and 43.6 and SO₂/NO_x low ratio values i.e. between 0.04 and 0.12 [1].

The levels of air pollutants in Asian countries, specifically India and China are considerably higher than in developed countries. Major sources of air pollutants are industries, traffics, chemical indoor pollutants, tobacco and also burning of household biomass, leading to an increased burden of pulmonary allergies. A study has highlighted the main constituent for indoor as well as outdoor pollutants and related effects on pulmonary allergic reactions correlated to allergic rhinitis and asthma in the region of Asia-Pacific. There is a pressing need to increase awareness of the public, underlining interventions target, population approval, and action call to policymakers to make changes along with interventions on how to reduce air pollution at levels of community-based [4].

Furthermore, more than 70% of total excretions are caused by vehicle ejections in the metropolitan area during periods of non-haze and they have shown diurnal variations at two peaks of the abovementioned air pollutants with the exception of ozone. The peak at rush hour in the morning is mostly due to vehicle ejections meanwhile the peak at late evening is mostly due to conditions of meteorological, specifically stability of the atmosphere and also the speed of the wind. The major pollutant is a total suspended particulate matter as its concentration at several sites frequently exceeded Guidelines of Recommended Air Quality Malaysia. Overall, the common quality of air in Malaysia has declined since 1970. This has been proved by studies showing that if there is no introduction of successful countermeasures, the ejections of nitrogen oxides, sulphur dioxide, hydrocarbons and carbon monoxide along with particulate matter in 2005 will eventually escalate approximately by 2.12, 1.4, 2.27 and 1.47 times, from the levels in 1992 [2].

METHODOLOGY

This study had been conducted on adults who were 18 years old and older and had lived near industrial

areas in Kuala Muda District in Kedah, Malaysia. The total populations for Kuala Muda district were 435, 959 as of 2020. Data collection for this study was done using the sampling method i.e. random sampling which involved residents of Kuala Muda District, Kedah with different age groups. Thus, a questionnaire had been sent by Google form using the online platform. The responses that had been recorded were divided into groups and tabulated in Table 1.

Each respondent's status would remain as anonymous as their personal details such as name, identity card number or residential address were not recorded. The information gathered consisted only of their age, gender and living area whether near the Kuala Muda industrial areas or not. The questionnaire used had been developed by professional and medical experts and consisted of several items. These factors were identified through a systematic literature review followed by a pilot study.

The online questionnaire had been created using Google form and the link for the online Google form had been shared to Kuala Muda residents by using social media platforms so that they can have easy access to the questionnaire. The database was used to measure the health effects of air pollutants in residents of Kuala Muda District industrial areas. The respondents needed to answer questions and noted if they experienced any health-related symptoms due to air pollutants.

RESULTS

Based on the data collected, analyses were performed using IBM SPSS V27. The frequencies of each variable were presented in a table such as socio-demographic characteristics (respondent's gender, race, age group, education level, smoking status, living with smokers). The distributions of health symptoms for people living near the industrial areas were measured using cross-tabulation.

Distance from industrial area versus respiratory symptoms was tested. The distance was distributed into 0 to 10 km, 11 to 20 km and more than 20 km. The respiratory symptoms screened were cough, flu, skin itchiness, eye itchiness and difficulty in breathing. From the findings, the subject living closest to the industrial areas (distance 0 to 10 km) have experienced all the respiratory symptoms as compared to others. Meanwhile, only a few of the subjects living the farthest to the industrial areas experienced some of the symptoms. These findings showed that the subjects closest to the industries are more prone to have respiratory symptoms and health effects in contrast to other subjects.

CONCLUSION

The study had been carried out with few limitations

Table 1: Sampling

Group	Distribution	Number	Percentage
Gender	Male Female	63 58	<p> ● Lelaki ● Perempuan </p>
Race	Malay Chinese Indian Others	106 10 3 2	<p> ● Cina ● India ● Lain-lain ● Melayu </p>
Age Group	18 - 25 years old 26 - 33 years old 34 - 41 years old 42 - 49 years old Above 50 years old	31 16 23 20 31	<p> ● 18 - 25 tahun ● 26 - 33 tahun ● 34 - 41 tahun ● 42 - 49 tahun ● 50 tahun ke atas </p>
Education	Primary School Secondary School Higher Education * certificate, diploma, bachelor degree, master degree, PhD	2 18 101	<p> ● Diploma ● Doktor Falsafah ● Sarjana ● Sarjana Muda ● Sijil ● STPM/ SPM/ PMR ● UPSR </p>
Smoking Status	Yes No	17 104	<p> ● Tidak (terus ke Soalan 3) ● Ya </p>
Living with Smoker	Yes No	32 89	<p> ● Tidak ● Ya </p>

Table 2: Distance from industrial area vs. respiratory symptoms.

Distance from industrial park	Respiratory Symptoms		
	Cough, Flu & Difficulty Breathing	Skin & Eye Itchiness	All
0 to 10km	69	46	
	71.029	43.971	
	-0.2408	0.3060	115
	0.05798	0.09367	
11 to 20km	7	1	
	4.941	3.059	
	0.9262	-1.1772	8
	0.85784	1.38575	
More than 20km	8	5	
	8.029	4.971	
	-0.0104	0.0132	13
	0.00011	0.00017	
Total	84	52	136
	Chi-Square	DF	
Pearson	2.396	2	
Likelihood Ratio	2.791	2	

as due to pandemic COVID-19 that strike worldwide, Malaysia included, the study was executed by using the online platform i.e. by using Google form. Initially, the sample size calculated for this screening was 384 but due to the changes in the mode of the questionnaire from face to face to the online platform, low sample size was obtained with only 121 respondents. This is because the subjects had very limited access to the internet or the internet connection was not good and they were not familiar with the online system during that time. Hence, there was no sufficient data obtained.

Next, time was also crucial and constraint as with the pandemic outbreak at that time (November 2020), the residents were mostly in lockdown and they were busy with the new task of online learning for kids which they had to assist their kids with online home-schooling, therefore, they did not have time to access the questionnaire as they were exhausted with their new responsibilities at home.

However, we can conclude from the findings that they were some effects on the population and this need to be further confirmed with a better number of respondents and a wider area of concern. Furthermore, in this study, there was a lack of data on air quality for the study area or relevant information regarding the actual emissions from the industries that hinders the full investigation. This had made the

study of the proximity to source method to identify the exposure for residents living in the areas. This proximity method had been widely used as it was quick, easy and inexpensive to assess the health impacts from industries and environmental study.

Nevertheless, the findings were useful for both authorities and populations as a whole for health facts and could help increase better livelihood to overcome this. For good measure, this will also help create health awareness regarding health pollution to the populations so that they can have cleaner and better air to live.

FUNDINGS

This research was funded by UniSHAMS short term grant (STG) research fund 100-161-RMU01STG2021 (05).

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