UNDERSTANDING AIR QUALITY PERCEPTION AND SEVERITY AMONG RESIDENTS OF TAMAN TASIK BIRU, SELANGOR

ABSTRACT

By Syazwani Izzati Norizaddin (2018227118)

This study aimed to assess the air quality perception and severity among residents of Taman Tasik Biru, Selangor as well as the residents' behaviour on health risk of air pollution, and the relationship between respondents' education level and air quality severity in Taman Tasik Biru. Data collection through an online questionnaire survey was distributed among the residents via mobile application for the duration of three weeks. The main content of the investigation includes background information, perceived severity of air quality among residents of Taman Tasik Biru, and residents' health risk perception on air quality. Out of 525 residents, 101 people took part as respondents in the survey. The percentages of respondents reporting each aspect of air quality awareness, health risk perception, and the relationship between education level and perceived severity were calculated and weighted. Overall result shows that the percentage of female respondents (61.4%) is higher than male respondents (38.6%). For the severity of air quality in Taman Tasik Biru, "Good" recorded the highest percentage (47.5%), and it was observed that more than half of the respondents (78.3%) agreed that air pollution is dangerous to health. Lastly, Chi-Square Tests were conducted to identify the association of air quality severity and education level of the respondents, and the null hypothesis was accepted because the p-value was greater than 0.05. It has been found that in this study, education level did not portray individual's opinion on the severity of air quality. Therefore, it can be concluded that both personal and contextual factors have to be taken into account in order to understand respondents reactions to air quality perception.

Keywords: Air quality, residents, perception, health risk, rducation level, severity

1.0 INTRODUCTION

Clean air is a basic necessity for all living things, especially human beings. Good air quality does not only improve quality of life, it also has many benefits to the environment. However, due to rapid economic development in some developing countries such as Malaysia, air pollution has become a silent threat to the public health. According to World Health Organisation (WHO) (2018), data on air pollution has been quite worrying as it shows that 97% of cities around the world have recently have failed to meet the WHO air quality guidelines. Besides that, WHO (2020) also stated that 9 out of 10 people breathe polluted air that exceeds WHO guideline limits containing high levels of pollutants, with low and middle-income countries suffering from the highest exposures. Meanwhile in some high income countries, their air quality has been improving due to a combination of de-industrialisation, improved technologies and environmental regulation. Even so, advances in the sciences of epidemiology suggest that even air that appears to be 'clean' may contain pollutants that are hazardous to people's health.

In Malaysia, areas with severe air quality problems are usually located in highly urbanised region on the Malaysian Peninsular, one of it being Klang Valley, Selangor (Azmi et al., 2010). Taman Tasik Biru, a selected location for this study, is also situated within the Klang Valley. It was once a palm oil plantation, and ex-mining lake now turned into residential and recreational area. During the past few years, Klang Valley has undergone rapid commercial and industrial development. This development is highly beneficial for the economy, as it changes several rural areas to be more developed and urbanised. Later on, highways, factories and commercial

buildings started operating, resulting more people to migrate and stay in Klang Valley. Despite that, there is a hidden environmental risk that rarely gets enough attention during those times. Without noticing, the air pollution of Klang Valley has significantly increased along with the development (Halim et al., 2020).

There are many contributing factors that lead to atmospheric pollution in Malaysia, where majority of them are anthropogenic sources. These pollutants vary depending on the location and sources they come from. According to Malaysian Department of Environment (DOE) (2013), the main causes of air pollution in Malaysia are industries, development activities, motor vehicles, power generation, land clearing, open burning and forest fires. These activities produces five major pollutants, namely sulphur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter with diameter <10 micron (PM_{10}) and ground level ozone (O_3). These pollutants can be very harmful for human health and the environment, especially when they are bioaccumulated for a long period of time.

Numerous past studies have proven an association between air pollution and human health. Exposure to air pollution can lead to adverse health effects ranging from respiratory illness like asthma and allergic bronchitis, to chronic illness such as cancer, adverse pregnancy outcomes and premature death (Egondi et al., 2013). In Malaysia, Department of Environment provided Air Pollutant Index of Malaysia (APIM), a website that contains all related data regarding air quality, and alerts the public when air quality is expected to effect the health of vulnerable and sensitive individuals, including those with heart or lung disease (APIM, 2020). In addition, this index also indicates its effect on human health ranging from good to hazardous and it can be

categorized according to the action criteria as stipulated in the National Haze Action Plan. The Malaysian Air Pollutant Index system closely follows the Pollutant Standard Index (PSI) developed by the United States Environmental Protection Agency (US-EPA) (DOE, 2020).

As previously stated, it shows that awareness about air quality is consequential in any community. Without clean air, humans' lives will be at risk, and they might end up suffering. To date, little information is available about housing residents perception and awareness of air quality. This is very alarming especially when the air quality in certain residential areas, where people live and seek shelter are badly affected. Variations in awareness of air quality alerts by sociodemographic characteristics, in particular, suggest that targeting messages about air quality might raise awareness about air quality alerts and motivate people to change their behaviours to reduce air pollution exposure during periods of unhealthy air quality (Mirabelli et al., 2020). Therefore, by understanding the perception and awareness of air quality among the residents, this can help the community to acknowledge the importance of clean air and implement any precaution measures. Moreover, the results will also be useful as background data to supplement current information for the local government administrators, and potentially serve as a rough guide for other locations in Malaysia and elsewhere that use similar procedures.

To conclude, this research is conducted to determine the perceived severity of air quality among residents of Taman Tasik Biru, to assess the residents' health risk perception on air quality and to determine the relationship between education level of the residents and their perceived severity of air quality. The findings of this study will

redound to the benefit of society as well as the researcher, considering that exposure to air pollutants causes significant impacts to human health. It will also be beneficial to the organisation involved in order to improve and educate the residents on air quality.

2.0 METHODOLOGY

2.1 Study design and data collection

This is a cross-sectional study design based on data collection through an online questionnaire survey (Oltra & Sala, 2018). In this research method, subjects respond to a series of statements or questions in a questionnaire. The survey targets some population of people who are the focus of research. Moreover, this design was chosen by taking a cross-section of the population, and it is best suited to studies aimed at finding out the prevalence of a phenomenon, situation, problem, attitude or issue (Kumar, 2019). The survey questions were adapted from a previous study conducted by Christian Oltra and Roser Sala in 2016.

Due to current pandemic Covid-19, many challenges were faced throughout the process of data collection, any face to face survey or interview are restricted and cannot be performed. Hence, Google form was created and sent out to the residents of Taman Tasik Biru through a well-known mobile application Whatsapp, for the duration of three weeks. The Google Form consists of twenty-seven multiple choice and Likert scale questions. The main content of the investigation includes 3 sections; background information, the air quality perceived severity among residents of Taman

Tasik Biru, and residents' health risk perception on air quality. Lastly, the survey results were compared and analysed.

2.2 Study area and population

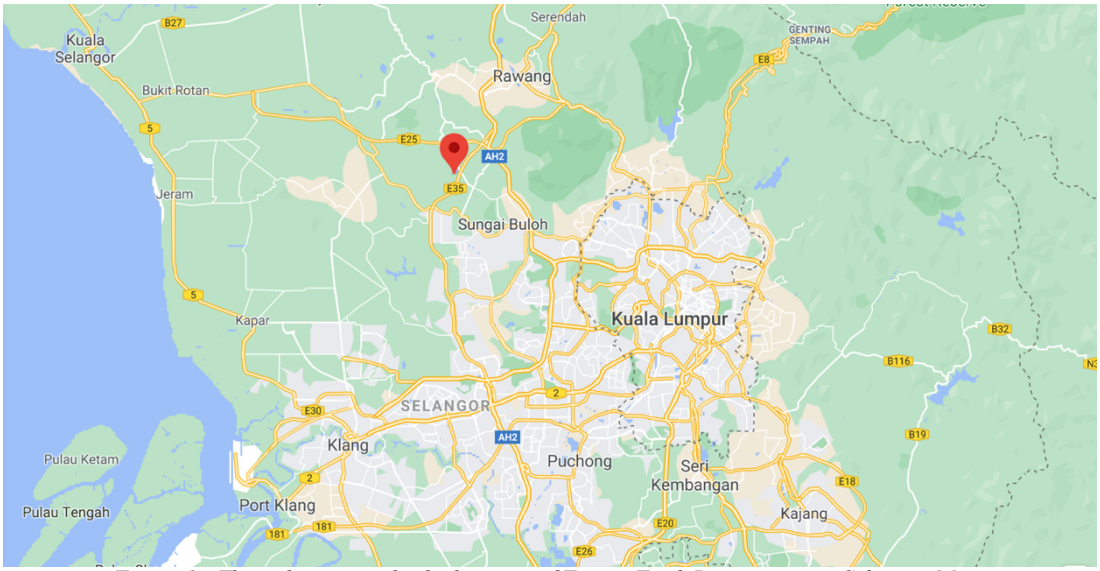

Figure 1 : The red point marks the location of Taman Tasik Biru as seen in Selangor Map.

Figure 2 : The highlighted area shows Taman Tasik Biru where this study was conducted.

Taman Tasik Biru is a residential area located next to the recreational lake known as Tasik Biru in Kundang Rawang, Selangor. Tasik Biru itself was an ex-mining lake that used to be developed many years ago during the British colonial time. During its olden days, the lake was used to be the biggest mining area in Rawang district, and one of the biggest in Selangor as well (Hat, 2015). Situated only 28 km away from Kuala Lumpur, Taman Tasik Biru is a developing suburban area, with the nearest town being Sungai Buloh.

The residential area is a mixed development of terrace and semi-detached unit, with 525 houses in total. Since this study sampled residents aging 18 years old and above, the number of population for this research is 525 too, considering one adult from each house to answer the online survey. As a result, the best possible number of sample size for this study is 223, as determined by Raosoft sample size calculator. It also includes 5% margin of error and 95% confidence level.

2.2 Statistical analysis

The study was conducted from 10th November to 30th November, and from 223 number of targeted sample size, only 101 people answered the survey. The answered questionnaires were screened, and 101 valid questionnaires were included in the study (Zhao et al., 2020). Then, the data were analysed using Statistical software IBM SPSS version 27 for descriptive statistics. It is used to summarize the characteristics of the participants, and cross tabulation was performed to determine the frequency and percentage participants' perceived severity and health risk perception towards air quality. Chi–Square Tests of independence were used to examine if education level was associated with participant's perceived severity of air quality. A p–value of less

than 0.05 was considered to be statistically significant (Liao et al., 2015), and minimum expected count should be more than 1 in order for the result to be conclusive.

3.0 RESULT

3.1 Demographic information of respondents.

According to Table 1, majority of the respondents who took part in this survey were between the ages of 35 to 44 years old (44.6%), while the least number of respondents were between the ages of 18 to 24 years old (7.9%). Female respondents were higher than males in all age groups except for 45 years old and above. Most of the respondents were Malay (97%), with the least being other races (1%). It was observed that 62.3% of the respondents received tertiary education involving Diploma, Degree and Master, while 37.6% of the respondents had secondary education. Most of these respondents have household income ranging from RM3,001 to RM5,000 (35.6%) followed by RM5,001 to RM10,000 (27.7%), and the least with income above RM10,000. Majority of the respondents (80.2%) had no experience with themselves or their family having health condition due to poor air quality. Lastly, 89.1% also had never been hospitalised due to poor air quality.

Variable (N = 101)			
Age			
	Male N (%)	Female N (%)	N (%)
18 - 24	4 (4.0)	4 (4.0)	8 (7.9)
25 – 34	5 (5.0)	16 (15..8)	21 (20.8)
35 - 44	16 (15.8)	29 (28.7)	45 (44.6)
45 & Above	14 (13.9)	13 (12.9)	27 (26.7)
Total	39 (38.6)	62 (61.4)	101 (100)
Race			
Bumiputera (Sabah / Sarawak)	1 (1.0)	1 (1.0)	2 (2.0)
Malay	37 (36.6)	61 (60.4)	98 (97.0)
Chinese	0	0	0
Indian	0	0	0
Others	1 (1.0)	0	1 (1.0)
Total	39 (38.6)	62 (61.4)	101 (100)
Education Level			
SPM	7 (6.9)	31 (30.7)	38 (37.6)
Diploma	16 (15.8)	11 (10.9)	27 (26.7)
Degree	11 (10.9)	19 (18.8)	30 (29.7)
Master and Above	5 (5.0)	1 (1.0)	6 (5.9)
Total	39 (38.6)	62 (61.4)	101 (100)
Household Income			
< RM3,000	9 (8.9)	14 (13.9)	23 (22.8)
RM3,001 – RM5,000	13 (12.9)	23 (22.8)	36 (35.6)
RM5,001 – RM10,000	10 (9.9)	18 (17.8)	28 (27.7)
> RM10,000	7 (6.9)	7 (6.9)	14 (13.9)
Total	39 (38.6)	62 (61.4)	101 (100)
Respondent or Family Member with Health Condition Due to Poor Air Quality			
Yes	6	14	20 (19.8)
No	33	48	81 (80.2)
Total	39 (38.6)	62 (61.4)	101 (100)
Respondent or Family Member was Hospitalised Due to Poor Air Quality			
Yes	5	6	11 (10.9)
No	34	56	90 (89.1)
Total	39 (38.6)	62 (61.4)	101 (100)

Table 1: Demographic characteristics of respondents.

3.2 Residents' perceived severity towards air quality in the neighbourhood.

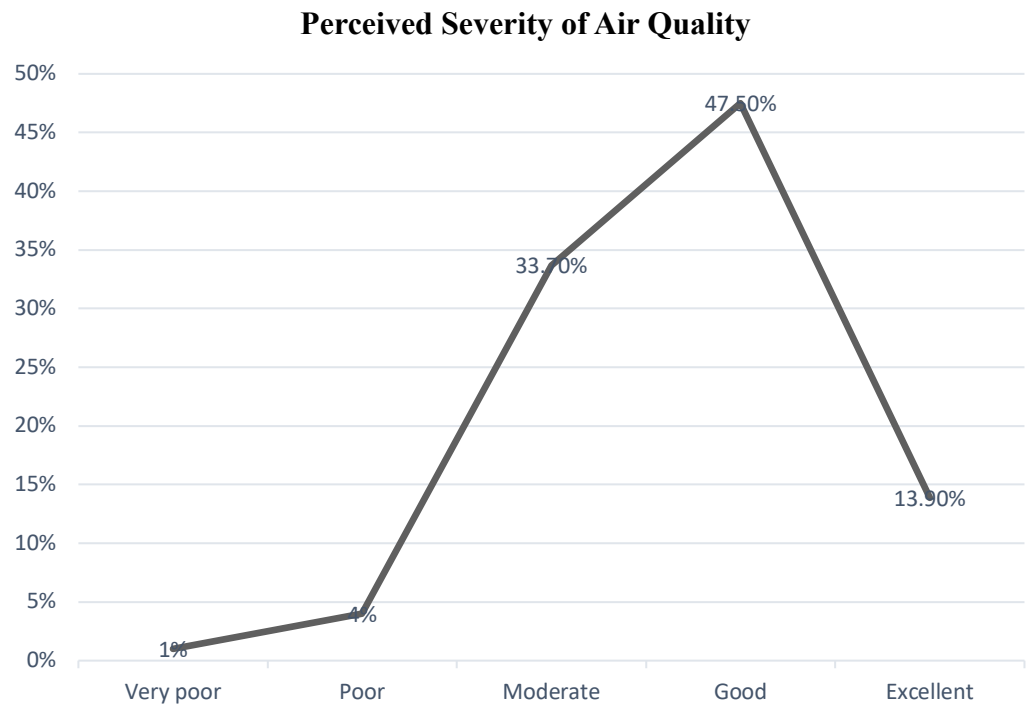

Figure 3: Respondents' perceived severity towards air quality in Taman Tasik Biru.

Variable (N = 101)

To what extent do you perceive the quality of the air in your neighbourhood?			
	Male N (%)	Female N (%)	N (%)
Very poor	1 (1.0)	0	1 (1.0)
Poor	1 (1.0)	3 (3.0)	4 (4.0)
Moderate	9 (8.9)	25 (24.8)	34 (33.7)
Good	25 (24.8)	23 (22.8)	48 (47.5)
Extremely good	3 (3.0)	11 (10.9)	14 (13.9
Total	39 (38.6)	62 (61.4)	101 (100)

Table 2: Perceived severity towards air quality in Taman Tasik Biru according to gender.

Figure 3 illustrates the respondents' perceived severity of air quality in Taman Tasik Biru, while Table 2 presents the respondents' severity based on gender. More than 50% of the respondents rated air quality in Taman Tasik Biru as "Good" and "Moderate". "Good" has the highest vote (47.5%) followed by Moderate with 40.6%. The least score with only 1% of male and none of female respondents rated the air quality as "Very poor".

3.3 Residents' health risk perception on air quality.

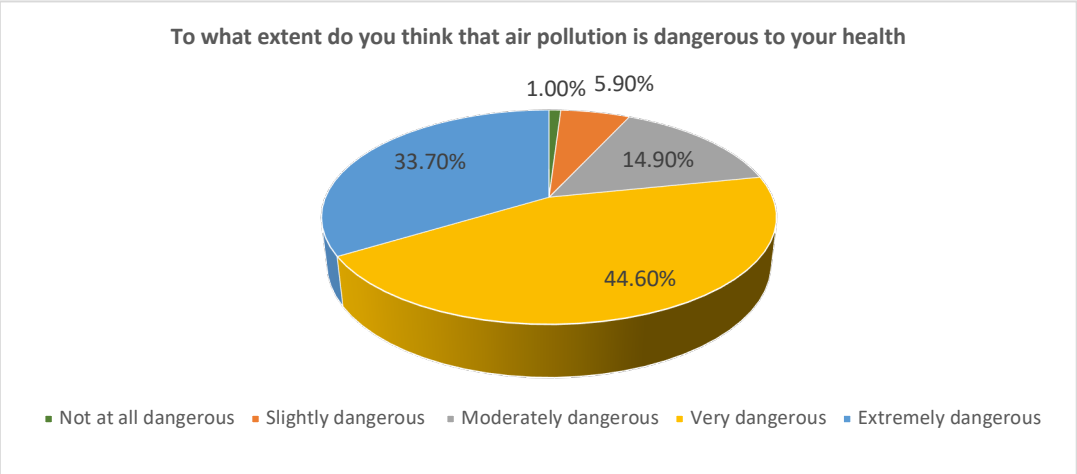

Figure 4: Survey question on health risk severity.

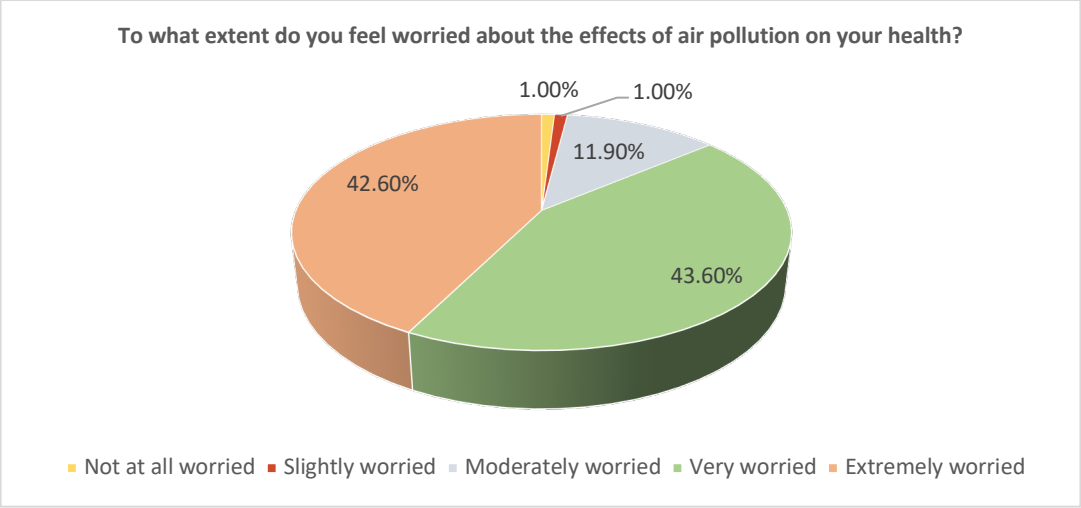

Figure 5: Survey question regarding concern on health effects of air pollution.

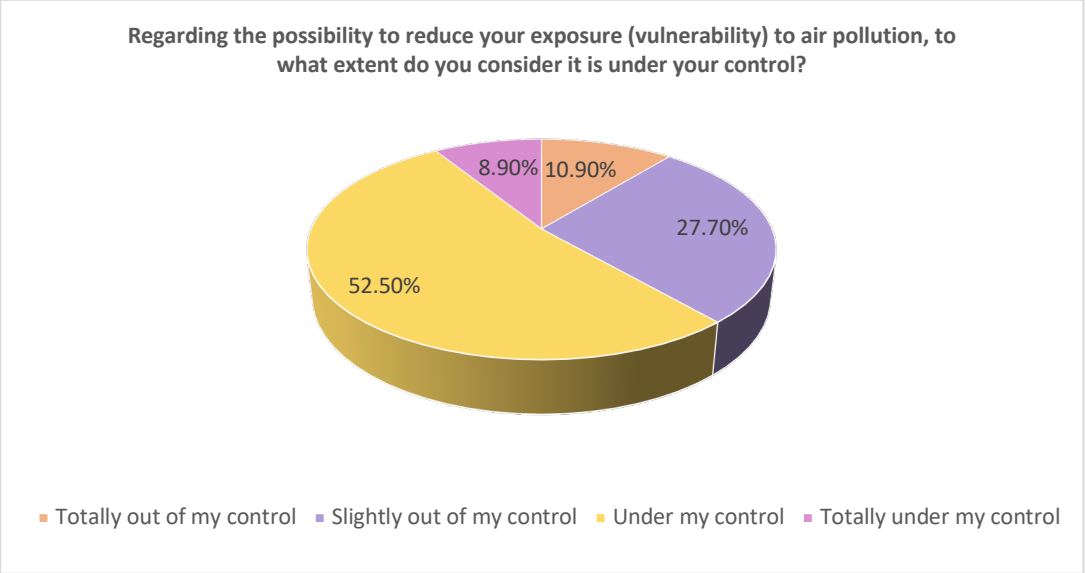

Figure 6: Survey question about controllability.

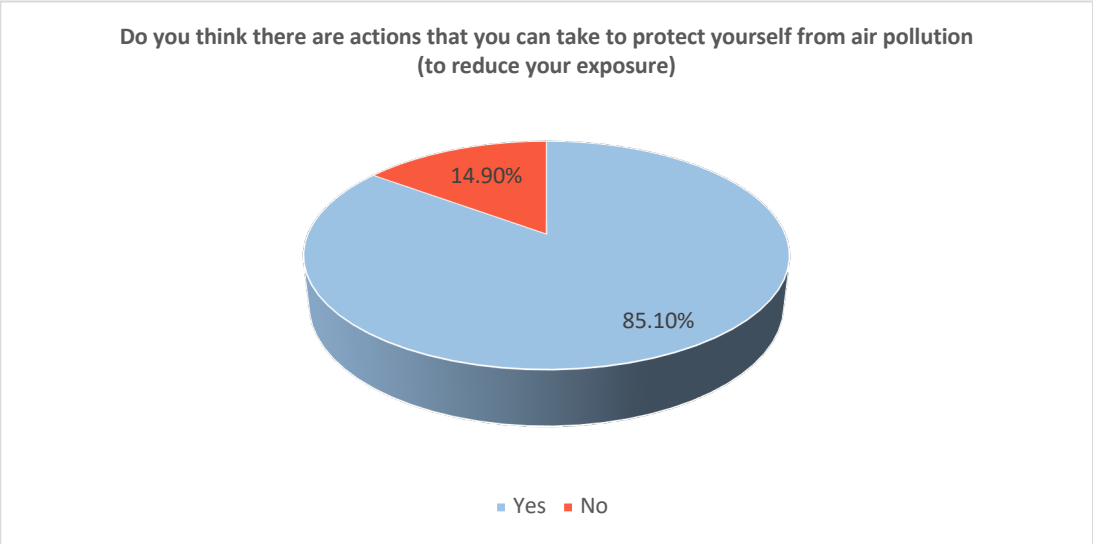

Figure 7: Survey question on self-proactive actions.

The health risk perception on air quality in Taman Tasik Biru was assessed with regards to the perceived health effects and its severity. Four questions were taken out from the survey to be analysed and presented in Figure 4 to Figure 8. It was observed that 78.3% of the respondents agreed that air pollution can be dangerous and extremely dangerous to health, meanwhile majority (86.2%) was worried and

extremely worried about the effects of air pollution. Regarding the possibility to reduce exposure to air pollution, 27.7% of the respondents rated the possibility as “out of my control”, and more than half (52.5%) rated as “under my control”. Lastly, majority (85.1%) of the respondents believe that there are proactive actions which can be done in order to protect themselves and reduce exposure of air pollution.

3.4 The relationship between education level of the residents and air quality severity in Taman Tasik Biru

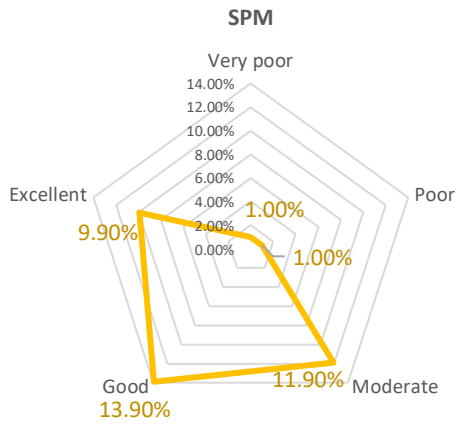

Figure 8: Awareness of residents with SPM education level.

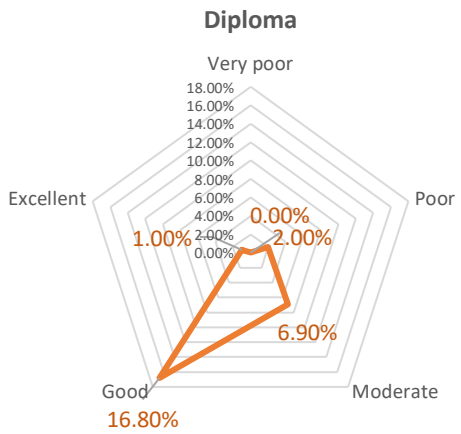

Figure 9: Awareness of residents with Diploma education level.

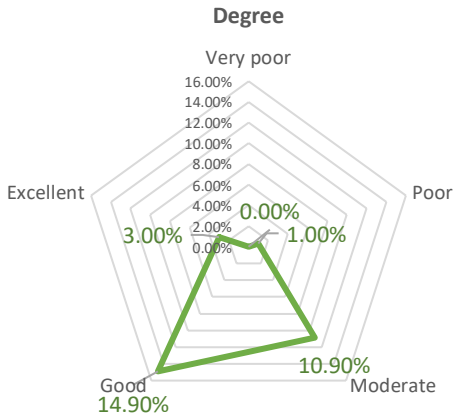

Figure 10: Awareness of residents with Degree education level.

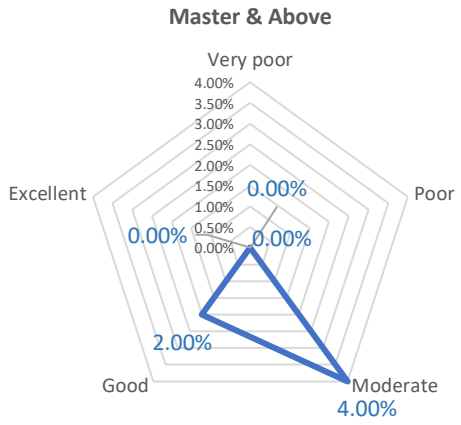

Figure 11: Awareness of residents with Master and above.

Figure 8 to Figure 11 illustrate the differences between education level of the residents and air quality severity in Taman Tasik Biru. Among respondents with SPM level, “Good” has the highest score (13.9%), followed by “Moderate” (11.9%) and “Excellent” (9.9%). Majority (16.8%) of the respondents with Diploma rated the air quality in Taman Tasik Biru as “Good”, while none of the respondents rated “Very Poor”. Besides that, respondents with Degree level considered the air quality as “Good” (14.9%) followed by “Moderate” (10.9%), while “Very Poor” remained 0.0%. Next, it can be seen clearly that “Moderate” has the highest score (4.0%) among respondents with Master and above, “Good” came in second place (2.0%) and “Very poor”, “Poor” and “Excellent” have none.

Lastly, the null hypothesis for this test found out that there is no association between education level of the residents and air quality severity in Taman Tasik Biru as seen in Table 3. From the Chi-Square tests, it was observed that the Pearson Chi-Square statistic is 15.432, and the degree of freedom is 12. The p-value of the test is 0.219 which is greater than 0.05, indicating that there is no significant difference and the null hypothesis is accepted. The minimum expected count for this test is 0.06, which is less than 1. Hence the results are not conclusive. It can be concluded that there is not enough evidence to suggest an association between respondents’ education level and air quality awareness.

Chi Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.432[a]	12	.219
Likelihood Ratio	16.215	12	.182
Linear-by-Linear Association	1.638	1	.201
N of Valid Cases	101		

a. 13 cells (65.0%) have expected count less than 5. The minimum expected count is .06.

Table 3: Chi-Square Test for relationship between education level of the residents and their perceived severity towards air quality in the neighbourhood.

4.0 DISCUSSION

Based on the demographic information (Table 1), it can be seen that the total number of respondents who managed to answer the survey during the given time frame was only 101 respondents, even though the calculated sample size was supposed to have 223 respondents. This is the limitation of this study due to current situation. Covid-19 pandemic has caused a lot of restrictions in terms of movement and contact. Therefore, the survey can only be distributed among Taman Tasik Biru residents through instant messaging application, WhatsApp. Unfortunately, the WhatsApp group does not include every house dweller, therefore the survey couldn't reach its targeted sample size.

The first objective of this study is to determine the residents' perceived severity towards air quality in Taman Tasik Biru. Results from the survey show that the subjective evaluation of air quality in the neighbourhood differs significantly between "Poor" and "Good". Only 4% of the total respondents rated the air quality as "Poor", while "Good" has the highest (47.5%) male and female respondents in total. Even

though it appears that total percentage of male respondents is lower than female, but majority of male respondents rated the air quality as “Good”.

According to Latif et al., (2018), during this pandemic period starting from March 2020, there was a decrease in the concentration of air pollutants within the Klang Valley, specifically Particulate Matter (PM) 10, PM2.5, nitrogen dioxide (NO_2) and carbon monoxide. The highest decrease was recorded for NO_2 with the percentage until -72%, whereas SO_2 and ozone (O_3) both showed fluctuation trend based on different locations. Hence, it can be concluded that the air quality in Taman Tasik Biru was good, resulting in the highest percentage of respondents in the rating. Moreover based on a nationwide study conducted by (Mei et al., 2016), environmental awareness including air pollution and behaviour from thirteen States and three Federal Territories were examined. The result revealed current level of environmental awareness and behaviour among Malaysians, where they are are equally aware and concern about air pollution. The study also stated that Malaysian awareness towards air quality deterioration and haze hindrance is ratified.

Based on residents’ health risk perception as displayed in Table 3, this data shows that aggregate measures of health risk perception (perceived severity, worry, and controllability beliefs) differed or did not differ between the respondents. The result percentage for the first question is a combination of “Dangerous” and “Extremely dangerous”, where both answers indicate a risk to health. Consequently, more than half (78.3%) agreed that air pollution is dangerous to health. The second question identifies respondents’ worries regarding the effects of air pollution to health. A combination of “Very worried” and “Extremely worried” was obtained, resulting in

86.2%. This means, majority of the respondents showed a sign of worry to the health risk of air pollution. This is somehow associated with previous research, where clinics in the Klang Valley reported a spike in the number of patients seeking treatment for cough and respiratory infection as the air quality worsened, and haze continued to blanket parts of Malaysia (Kanyakumari, 2019).

Other than that, regarding the possibility to reduce exposure to air pollution, 27.7% of the respondents reported believing that limiting their exposure to air pollution is out of their control. However, the evidence on controllability and self-efficacy beliefs in response to outdoor air pollution is really limited. From investigative qualitative research prior to this study, a low level of perceived behavioural control among participants was expected. Nevertheless, 52.5% of the respondents considered it was under control. These results suggest that controllability beliefs regarding the exposure to the risks from air pollution may be independent and subjective. The health risk perception combined with high level of knowledge on self-protective actions against air pollution among the respondents might explain the result (Oltra & Sala, 2018).

Uncertainty exists with regards to the association of air quality severity and education level of the residents in Taman Tasik Biru. Based on the Chi-Square Tests, null hypothesis is accepted because the p-value of the test is greater than 0.05. It has been found that education level does not portray individual's opinion on the severity of air quality, since it does not require any professional knowledge to assess. There were also past studies that have not found a significant association between the two. According to Semenza et al., (2008), individuals with lower levels of education and

income were found to be likely to perceive air quality as poor. However at the end of the discussion, it was concluded that the relationship between education and environmental perception or awareness remains controversial.

5.0 CONCLUSION

Residential area is supposed to be a safe place for people to seek shelter, and the air quality should be free from any pollution. This study revealed current understanding of residents' perceived severity towards air quality in Taman Tasik Biru, their health risk perception, controllability and self-protective actions due to air pollution. Besides that, this study also analysed the relationship between education level of the respondents and their perceived severity towards air quality in the neighbourhood. Since uncertainty exists between the two association, it can be concluded that high education level does not determine the air quality awareness and perception in an individual. More improvements can be made by the residents, such as disseminating information on how to rate air quality or read Air Pollution Index (API) and share online sources like websites, e-posters and educational pictures. This way, the residents will be able to understand the severity of air quality in the area, as it will also help them to avoid any dangerous condition relating to air pollution.

To sum up, the results show that personal and surrounding factors have to be taken into account to understand the residents' perception and severity of air quality. Communications on air quality would ideally incorporate the findings from this questionnaire survey, as these may aid in the design and evaluation of more effective interventions aimed at helping the residents to be aware of air pollution, reduce exposure and improve their health.

6.0 REFERENCES

Air Pollutant Index (API). (2020, November). Retrieved November 4, 2020, from https://www.doe.gov.my/portalv1/en/info-umum/english-air-pollutant-index-api/100

Air Pollutant Index of Malaysia. (2020). Retrieved November 4, 2020, from http://apims.doe.gov.my/public_v2/home.html

Air Pollution. (2020). Retrieved November 3, 2020, from https://www.who.int/health-topics/air-pollution

Azmi, S. Z., Latif, M. T., Ismail, A. S., Juneng, L., & Jemain, A. A. (2010). Trend and status of air quality at three different monitoring stations in the Klang Valley, Malaysia. *Air Quality, Atmosphere and Health*, *3*(1), 53–64.

Egondi, T., Kyobutungi, C., Ng, N., Muindi, K., Oti, S., van de Vijver, S., Ettarh, R., & Rocklöv, J. (2013). Community perceptions of air pollution and related health risks in Nairobi slums. *International Journal of Environmental Research and Public Health*, *10*(10), 4851–4868.

Halim, N. D. A., Latif, M. T., Mohamed, A. F., Maulud, K. N. A., Idrus, S., Azhari, A., Othman, M., & Sofwan, N. M. (2020). Spatial assessment of land use impact on air quality in mega urban regions, Malaysia. *Sustainable Cities and Society*, *63*(August), 102436.

Kanyakumari, D. (2019, September 16). More people fall sick as haze worsens in Malaysia. Retrieved December 20, 2020, from https://www.channelnewsasia.com/news/asia/malaysia-haze-fall-sick-patients-respiratory-problems-fires-11902668

Latif, M. T., Othman, M., Idris, N., Juneng, L., Abdullah, A. M., Hamzah, W. P., Khan, M. F., Nik Sulaiman, N. M., Jewaratnam, J., Aghamohammadi, N., Sahani, M., Xiang, C. J., Ahamad, F., Amil, N., Darus, M., Varkkey, H., Tangang, F., & Jaafar, A. B. (2018). Impact of regional haze towards air quality in Malaysia: A review. *Atmospheric Environment*, *177*(June 2017), 28–44.

Liao, X., Tu, H., Maddock, J. E., Fan, S., Lan, G., Wu, Y., Yuan, Z. K., & Lu, Y. (2015). Residents' perception of air quality, pollution sources, and air pollution control in Nanchang, China. *Atmospheric Pollution Research*, *6*(5), 835–841.

Mei, N. S., Wai, C. W., & Ahamad, R. (2016). Environmental Awareness and Behaviour Index for Malaysia. *Procedia - Social and Behavioral Sciences*, *222*(07), 668–675.

Mirabelli, M. C., Ebelt, S., & Damon, S. A. (2020). Air Quality Index and air quality awareness among adults in the United States. *Environmental Research*, *183*(October 2019), 109185.

Oltra, C., & Sala, R. (2018). Perception of risk from air pollution and reported behaviors: a cross-sectional survey study in four cities. *Journal of Risk Research*, *21*(7), 869–884.

Semenza, J. C., Wilson, D. J., Parra, J., Bontempo, B. D., Hart, M., Sailor, D. J., & George, L. A. (2008). Public perception and behavior change in relationship to hot weather and air pollution. *Environmental Research*, *107*(3), 401–411.

Zhao, F., Zhao, Z. hua, & Ma, J. xue. (2020). Influence of air quality on the selection tendency of contact lens wearers. *Contact Lens and Anterior Eye*, *43*(5), 469–471.

7.0 APPENDICES

Appendix 1: Demographic Information of Participants

1. Age *
   Umur

   Mark only one oval.

   - ◯ 18 - 24
   - ◯ 25 - 34
   - ◯ 35 - 44
   - ◯ 45 and Above / 45 dan keatas

2. Gender *
   Jantina

   Mark only one oval.

   - ◯ Male / Lelaki
   - ◯ Female / Perempuan

3. Race *
   Bangsa

   Mark only one oval.

   - ◯ Malay / Melayu
   - ◯ Chinese / Cina
   - ◯ Indian / India
   - ◯ Bumiputera (Sabah or Sarawak)
   - ◯ Other: _____

4. Education Level *
   Tahap Pendidikan

   Mark only one oval.

   - ◯ SPM / Sijil Pelajaran Malaysia
   - ◯ Diploma / Diploma
   - ◯ Degree / Ijazah Sarjana Muda
   - ◯ Master and above / Ijazah Sarjana dan keatas

5. Household Income *
Pendapatan Isi Rumah

Mark only one oval.

- ◯ <RM3,000
- ◯ RM3,001 - RM5,000
- ◯ RM5,001 - RM10,000
- ◯ >RM10,000

6. Do you or your family members have any respiratory disease / health condition which is caused by poor air quality? *
Pernahkan anda atau ahli keluarga anda mempunyai penyakit pernafasan / keadaan kesihatan yang disebabkan oleh kualiti udara yang buruk?

Mark only one oval.

- ◯ Yes / Ya
- ◯ No / Tidak

7. Have you or your family member has been hospitalized due to respiratory diseases which is caused by poor air quality before? *
Pernahkan anda atau ahli keluarga anda dimasukkan ke hospital kerana penyakit pernafasan disebabkan oleh kualiti udara yang buruk sebelum ini?

Mark only one oval.

- ◯ Yes / Ya
- ◯ No / Tidak

Part B

To determine the awareness among residents of Taman Tasik Biru regarding air quality.
Untuk mengetahui kesedaran di kalangan penduduk Taman Tasik Biru mengenai kualiti udara

1. Very poor / sangat buruk
2. Poor / Buruk
3. Moderate / Sederhana
4. Good / Baik
5. Excellent / Sangat Baik

1. Never / Tidak pernah
2. Rarely / Jarang-jarang
3. Sometimes / Kadang-kadang
4. Always / Selalu

Appendix 2: To determine awareness of air quality among participants.

8. To what extent do you perceive the quality of the air in your neighbourhood? *
Sejauh mana anda melihat kualiti udara di kawasan persekitaran anda?

Mark only one oval.

	1	2	3	4	5	
Very Poor / Sangat Buruk	◯	◯	◯	◯	◯	Excellent / Sangat Baik

9. To what extent do you perceive the quality of the air in the neighbourhood where you travel frequently for work or stud *
Sejauh mana anda melihat kualiti udara di kawasan tempat anda semasa pergi bekerja atau belajar?

Mark only one oval.

	1	2	3	4	5	
Very Poor / Sangat Buruk	◯	◯	◯	◯	◯	Excellent / Sangat Baik

10. When you go out from your house or place of work, do you pay attention to the quality of the air you are breathing? *
Semasa anda keluar dari rumah atau tempat kerja anda, adakah anda memperhatikan kualiti udara yang anda hirup?

Mark only one oval.

	1	2	3	4	
Never / Tidak Pernah	◯	◯	◯	◯	Always / Selalu

11. During the last month, and due to air pollution, have you ever thought that your quality of life has diminished? *
Selama satu bulan yang lalu, dan disebabkan oleh pencemaran udara, adakah anda pernah berfikir bahawa kualiti hidup anda menurun?

Mark only one oval.

- ◯ Yes / Ya
- ◯ No / Tidak
- ◯ Maybe / Mungkin

12. Over the past month, have you been annoyed by outdoor air pollution (from traffic and other sources)? *
Selama satu bulan yang lalu, adakah anda terganggu dengan pencemaran udara luar (dari lalu lintas dan sumber lain)?

Mark only one oval.

- ◯ Yes / Ya
- ◯ No / Tidak

In general, if you are walking through the city and perceive that the air is too polluted (e.g. from cars, industry), to what extent do you
Secara amnya, jika anda berjalan-jalan di bandar dan merasakan udara terlalu tercemar (mis. Dari kereta, industri), sejauh mana anda

13. Ignore or continue your activities? *
Abaikan atau teruskan aktiviti anda?

Mark only one oval.

- ◯ Ignore / Abaikan
- ◯ Continue / Teruskan

14. Get angry? *
Terasa marah?

Mark only one oval.

	1	2	3	4	
Never / Tidak pernah	◯	◯	◯	◯	Always / Selalu

15. Look for a less polluted area? *
Mencari kawasan yang kurang tercemar?

Mark only one oval.

	1	2	3	4	5	
Never / Tidak pernah	◯	◯	◯	◯	◯	Always / Selalu

16. Have you ever sought information (via the Internet, the press, etc.) about the levels of air quality in your city? *
Pernahkah anda mencari maklumat (melalui Internet, akhbar, dll.) mengenai tahap kualiti udara di bandar anda?

Mark only one oval.

- ◯ Yes / Ya
- ◯ No / Tidak
- ◯ Maybe / Mungkin

17. Have you ever consulted the air quality index provided by the city council? *

Pernahkan anda berunding dengan indeks kualiti udara yang disediakan oleh majlis bandar?

Mark only one oval.

- Yes / Ya
- No / Tidak
- Maybe / Mungkin

18. Because of air pollution, have you ever complained to the responsible authorities or industry? *

Disebabkan pencemaran udara, adakah anda pernah mengadu kepada pihak berkuasa atau industri yang bertanggungjawab?

Mark only one oval.

- Yes / Ya
- No / Tidak
- Maybe / Mungkin

Part C

To assess the residents' health risk perception on air quality.
Untuk menilai persepsi risiko kesihatan penduduk terhadap kualiti udara

1. Not at all distressed / Sangat tidak tertekan
2. Slightly distressed / Sedikit tertekan
3. Moderately distressed / Sederhana tertekan
4. Very Distressed / Sangat tertekan
5. Extremely distressed / Terlampau tertekan

1. Not at all dangerous / Sangat tidak bahaya
2. Slightly dangerous / Sedikit bahaya
3. Moderately dangerous / Sederhana bahaya
4. Very dangerous / Sangat bahaya
5. Extremely dangerous / Terlampau bahaya

1. Not at all worried / Sangat tidak merisaukan
2. Slightly worried / Sedikit merisaukan
3. Moderately worried / Sederhana merisaukan
4. Very worried / Sangat merisaukan
5. Extremely worried / Terlampau merisaukan

1. Totally out of my control / Sangat diluar kawalan
2. Slightly out of my control / Sedikit diluar kawalan
3. Under my control / Dibawah kawalan
4. Totally under my control / Sangat dibawah kawalan

19. During the last month, due to air pollution, have you had difficulties breathing? *

Selama satu bulan yang lalu, disebabkan oleh pencemaran udara, pernahkan anda mengalami kesukaran bernafas?

Mark only one oval.

	1	2	3	4	
Never / Tidak pernah					Always / Selalu

Appendix 3: To assess the participants' health risk perception on air quality.

20. During the last month, did you feel distress by air pollution? *
Selama sebulan terakhir, adakah anda merasa tertekan dengan pencemaran udara?

Mark only one oval.

	1	2	3	4	5	
Not at all distressed / Sangat tidak tertekan	◯	◯	◯	◯	◯	Extremely distressed / Sangat tertekan

21. To what extent do you think that air pollution is dangerous to your health? *
Sejauh mana anda berpendapat bahawa pencemaran udara berbahaya untuk kesihatan anda?

Mark only one oval.

	1	2	3	4	5	
Not at all dangerous / Sangat tidak bahaya	◯	◯	◯	◯	◯	Extremely dangerous / Sangat bahaya

22. To what extent do you feel worried about the effects of air pollution on your health? *
Sejauh mana anda merasa risau akan kesan pencemaran udara terhadap kesihatan anda?

Mark only one oval.

	1	2	3	4	5	
Not at all worried / Sangat tidak merisaukan	◯	◯	◯	◯	◯	Extremely worried / Sangat merisaukan

23. Regarding the possibility to reduce your exposure (vulnerability) to air pollution, to what extent do you consider it is under your control? *
Mengenai kemungkinan untuk mengurangkan pendedahan anda terhadap pencemaran udara, sejauh mana anda menganggap hal itu berada di bawah kawalan anda?

Mark only one oval.

	1	2	3	4	
Totally out of my control / Sangat diluar kawalan	◯	◯	◯	◯	Totally under my control / Sangat di bawah kawalan

24. Do you think there are actions that you can take to protect yourself from air pollution (to reduce your exposure) *
Adakah anda fikir terdapat tindakan yang boleh anda lakukan untuk melindungi diri anda dari pencemaran udara (bagi mengurangkan pendedahan anda)

Mark only one oval.

◯ Yes / Ya
◯ No / Tidak

During the last month, and due to air quality, have you ever
Selama satu bulan yang lalu, dan kerana kualiti udara, pernahkah anda

25. Changed your leisure activities? *
Mengubah aktiviti riadah anda?

Mark only one oval.

- Yes / Ya
- No / Tidak
- Maybe / Mungkin

26. Avoided physical exercise outdoors? *
Mengelakkan senaman fizikal di luar rumah?

Mark only one oval.

- Yes / Ya
- No / Tidak
- Maybe / Mungkin

27. Used a face mask? *
Menggunakan pelitup muka?

Mark only one oval.

- Yes / Ya
- No / Tidak
- Maybe / Mungkin

Your participation is highly appreciated. Thank you very much!
Penyertaan anda amat dihargai. Terima kasih!