

A Study Case on Noise Pollution to the Residential Areas Along Jalan Kluang, Batu Pahat, Johor

Muhamad Haffiz Abdul Rahim¹, Yean Ghing Tong^{1*}

¹Faculty of Civil Engineering and Built Environment,
Universiti Tun Hussein Onn Malaysia, Batu Pahat, 86400, MALAYSIA

*Senior Lecturer, Faculty of Civil Engineering and Built Environment, Universiti Tun Hussein Onn Malaysia

DOI: <https://doi.org/10.30880/rtcebe.2023.04.03.021>

Received 06 January 2022; Accepted 15 May 2023; Available online 31 December 2023

Abstract: In recent year, noise pollution has become a common environmental problem, especially in developing cities. It is one of the most significant urban environmental issues affecting people's daily life and health. The aims of the study are to identify the factors and effects of noise pollution in residential area along Jalan Kluang and evaluate the acoustic comfort of the resident areas. The residential areas located near to heavy traffic road of Jalan Kluang including Taman Pura Kencana, Taman Gading 1, and Taman University were chosen in this study. Questionnaire has been developed based on the literature review. Expert reviews have been carried before distributing to the respondents. Total number of respondents that have been collected were 72 respondents. The results showed that the main factors of noise pollution in the residential area are noise that produced from construction activities, inside the house, nearby neighbourhood, and traffic road. From the survey, noise from the neighbourhood nearby recoded the highest means score of at 4.40 using 5 Likert scale which was obtained from respondents living in Taman Universiti. For the effect of noise pollution, the highest data that has been collected was sleep disturbance at Taman Universiti which obtained the mean value of 4.40. The study the acoustic comfort of the respondents in their residential areas was considered good.

Keywords factor noise pollution, effect noise pollution, acoustic comfort

1. Introduction

Noise pollution is the unwanted sound that disturbing surrounding that disrupting daily activities. Noise pollution has become a common environmental problem in recent years, especially in developing cities. Noise pollution can make negative effect to the human health such as lack of sleep, stress, loss of productivity in daily activities and lack concentration. In general, noise pollution can be come from industry area, community, traffic noise, and nearby construction area. For example, the noise from construction area can come from activities like piling works, demolish, excavation, and earthwork.

*Corresponding author: ygtong@uthm.edu.my

2021 UTHM Publisher. All rights reserved.

publisher.uthm.edu.my/periodicals/index.php/rtcebe

According to the World Health Organization (WHO)[1], noise from the traffic is ranked as the second most dangerous environmental impact after air pollution in Europe. Industry area also contributes to noise pollution with the compact area with the high and heavy machineries usage. In Europe, the major contributor of noise pollution in most cities is noise from the transportation industry which affect the public health [2].

Malaysia also having the problem of noise pollution from many factors especially in the big and crowded populated cities like Kuala Lumpur. This urban noise can cause negative effects to the human such as annoyance, sleep disturbance, stress, and health. For residential areas in Malaysia, the DOE has set up guideline and noise exposure limit for Residential area was 55dBA in order to protect the population from this urban noise. The noise exposure limit must not be higher to make sure the residents will not be affected by the noise. The noise pollution becomes worse especially when traffic, construction area, neighbourhood area and industry area growth with the population and economy have also grown rapidly.

2. Noise pollution factor, effect and acoustic comfort

The feeling of well-being experienced by a person while engaging in an activity within a sound field (direct & reverberation) is described as acoustic comfort. It provides no interference, good reception, and good speech intelligibility when it comes to the acoustic quality of places. On the other hand, noise is a situation where humans are not comfortable or unpleasant with the sound. Acoustic comfort is a comfort that is tasted and felt comfortable by self on its own sound level and quality [3]. Acoustic comfort gives the calmness to the nearby area that does not have a sound unnecessary noise or unpleasant noise.

Table 1 : Summary of journals and its outcome

No	Author/Year	Factor/effect noise pollution
1	Ioana et al., (2016)	Noise pollution from construction area.
2	Tolga and Cenk (2016)	Noise pollution from construction area.
3	Jaana I. Halonen (2015)	Noise pollution from traffic noise.
4	Fahd Ligar Tinimbang et al., (2020)	Noise pollution from traffic noise.
5	Nur Shazwanie roshean et al., (2019)	Noise pollution from traffic noise
6	Bronzaft A,2007	Noise pollution from neighborhood noise
7	Jiho lee (2020)	Noise pollution from neighborhood noise.
8	Yoshioka-Maeda K., (2014)	Noise pollution from neighborhood noise
9	Azodo, et al. (2019)	Noise pollution from industrial noise.

10	Samir N.Y Gerges et al., 2001	Noise pollution from industrial noise
11	E. Atmca & A. Atlin, (2005)	Noise pollution from industrial noise
12	Ilona Paozalyte1 et al., (2001)	Noise pollution from railway noise
13	Wei Wang et al., (2014).	Noise pollution from traffic noise
14	Stephen, (2015).	Sleep disturbances, stress, and effect to the cardiovascular.
15	Hiral J. Jariwala et al., (2017).	Sleep disturbances, hearing impairment, and effect to the cardiovascular.
16	Mahendr (2017)	Hearing Impairment.
17	Demian Halperin, (2014),	Sleep disturbance and effect to the cardiovascular.

Table 1 shows the summaries of previous case studie. The result showed noise pollution from traffic noise recorded the highest number for the factor of noise pollution. Based on literature reviews, the most significant effect of noise pollution to the residents were. Sleep disturbance and risk of to cardiovascular disease.

3. Methods and procedure

The purpose of the research design is to offer a suitable framework for a study. The decision to be made about research strategy is a very important decision in the research design process since it affects how relevant information for a study will be gathered the research design process contains several interconnected decisions. [4]. According Kerlinger [5], research design is the plan and structure of an investigation that is designed to answer research questions. From the formulation of hypotheses and their operational implications to the final data analysis, the plan lays out what the investigator will undertake.

3.1 Location of study

The locations of the case study that located along Jalan Kluang. Jalan Kluang is the main road connected between the towns of Batu Pahat, Ayer Hitam, and Kluang which has the total length of 46.7km the selected residential areas in this study were Taman Pura Kencana that cover around 664,794.94 m², Taman Gading 1 which around 13,843.87 m² and Taman University that has area coverage around 410,546.62 m².

3.2 Data collection

This case study aims to identify the factors and effects of noise pollution in residential areas along Jalan Kluang. The data collection has been carried out through the questionnaire survey. The questionnaire was developed based on literature review and it was sent to experts for review before distributed to the respondents.

3.3 Questionnaire

The questionnaire has been divided into four parts as part, part A,: demographic of respondent, Part B, : the factors and effects of noise pollution in residential areas, and part C : acoustic comfort of the respondents. . The 5-likert scale were used in the questions in part B and part C which showed in Table 2. Thus, the mean values based on 5-likert scale was used in the analysis later as shown in Eq. (1).

Table 2: Level of choice for Respondent

Level of choice				
1	2	3	4	5
Not Satisfactory	Less Satisfactory	Satisfactory	Good	Very Good

$$\begin{aligned}
 & [(\text{number of people who selected response 1}) * 1 + (\text{number of people who selected response 2}) \\
 & * 2 + (\text{number of people who selected response 3}) * 3 + (\text{number of people who selected response} \\
 & 4) * 4 + (\text{number of people who selected response 5}) * 5] / (\text{total number of respondents}) \qquad \text{Eq. (1)}
 \end{aligned}$$

3.4 Expert Review

Expert review is a small study that has been done first to test and identify problems before the questionnaire study is conducted. The first expert review was conducted by an expert who is a lecture that have experience in survey for more than 10 years. The second expert was the Chief of community “Penghulu” which has been experiencing in managing the residents for 7 years. The main function of this expert review procedure is to make sure that the questions in the survey were clear and easy to understand and at the same time the aims of the study can be achieved based on the output of the survey. The questionnaire then was distributed to the respondents.

2.5 Actual survey

In actual survey the questionnaires transform done into google form. Then, the questionnaires were distributed to the residents by using email and applications such as WhatsApp’s and Telegram. The main target of respondent was 3 residential areas that have been appointed. Data analysis is a step that must be carried out after obtaining the data that collected from the respondents. 100 questionnaires were targeted in this survey, but only 74 returned responds were collected.

4. Results and Discussion

This chapter discusses the results and analysis obtained through the questionnaire survey that have been distributed to respondents at Taman Universiti, Taman Pura Kencana, and Taman Gading 1. The respondents have provided encouraging feedback through the distributed of questionnaires which were conducted in November 2021

Table 3: Summary of factors and effect of noise pollution

Factors and effects of noise pollution in residential area along Jalan Kluang.	Not agree	Less agree	Not Sure	Agree	Strongly agree	Total Respondent	Average	Classification
	1	2	3	4	5			
Taman Universiti Construction area or site nearby the residential area or house produce noise	0	0	0	24	3	27	4.11	Agree
Taman Pura Kencana Construction area or site nearby the residential area or house produce noise.	1	2	1	8	3	15	3.67	Agree
Taman Universiti There is noise coming from the neighbourhood nearby.	1	2	2	9	22	36	4.40	Agree
The factor of noise pollution is the noise that produced inside the house.	1	2	2	10	21	36	4.30	Agree
The traffic noise from Jalan Kluang (Batu Pahat- Air Hitam) become the factor of noise to the residential area or house.	0	5	5	24	2	36	3.63	Agree
Taman Pura Kencana The factor of noise pollution is the noise that produced inside the house.	2	4	6	12	7	31	3.58	Agree
Taman Gading 1 The traffic noise from Jalan Kluang (Batu Pahat- Air Hitam) become the factor of noise to the residential area or house.	1	1	0	2	3	7	3.71	Agree
Taman Universiti Noise pollution in residential area or house become the factor of sleep disturbance.	1	2	1	9	23	36	4.40	Agree
Noise pollution in residential area or house become the factor of stress.	0	3	1	22	10	36	4.08	Agree

3.1 Results

A total of 27 residents from Taman Universiti responded that there is construction noise created at their residential area. From the analysis majority of respondents that having noise pollution from construction noise was agree that construction noise was the factor of noise pollution in their residential by using Likert Scale formula. 15 respondents in Taman Pura Kenana are responded. From the analysis majority of respondents that having noise pollution from construction noise was agree that construction noise was the factor of noise pollution in their residential.

The noise coming result clearly shows that residents in Taman Universiti agree there is noise coming from the neighbourhood nearby. The first and highest factor that has been highlight for respondent were neighbourhood from the neighbourhood nearby also increase rapidly. With the availability of public facilities such as Tesco, McDonald's, Family Mart, shops lot and other else, Taman Universiti to be the focus area of the surrounding population. For the second highest factor, the noise that produced inside the house, majority respondent was agree that the noise was come from inside the house itself. This is because of the period of during the Movement Control Oder (MCO). All industry was shut down and reopened in stages according to the Covid-19 current situation. With the school and work were from home, the noise was produced and increase inside the house. For the effect from traffic noise the result show that majority of the respondent agree that become the factor of noise to the residential area or house. With the increase of the vehicle nowadays, the noise from the traffic also will be increase. From previous study [6] two locations of residential areas along Jalan Kluang were recoded noise level higher than noise limit that set by DOE and other three locations were under the limit recommended by DOE. For the last factor of the noise pollution that coming from the industrial area nearby, the majority respondent showed less agree with the statement. This is because in Taman Universiti area do not have a heavy-duty industry like iron steel factory, cement factory, and textile factory that make la loud and high of noise.

Most of the residence at Taman Pura Kencana agree that the highest factor come from noise that produced inside the house. If we compare the number of kids in the house at Taman Pura Kencana is exceeded than Taman Universiti despite the number of respondents from Taman Universiti is more than Taman Pura Kencana. The total of kids will be affected to noise that produced inside the house. The more children are at home the louder the noise produced in the house. The factor from traffic noise and noise coming from the neighbourhood nearby are recoded as not sure. The layout of residential area of Taman Pura Kencana was less crowded than Taman Universiti. The orientation of Taman Pura Kencana also not close and crowded compared to Taman Universiti. With the availability of public facilities are less than Taman Universiti, Taman Pura Kencana are less receptive to impact from the noise of traffic noise and noise coming from the neighbourhood nearby. Same with Taman Universiti, Taman Pura Kencana also that show for last factor of the noise pollution that coming from the industrial area nearby, the majority respondents showed less agree with the statement. This is because in residential area of Taman Pura Kencana there are not heavy-duty industry that produce loud and high level of noise.

The only factor that the residence of Taman Gading 1 agree was noise pollution noise from traffic noise. Taman Gading 1 show the analysis that was the highest score by Lickert Scale that recoded 3.71 exceed that Taman Universiti and Taman Pura Kencana that both recoded just 3.63 and 3.22. This is because the residential area in Taman Gading is the closest area to Jalan Kluang that give the factor of traffic noise. For the factor the noise that produced inside the house and noise coming from the neighbourhood nearby the analysis shows both respondents are not sure. This is because the total of amount of house at Taman Gading 1 was having small number of houses. The area does not have crowded residence and the area of Taman Gading 1 do not have the availability of public facilities

nearby. Analysis on Taman Gading 1 show for last factor of the noise pollution that coming from the industrial area nearby, the majority respondent showed less agree with the statement. This is because in Taman Pura Kencana area do not have a heavy-duty industry that make la loud and high of noise.

For the effect of noise pollution there was four general effects were selected based on literature review. The first and highest effect was noise pollution in residential area or house become the factor of sleep disturbance, majority of respondent agree with the statement. Noise will disturb of human hearing and make sleep disturbance to residents. With the factor of noise coming from the neighbourhood nearby was the highest at Taman Universiti the effect to the residence is related to sleep disturbance. Based on previous study by [7], noise exposure can increase the heart rate and blood pressure. It will disturb the sleep quality and mode when the sleep was disturbed by road traffic noise. For second effect, noise pollution in Taman Universiti become the factor of stress. In the previous study also conclude noise can make the release of stress hormones that will be affected to the body. Stress will have a negative effect on human, like a negative effect to the cardiovascular that will bring an impact on the organ of humans [7]. Majority of this respondent agree with the statement that have been given. The noise that disturbs surrounding conditions while study or work at house can make people stress and gave more burden to them. Most of the respondent was not sure about noise pollution in residential area or house become the factor of hearing impairment. The last effect for noise pollution were noise become the factor of hypertension, cardiovascular or heart problem. For this question the feedback that were obtained respondent are not sure that noise pollution in residential area or house become the factor of hypertension, cardiovascular or heart problem.

For Taman Pura Kencana all the effect that given are recoded not sure by the respondents. With the less amount of factor noise pollution compared to Taman Universiti, the residence of Taman Pura Kencana show there are not sure about affected by noise pollution on their residential. With the small of area and less of crowded residence in Taman Gading 1, the noise pollution does not give the effect to the residence.

The analysis of evaluation at Taman Universiti on the acoustic comfort of the respondents in residential areas in the morning, majority of respondent was good. It showed that are less of noise at the residential area of respondents in the morning. For the evaluation of noise in residential area or house in the afternoon, evening and night, the respondents just satisfactory for that time. The noise level is increase after morning and the quality of sound surrounding was in a satisfactory quality. Next question was evaluated between weekdays and weekends. The result showed the noise are in a satisfactory for respondents. After that the question also evaluated the noise at residential area or house during the Movement Control Oder (MCO). Majority of the respondent was chosen satisfactory. Last question was evaluated the overall noise level at their residential area or house. A solid satisfactory has been selected by the respondent. This shows they are satisfied with feel comfortable with their living environment.

Taman Pura Kencana showed that are less of noise at the residential area of respondents in the morning. Same with Taman Universiti, Taman Pura Kencana also shows the evaluation of noise in residential area or house in the afternoon, evening and night, the respondents just satisfactory for that time. The noise level is increase after morning and the quality of sound surrounding was in a satisfactory quality. Next was evaluation on weekdays and weekends, both result shows the result just satisfactory. The level of noise in residential area or house during the Movement Control Oder (MCO) was good by analysis. For the overall at Taman Pura Kencana shows the result was satisfactory based on the analysis. This show overall residents of Taman Pura Kencana shows they are satisfied with feel comfortable with their living environment.

In Taman Gading 1, different with Taman Universiti and Taman Pura Kencana, the result shows the evaluation of noise in residential area or house in the morning, afternoon, evening and night, the result shows a good for that time. During evaluation on weekdays and weekends, both result shows the

result shows was good. A solid good also achieve noise in residential area during the Movement Control Oder (MCO). Lastly, the result shows a good for overall noise level in Taman Gading 1. This result affected by the factor and effect that less between two more residential area. For Taman Gading 1, there are in good acoustic conform for the residence.

5. Conclusion

The conclusion should summarize the main findings of the study, and restate the key points inferred from trends observed and discussed regarding the data. Some suggestions should be included to encourage the continuation of the current research.

Table 3 showed summary of factor of noise in residential area

Factor of noise	Noise from Construction	Noise from the produced inside the house.	Noise coming from the neighbourhood nearby.	Noise coming from traffic noise
Taman Universiti	√	√	√	√
Taman Pura Kencana	√	√	X	X
Taman Gading 1	X	X	X	√

Table 3 showed the summary of factor of noise. The factor of noise pollution that have been identify at Taman Universiti are noise coming from the neighbourhood nearby recorded average 4.4. Taman Universiti has a high population and a lack of vacant or derelict houses. This will increase the noise coming from the neighbourhood nearby. The second factor are noise pollution is the noise that produced inside the house with an average amount 4.3. With the current situation, all people that work or study from home will increase the sound surrounding inside the houses. The third highest at Taman Universiti is noise come from construction area or site nearby the residential area with the average 4.11. This show that the residence of Taman Universiti is disturb by the construction that growth at the residential nearby. There is new residential area back in Taman University and half of Apartment Taman Universiti are still in progress on construction. The last factor that has been identify is noise from the traffic with average 3.63 was recorded. With the growth of population in Batu Pahat, the number of vehicle and road user Jalan Kluang will increase rapidly. For Taman Pura Kencana the highest factor that been analysis and shows noise from construction nearby are show at 3.67 average. Area nearby of Taman Pura Kencan also show disturb by the construction that growth at the residential nearby. According to pervious study by [8], the noise from the surrounding community and construction is one of the most significant contributors to environmental issues. There are one more factor that residence Taman Pura Kencana have been choose as factor. The factor of noise pollution is the noise that produced inside the house was recorded 3.58 as an average of the analysis. For the third location, Taman Gading 1, there are just one factor that have been identify. The respondent agrees that the traffic noise from Jalan Kluang (Batu Pahat- Air Hitam) become the factor of noise to the residential area or house with 3.71 in an average of the result.

Table 4 showed summary of effect of noise in residential area

Effect of noise	Noise pollution in residential area or house become the factor of sleep disturbance.	Noise pollution in residential area or house become the factor of stress.	Noise pollution in residential area or house become the factor of hypertension, cardiovascular or heart problem.	Noise pollution in residential area or house become the factor of hearing impairment.
Taman Universiti	√	√	X	X
Taman Pura Kencana	X	X	X	X
Taman Gading 1	X	X	X	X

Table 4 showed summary of effect of noise in residential area. For this study we can evaluate the effect noise pollution by the result from the respondents. Based on the result that have been analysis Taman Universiti recorded two effect that noise pollution to the residential. The first and highest effect was sleep disturbance. With the noise that disturb the residence, it will disturb of sleep residence. Next effect of noise pollution that have been evaluated was noise pollution in residential area become the factor of stress. When people do not have enough time for rest and sleep, they will become stress. With the noise also disturb the daily activities, residence become stress.

5.1 Acoustic comfort

For the acoustic comfort in residential area, Taman Universiti and Taman Pura Kencana get almost the same result. The conditions acoustic comfort in the morning only gets the result good in average. This show the noise at the morning was good and doesn't make a noise pollution for in residential areas. At Taman Gading 1 the result show that majority of residential are in good acoustic comfort in their residential areas. This is because Taman Gading have less of residence and the area of the residential are small compared to Taman Universiti and Taman Pura Kencana.

Acknowledgement

The authors would also like to thank the Faculty of Civil Engineering and Built Environment, Universiti Tun Hussein Onn Malaysia for its support.

References

- [1] World Health Organization (2011), Burden of disease form environmental noise: *Quantification of healthy life years lost in Europe*.
- [2] European Environment Agency (2017) Noise pollution is a major problem, both for human health and the environment.
- [3] Vardaxis, N.-G. (2017). *Evaluation of acoustic comfort in apartment buildings*. <https://www.researchgate.net/publication/342361202>
- [4] Aaker A, Kumar VD, George S. Marketing Research. New York: John Wiley & Sons Inc; 2000

- [5] Kerlinger, F. N. (1970). A Social Attitude Scale: Evidence on Reliability and Validity. *Psychological Reports*
- [6] Chandira Segaran, V., Yean Ghing, T., Haslinda Abas, N., Izzaty Azni, N., & Akmal Zairuddin, M. (2019). Assessment of Traffic Noise Pollutions Outside School, Residential, Hospital and Commercial Areas along Jalan Kluang, Batu Pahat, Johor.
- [7] Stephen. (2015). *Noise-Pollution-Research-Summary*.
- [8] Celik, T., & Budayan, C. (2016). How the Residents are Affected from Construction Operations Conducted in Residential Areas. *Procedia Engineering*