Knowledge, Attitude and Perception on Traffic Noise Pollution among Undergraduate Medical Students in Malaysia: A Cross-Sectional Study

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ABSTRACT

Noise is a persistent environmental hazard in our current world, and it arises from a diverse number of sources, and it is not taken as seriously as other sources of pollution. However, noise pollution can be regarded as the third most harmful factor in major cities. This study was conducted to assess the effects of noise pollution on undergraduate medical students in Malaysia as well as due to the limited amount of research on this topic. Therefore, a cross-sectional study was conducted from July 2022 to August 2022 among undergraduate medical students in a private medical university in Malaysia. A purposeful sampling method was utilized to enlist students and a questionnaire was used to collect data. The analysis is explained using frequency tables, percentages, standard deviations, unpaired t-test, and one-way ANOVA test. The effect of noise pollution on human health respondents, the highest number correctly answered was 95.9% for irritation and the lowest number was 30.6% for increased heart rate respectively. The next question was whether reflection levels of high-rise buildings were a factor in raising the level of noise pollution, 83.7% answered correctly and the third question was whether trees reduce noise pollution, 80.6% answered correctly. 73.5% answered correctly that retaining walls were effective to reduce traffic noise pollution and 68.4% correctly answered vegetation density was effective in reducing noise. A total of 51.0% answered creating walls was more effective in reducing noise pollution than using dirt hills next to highways, 87.8% were familiar with the suitable plant species for

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reducing sound, and 71.4% familiar with the suitable materials of the highway walls to reduce noise. And for the final questions, 57.1%, 80.6%, and 76.5% answered correctly on the knowledge level of students about the effects of noise pollution on human health. The mean score obtained was 14.5, whereby 56% had good knowledge regarding the effects of noise pollution on human health.

INTRODUCTION

Noise is an ever-present environmental hazard in the modern world from a wide variety of sources that contribute immensely to the environment [1]. Noise pollution is seen as the third most harmful factor in major cities [2]. Environmental education is a process through which individuals and society build social principles, knowledge, skills, attitudes, and competencies that are directed toward environmental conservation. This is a valuable resource for the sustainability and well-being of a community [3]. Environment noise does not initially show its effects, however, the long-term effects of exposure are harmful to individuals, as deafness deprives humans of communication and contact with others, leading to isolation and social alienation [3]. Avoiding loud noises is the best way to prevent hearing loss and other symptoms (tinnitus, difficulty understanding conversations, irritability, malaise, etc. [3]. The students must understand that environmental education is a deliberate social practice that should help them develop a social character in their relationships with nature and with other people. The objective is to improve the interaction between people and their environment so that it will teach them how to reduce traffic noise pollution [4].

Due to the increasing population, the quantity of vehicles would also keep increasing in proportion. Since most of the community is straightforward to be accessed and located using nearby roads, the rise in the number of vehicles will result in traffic noise that may cause disturbances to the community. Per Darvis and Cornwell, exposure to noise with 89 DBA for an hour in 24 hours is unacceptable for human hearing. Thus, it's important to understand the perspective of undergraduate medical students on traffic noise pollution [5]. It is clear from the above discussion that health effects of noise such as hypertension, myocardial infarction, stroke, mortality, dizziness, hypertension, and cognitive impairment are prevalent regardless of the sources of noise, which suggests the need to control all sources of noise [6].

In order to control the noise, various methods and equipment are made to control or minimize the noise from various places such as hospitals, educational institutions, and workplaces, and as undergraduate medical students we must understand that we can also play a part and make a difference within an institution [7]. Especially more so when knowing the effects range from cardiovascular disease to metabolic disorders [8]. To add on, the noise can seriously damage communication skills among one another,

memory capacity, and hearing of an individual and being undergraduate medical students, this is essential for the medical students to be aware of [9]. Students' learning outcomes are significantly impacted by their learning environment. Noise is a significant element that can distract students and cause concentration problems, anxiety, and headaches [10]. Traffic noise should be regulated, and if it is proven to be excessive, traffic can be prohibited to handle this issue in educational institutions. Bus stops for schools and colleges should be located away from those institutions. Institutions should not be built next to railroad tracks, airports, or other transportation hubs [11].

According to a study done to examine the effects of noise pollution in universities in Malaysia, noise beyond 65 DBA can be degrading to the general wellbeing of a person, livelihood, and the surroundings [12]. Furthermore, a study was conducted on the sound level measurements in Kuala Lumpur, Malaysia and it was found that the noise levels were around 75 and 85 DBA, and periodically the values went up to 90 DBA due to the increased traffic on the road, which in turn has transcended the standard levels allowed by WHO [13]. Although considered a nuisance, noise is a pollutant whose health effects are frequently overlooked due to accustomed action [14]. Thus, the behaviours received by people to limit these impacts of traffic noise pollution are great and quite responsive [15]. Few results of certain research show that increasing traffic noise has several adverse effects on people's health [16].

Previous studies investigated the knowledge, attitude, and practice of nurses towards noise in a public hospital in Palestine. Among the study subjects, it was found that there were deficiencies in knowledge, attitude, and behaviour [17]. Another study has been done related to the effect of traffic noise pollution on human work efficiency where it is clear that noise from traffic impacts people's ability to work efficiently [18]. Moreover, a study about noise pollution in urban environments was done in Iran where in most areas of the city, the noise levels were shown above what was considered to be tolerable [19]. Furthermore, a study regarding road-traffic noise and annoyance, risk perception, and noise sensitivity in the Finnish adult population was done where it was found that many Finnish people find that road traffic noise is extremely annoying and it poses a serious health danger, virtually on par with exhaust from moving vehicles [20]. All these studies have shown a significant relationship between traffic noise pollution and its effects on people's daily lives. This research aimed to assess the knowledge, attitude, and perception toward traffic noise pollution among undergraduate medical students in a private medical university in Malaysia.

METHODS

Study design and setting

The study is a cross-sectional study that was conducted for 6 weeks (July 2022 to August 2022) among undergraduate medical students in a private medical university in Malaysia. The target population of this study is undergraduate medical students from pre-clinical years and clinical years.

Sample size and sampling

The sample size (n) was calculated by using "Epi Info" version 7.2.5.0. The expected frequency of knowledge on the effects of noise pollution on human health is 87.7% [7]. The minimum sample size required with a confidence level of 95% and an acceptable margin of error of 6% is 88. Taking non-response percentage of 10% into consideration, the final sample size was 98.

The respondents were recruited by non-probability purposeful sampling. The students were invited to answer the questionnaire and students who provided informed consent, who were above the age of 18 years old, and MBBS undergraduate students were recruited. The exclusion criteria were pre-medical students, BDS undergraduate students, and those who did not provide informed consent.

Data collection

A questionnaire in the type of an online form (Google form) was created and distributed via social media, such as WhatsApp and email. The questionnaire comprised four parts: the demographics, knowledge, attitude, and perception of traffic noise pollution among undergraduate medical students in Malaysia. The questions were prepared based on the previous study conducted in Iran [7]. The demographics included gender, age, nationality, ethnicity, academic year, and preferred mode of travel. The second part showed the knowledge level of students about the effects of noise pollution on human health, which was "yes or no" question that consists of 11 questions. The mean of each respondent for a total of 11 questions on knowledge, "1" is given to a correct response to every question. The scores for each respondent were calculated out of 11. Knowledge level was categorised as good, and poor based on the mean score. The third part had 6 questions on the attitudes of students about the health effects of traffic noise pollution and its possible effects on people. The mean of each respondent for a total of 6 questions on attitude, was given five points: (1) Strongly disagree; (2) Disagree; (3) Neutral; (4) Agree; (5) Strongly agree for each question. The scores for each respondent were calculated out of 6. The attitude category was classified based on the mean score. The last part is the perception of students on ways to reduce traffic noise pollution which has

9 questions. The last two parts use five-point Likert scales ("strongly disagree," "disagree," "neutral", "agree", and "strongly agree"). The perception category was classified based on the mean score. In total, the questionnaire consists of 26 questions.

Data processing and analysis

Epi Info version 7.2.5.0 was used for analysis once data were entered into Microsoft Excel. The total score was determined regarding knowledge, attitude, and perception. The total score was calculated, and a higher number showed that the respondents have more knowledge, attitudes, and perceptions regarding traffic noise pollution. Higher scores indicated higher perceived knowledge, attitude, and perspective of the study. The independent variable used in this study were gender, age, nationality, ethnicity, academic year, and preferred mode of travel. The dependent variables used in the study were knowledge, attitude, and perception of traffic noise pollution among undergraduate medical students. Results were presented through frequency count and other descriptive statistics. The association between gender, age, nationality, ethnicity, academic year, the preferred mode of travel, and knowledge, attitude, and perception of traffic noise pollution among undergraduate medical students were assessed with inferential statistics. The significant level (p-value) will be set up at 0.05 with a 95% confidence interval.

Ethical consideration

The study information was provided to the respondents and informed consent was obtained. The decision to take part in this study was completely up to the participants. No incentives were offered to encourage participation, and participation was entirely voluntary. All information submitted by the research's participants was kept private and confidential and only be used for the intended purpose of the study. The participants' privacy and anonymity were maintained. The study protocol was submitted to the Research Ethics Committee, Faculty of Medicine, Manipal University College Malaysia (MUCM).

RESULTS

Table 1 shows the frequency and percentage of respondents under each independent variable such as age, gender, nationality, ethnicity, academic year, and preferred mode of travelling. As of age, it is divided into two categories which are younger or equal to 22 years old and older than 22 years old. Among 98 respondents, 62.2 % respondents were younger or equal to 22 years old and 37.8% respondents were older than 22 years old. Out of 98 respondents, 23.5 % were males and 76.5% were females. 86.7% were Malaysian and 13.3% were international students. Among 98 respondents, 8.2% were

Malay, 31.6% were Chinese, 45.9% were Indian and 14.3% were of other ethnicities. 13.3% were from pre-clinical years and 86.75% were from clinical years. As for preferred mode of travelling, 80.6% respondents prefer their own vehicle, 13.3% prefer public transportation and 6.1% prefer others (Table 1).

Table 1: Sociodemographic characteristics of respondents (n=98)

Variable	Frequency (%)
Age (years)	
≤22	61 (62.2)
>22	37 (37.8)
Gender	
Male	23 (23.5)
Female	75 (76.5)
Nationality	
Malaysian	85 (86.7)
International	13 (13.3)
Ethnicity	
Malay	8 (8.2)
Chinese	31 (31.6)
Indian	45 (45.9)
Others	14 (14.3)
Academic year	
Pre-clinical year	13 (13.3)
Clinical years	85 (86.7)
Preferred mode of travelling	
Own vehicle	79 (80.6)
Public transportation	13 (13.3)
Others	6 (6.1)

Table 2 shows the knowledge level of students about the effects of noise pollution on human health. A total of 11 questions were asked on knowledge and frequency, and percentage were calculated for each question. For question 1, the effect of noise pollution on human health, number of respondents correctly answered for irritation was 95.9%, aggression was 79.6%, headache was 89.8%, sleep disturbance was 88.8%, hearing loss was 66.3%, loss of focus was 91.8%, cognitive impairment in children was 49.0%, increased stress was 89.8%, increased blood pressure was 34.7%, and increased heart rate was 30.6% respectively. The next question was whether reflection levels of high-rise buildings were a factor in raising the level of noise pollution, 83.7% answered correctly and the third question was whether trees reduce noise pollution, 80.6% answered correctly. 73.5% answered correctly that retaining walls were effective to reduce traffic noise pollution and 68.4% correctly answered vegetation density was effective in reducing noise. A total of 51.0% answered creating walls was more effective in reducing noise pollution than using dirt hills next to highways, 87.8% were familiar with the suitable plant species for reducing sound, and 71.4% were familiar with the

suitable materials of the highway walls to reduce noise. For the final three questions were whether wind and its direction cause changes in the amount of noise pollution, whether the distance between residential houses and the street (at least 51 meters) reduce the amount of noise pollution, and whether car speeds have a significant effect on reducing traffic noise pollution, number of participants correctly answered were 57.1%, 80.6%, and 76.5% respectively (Table 2).

Table 2: Knowledge level of students about the effects of noise pollution on human health (n=98)

No	Item	Correct answer n (%)
1.	The following may or may not be the effect of noise pollution on human health. We are interested in your opinion.	
	Irritation	94 (95.9)
	Aggression	78 (79.6)
	Headache	88 (89.8)
	Sleep disturbance	87 (88.8)
	Hearing loss	65 (66.3)
	Loss of focus	90 (91.8)
	Cognitive impairment in children	48 (49.0)
	Increased stress	88 (89.8)
	Increased blood pressure	34 (34.7)
	Increased heart rate	30 (30.6)
2.	Are the reflection levels of high-rise buildings a factor in raising the level of noise pollution?	82 (83.7)
3.	Can trees reduce noise pollution?	79 (80.6)
4.	Is a retaining wall effective to reduce traffic noise pollution?	72 (73.5)
5.	Is vegetation density effective in reducing noise?	67 (68.4)
6.	Is creating walls more effective in reducing noise pollution than using dirt hills next to highways?	50 (51.0)
7.	Are you familiar with the suitable plant species for reducing sound?	86 (87.8)
8.	Are you familiar with the suitable materials of the highway walls to reduce noise?	70 (71.4)
9.	Is the wind and its direction causing changes in the amount of noise pollution?	56 (57.1)

10.	Does the distance between residential houses and the street (at least 51 meters) reduce the amount of noise pollution?	79 (80.6)
11.	Do car speeds have a significant effect on reducing traffic noise pollution?	75 (76.5)

Table 3 shows attitutes of the respondents about the health effects of traffic noise pollution and its possible effects on people. A total of 6 questions were asked on attitude and the frequency, percentage was calculated for each question. For the first question, regarding the noise of your surroundings (your workplace) is annoying, 40.8% of them answered neutral. For the question where there is a disturbing noise in your residential area, 37.8% respondents disagree. For the question "when you watch the TV, the traffic noise disturbs you", 43 % respondents disagrees while for the fourth question on the traffic noise causes insomnia, 40.8% agree. For the fifth question, on noise can cause fatigue and anger, a total of 65.3% respondents agrees. For the sixth question on mass media notification can be effective in controlling noise pollution, 42.9a% of them answered neutral 42.9% (Table 3).

Table 3: Attitudes of students about the health effects of traffic noise pollution and its possible effects on people (n=98)

No	**Item**	**Strongly Disagree n (%)**	**Disagree n (%)**	**Neutral n (%)**	**Agree n (%)**	**Strongly Agree n (%)**
1.	The noise of your surroundings (your workplace) is annoying.	7 (7.1)	14 (14.3)	40 (40.8)	27 (27.6)	10 (10.2)
2.	There is a disturbing noise in your residential area.	10 (10.2)	27 (27.6)	32 (32.7)	22 (22.4)	7 (7.1)
3.	When you watch the TV, the traffic noise disturbs you.	11 (11.2)	32 (32.7)	27 (27.6)	21 (21.4)	7 (7.1)
4.	The traffic noise causes insomnia.	9 (9.2)	25 (25.5)	24 (24.5)	26 (26.5)	14 (14.3)
5.	Noise can cause fatigue and anger.	0 (0)	10 (10.2)	24 (24.5)	45 (45.9)	19 (19.4)
6.	Mass media notification can be effective in controlling noise pollution.	4 (4.1)	14 (14.3)	42 (42.9)	30 (30.6)	8 (8.1)

Table 4 shows perception of 98 respondents on ways to reduce traffic noise pollution. Total of 9 questions were asked about their perception and the frequency, percentage was calculated for each question. For the first question, majority of them agree about to which extent do you agree that the following measures could reduce traffic noise pollution. The frequency and percentage of each measure regarding reducing speed limits was 62.3%, controlling traffic flow was 78.6%, special lane for heavy vehicles was 77.5%, noise barriers rail networks was 78.6%, low noise brake blocks was 75.5%, noise standards for vehicles was 69.3%, building insulation was 76.5%, changing driving styles was 51%, quiet road surfaces was 78.6%, low noise tyres was 75.5%, soundproofing barriers in home was 75.5%, plant trees in home was 68.4%, close the windows was 66.3% and put on earplugs was 55.1% respectively. When penalties and taxes effective in reducing noise pollution is asked, 62.3% agreed. For the question if the municipality has taken appropriate measures to control the noise in the neighbourhood, 49% agreed. Asked If the traffic police carry out appropriate control and training for the reduction of noise pollution, 53% agreed. When in your neighbourhood, noise control engineering has been done asked, majority of 20.2% agreed. When the people in Malaysia are familiar with the importance of noise pollution question asked a majority of 40.8% stayed neutral. The people in Malaysia are familiar with the ways to avoid creating noise pollution, majority of them (37.7%) agreed. When the people of Malaysia have received the necessary education regarding noise pollution asked, a majority of them (35.7%) stayed neutral. When the educational programs are effective in reducing noise pollution asked, a majority of respondents (51.1%) agreed (Table 4).

Table 4: Perception of students on ways to reduce traffic noise pollution (n= 98)

No	Item	Strongly Disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)
1.	To which extend do you agree that the following measures could reduce traffic noise pollution:					
	Reducing speed limits	4 (4.1)	7 (7.1)	26 (26.5)	48 (49.0)	13 (13.3)
	Controlling traffic flow	2 (2.0)	4 (4.1)	15 (15.3)	57 (58.2)	20 (20.4)
	Special lane for heavy vehicles	4 (4.1)	4 (4.1)	14 (14.3)	51 (52.0)	25 (25.5)
	Noise barriers rail networks	0 (0)	4 (4.1)	17 (17.3)	49 (50.0)	28 (28.6)
	Low noise brake blocks	1 (1.0)	3 (3.1)	20 (20.4)	53 (54.1)	21 (21.4)
	Noise standards for vehicles	3 (3.1)	5 (5.1)	22 (22.5)	51 (52.0)	17 (17.3)
	Building insulation	4 (4.1)	3 (3.1)	16 (16.3)	51 (52.0)	24 (24.5)
	Changing driving styles	5 (5.1)	12 (12.3)	31 (31.6)	34 (34.7)	16 (16.3)
	Quiet road surfaces	2 (2.0)	4 (4.1)	15 (15.3)	51 (52.1)	26 (26.5)
	Low noise tyres	3 (3.1)	4 (4.1)	17 (17.3)	52 (53.1)	22 (22.4)
	Soundproofing barriers in home	1 (1.0)	4 (4.1)	19 (19.4)	48 (49.0)	26 (26.5)
	Plant trees in homes	3 (3.1)	3 (3.1)	25 (25.4)	49 (50.0)	18 (18.4)
	Close the windows	5 (5.1)	8 (8.2)	20 (20.4)	44 (44.9)	21 (21.4)
	Put on Earplugs	7 (7.1)	12 (12.3)	25 (25.5)	35 (35.7)	19 (19.4)
2.	Penalties and taxes effective in reducing noise pollution.	2 (2.0)	9 (9.2)	26 (26.5)	43 (43.9)	18 (18.4)

3.	The municipality has taken appropriate measures to control the noise in the neighbourhood.	2 (2.0)	12 (12.3)	36 (36.7)	34 (34.7)	14 (14.3)
4.	The traffic police carry out appropriate control and training for the reduction of noise pollution.	4 (4.1)	15 (15.3)	27 (27.6)	40 (40.8)	12 (12.2)
5.	In your neighbourhood, noise control engineering has been done.	6 (6.1)	23 (23.5)	33 (33.7)	26 (26.5)	10 (10.2)
6.	The people in Malaysia are familiar with the importance of noise pollution.	6 (6.1)	20 (20.4)	40 (40.8)	24 (24.5)	8 (8.2)
7.	The people in Malaysia are familiar with the ways to avoid creating noise pollution.	7 (7.1)	24 (24.6)	30 (30.6)	30 (30.6)	7 (7.1)
8.	The people of Malaysia have received the necessary education regarding noise pollution.	8 (8.2)	22 (22.4)	35 (35.7)	28 (28.6)	5 (5.1)
9.	Educational programs are effective in reducing noise pollution.	5 (5.1)	7 (7.1)	36 (36.7)	39 (39.8)	11 (11.3)

Figure 1 shows the respondents' knowledge, attitudes, and perception toward traffic noise. Among the respondents, 57% reported having good knowledge, 50% had good attitudes, and 48% had good perception on the prevention of traffic noise (Figure 1).

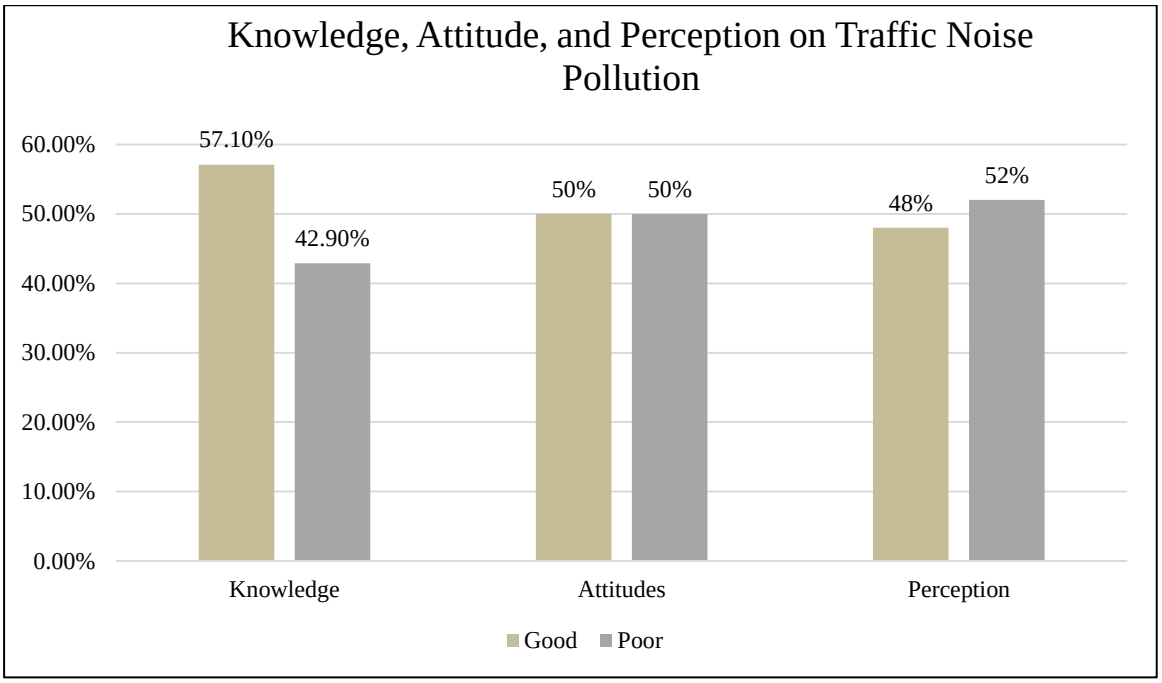

Figure 1. Knowledge, attitude, and perception on traffic noise pollution and ways to reduce traffic noise pollution

Table 5 shows the association of age, gender, nationality, ethnicity, study year, and preferred mode of travelling towards the knowledge level of respondents about the effects of noise pollution on human health. Each independent factor (categorical) was compared with the total knowledge level of students about the effects of noise pollution on human health. Unpaired t-test and one-way ANOVA were used to examine age, gender, nationality, ethnicity, study year, and preferred mode of travelling towards knowledge level. There were no significant association between age, gender, nationality, ethnicity, study year, and preferred mode of travelling towards knowledge level of students about the effects of noise pollution (Table 5).

Table 5: Association of age, gender, nationality, ethnicity, study year and preferred mode of travelling towards knowledge level of students about the effects of noise pollution on human health (n=98)

Independent Variable	Frequency (%)	Knowledge Percentage Mean (SD)	Mean difference (95% Cl)	P value
Age (Years)				
≤22	61 (62.2)	14.6 (2.1)	0.4 (-0.5, - 1.3)	0.38
>22	37 (37.8)	14.2 (2.4)		
Gender				
Male	23 (23.5)	14.5 (2.2)	-0.01 (-1.1, - 1.0)	0.98
Female	75 (76.5)	14.5 (2.3)		
Nationality				
Malaysian	85 (86.7)	14.3 (2.3)	1.1 (-0.2, - 2.4)	0.08
International	13 (13.3)	15.5 (1.3)		
Ethnicity				
Malay	8 (8.2)	12.5 (2.2)	-	0.06
Chinese	31 (31.6)	14.9 (2.1)		
Indian	45 (45.9)	14.5 (2.2)		
Others	14 (14.3)	14.4 (2.3)		
Academic year				
Pre-clinical year	13 (13.3)	14.5 (2.9)	-0.08 (-1.4, - 1.2)	0.91
Clinical years	85 (86.7)	14.5 (2.1)		
Preferred mode of travelling				
Own vehicle	79 (80.6)	14.4 (2.3)	-	0.51
Public transportation	13 (13.3)	14.5 (2.3)		
Others	6 (6.1)	15.5 (1.2)		

Table 6 shows the association of age, gender, nationality, ethnicity, study year, and preferred mode of travelling towards attitudes of the respondents about the health effects of traffic noise pollution and its possible effects on people. Each independent factor (categorical) was compared with the total attitudes level of students about the health effects of traffic noise pollution. Unpaired t-test and one-way ANOVA were used to examine age, gender, nationality, ethnicity, study year, and preferred mode of travelling towards knowledge level. There were no significant association between age, gender, nationality, ethnicity, study year, and preferred mode of travelling towards attitudes of the respondents about the health effects of traffic noise pollution and its possible effects on people (Table 6).

Table 6: Association of age, gender, nationality, ethnicity, study year and preferred mode of travelling towards attitudes of students about the health effects of traffic noise pollution and its possible effects on people (n=98)

Independent Variable	Frequency (%)	Knowledge Percentage Mean (SD)	Mean difference (95% Cl)	P value
Age (years)				
≤22	61 (62.2)	19.3 (4.5)	0.9 (-0.8, - 2.5)	0.32
>22	37 (37.8)	18.5 (3.2)		
Gender				
Male	23 (23.5)	19.4 (4.7)	-0.5 (-2.5, - 1.4)	0.59
Female	75 (76.5)	18.9 (3.9)		
Nationality				
Malaysian	85 (86.7)	18.9 (4.1)	0.7 (-1.7, - 3.1)	0.55
International	13 (13.3)	19.6 (3.6)		
Ethnicity				
Malay	8 (8.2)	17.6 (3.8)	-	0.63
Chinese	31 (31.6)	18.7 (4.8)		
Indian	45 (45.9)	19.2 (3.8)		
Others	14 (14.3)	19.9 (3.3)		
Academic year				
Pre-clinical year	13 (13.3)	18.1 (2.8)	1.1 (-1.4, - 3.5)	0.39
Clinical years	85 (86.7)	19.1 (4.2)		
Preferred mode of travelling				
Own vehicle	79 (80.6)	19.1 (4.2)	-	0.64
Public transportation	13 (13.3)	18.0 (3.7)		
Others	6 (6.1)	19.3 (3.7)		

Table 7 shows the association of age, gender, nationality, ethnicity, study year, and preferred mode of travelling towards the perception of the respondents on ways to reduce traffic noise pollution. Each independent factor (categorical) was compared with the total perception of students about the health effects of traffic noise pollution. Unpaired t-test and one-way ANOVA were used to examine age, gender, nationality, ethnicity, study year, and preferred mode of travelling towards perception on ways to reduce traffic noise pollution. Students 22 years old and below has a higher mean towards perception on ways to reduce traffic noise pollution compared to students more than 22 years old. The mean difference is 6.0 and it is statistically significant (P = 0.04). However, there was no significant association between gender, nationality,

ethnicity, study year, and preferred mode of travelling in perception of the respondents on ways to reduce traffic noise pollution (Table 7).

Table 7: Association of age, gender, nationality, ethnicity, study year and preferred mode of travelling towards perception of students on ways to reduce traffic noise pollution (n= 98)

Independent Variable	Frequency (%)	Knowledge Percentage Mean (SD)	Mean difference (95% Cl)	P value
Age (years)				
≤22	61 (62.2)	81.7 (14.4)	6.0 (0.4, - 11.5)	0.04
>22	37 (37.8)	75.8 (11.7)		
Gender				
Male	23 (23.5)	75.9 (14.2)	4.7 (-1.7, - 11.2)	0.15
Female	75 (76.5)	80.6 (13.4)		
Nationality				
Malaysian	85 (86.7)	79.3 (13.5)	1.4 (-6.7, - 9.5)	0.74
International	13 (13.3)	80.7 (15.6)		
Ethnicity				
Malay	8 (8.2)	79.0 (19.7)	-	0.77
Chinese	31 (31.6)	77.6 (15.5)		
Indian	45 (45.9)	81.0 (11.0)		
Others	14 (14.3)	79.1 (14.2)		
Academic year				
Pre-clinical year	13 (13.3)	79.3 (9.5)	0.2 (-7.9, - 8.3)	0.96
Clinical years	85 (86.7)	79.5 (14.3)		
Preferred mode of travelling				
Own vehicle	79 (80.6)	79.6 (13.7)	-	0.94
Public transportation	13 (13.3)	79.5 (12.4)		
Others	6 (6.1)	77.5 (17.6)		

DISCUSSION

This study assessed knowledge, attitude, and perception of traffic noise pollution among undergraduate medical students. The findings from this study have discovered that the noise stages fall in the extraordinarily risky noise sensitivity index. High stages of noise are acknowledged to reason annoyance. Several research found that noise annoyance is related to intellectual health, anger, disappointment, dissatisfaction, withdrawal, helplessness, depression, anxiety, distraction, agitation or exhaustion, and sleep disturbance [4]. As for the respondents, the frequency was the highest in the clinical year at 86.7% compared to the pre-clinical year who took part in the study. The roads in the research region had been seen to be clogged with heavy traffic all day long. In this section, the outcomes of observation and field data were examined and discussed [18]. In addition to facilitating the flow of people and goods, these infrastructures must be carefully planned and designed to lessen or eliminate any negative effects. Numerous studies established the connection between various travel modes and air pollution and climate change [21]. Those who were exposed to louder streets had a higher sensitivity to the irritation caused by traffic noise. More than half of the respondents in the survey did not consider or identify noise as a bothersome element [22]. The knowledge level of students about the effects of noise pollution on human health was seen more by irritation as it was the highest percentage at 95.9%, whereas the lowest was in increased heart rate at 30.6%. To reduce the environmental and economic impact comprehensively and effectively, noise reduction within the vehicle design process must be considered as one of the aims along with other factors like fuel consumption [23]. Knowledge of the respondents was categorized based on the mean score which was 14.5 and 57.1% of respondents scored good knowledge while 42.9% scored poor knowledge. It has been found that the volume of noise and the type and volume of road traffic are highly correlated. In this situation, various actions can be taken to lessen noise pollution [24]. It has been found that the volume of noise and the type and volume of road traffic are highly correlated. In this situation, action needs to be taken to reduce the amount of noise pollution in the city. Based on the respondents' attitude, it could be concluded that both the good as well as the poor attitude weighs in at 50%. For protection against the negative effects of noise, industries utilize ear plugs and mufflers, hospitals use rubber seals and noise sensors, and residential areas use shelter belts [11]. Associations between exposure and perception of noise sources, annoyance caused by the noise, and the belief that noise levels were higher at night were noted in the institution setting [25]. Besides that, the respondents' mean score was based on their perception, good perception was observed in 48.0% whereas poor perception was in 52.0% respondents. While more study is being done, several ways to reduce noise exposure were identified and eventually improved public health [26].

To deal with this issue, a variety of mitigation measures should be taken into consideration, including the sound management component, an education-based

awareness campaign, and the physical construction of a natural fortress, such as planting trees between the source and receiver of the noise, effective traffic management, and law enforcement [27]. In contrast to institutional settings, exposure to road traffic noise at school was linked to a slower rate of sophisticated working memory development [28]. The health of the population may be negatively impacted by this type of pollution in several long-term, chronic, and immediate ways [29]. Additional main effects included making people feel tired, anxious, worried, uneasy as well as uncomfortable [30]. If it is not feasible to construct service roads, there should be a distinct division made between various vehicle types on the main roadways using road studs and partitioning [31]. Communication between students and teachers must be open and honest for kids to grow academically and improve their capacity to understand what teachers are going to say [32]. Noise pollution is an artificially created environmental issue that interferes with human activity and the delicate balance of life [31]. A representative sample of the public was surveyed using a questionnaire to define how people perceive noise and its impact on institution health [33]. This high level is attributable to traffic, particularly lorries with inefficient silencers (without filters) and frequent horn use by buses, wagons, trucks, and other vehicles [34]. These findings were in line with earlier research, which found that higher traffic levels generally resulted in louder traffic noise [35].

A previous study reported that primary traffic-related air pollutant exposures had a significant confounding effect on the relationship between road traffic noise and birth weight, and the findings, suggested little evidence for an independent exposure-response effect of traffic-related noise on birth weight outcomes [36]. Furthermore, noise pollution is not just an issue for rich nations; it also affects developing nations. The noise levels brought on by road traffic may, therefore, need to be reduced [37]. Population growth, the number of vehicles on the road, air traffic, airplane noise, the existence of some industrial facilities inside cities, urban and interurban trains, etc. [38].

The limitation of our study was the respondents were recruited with a non-probability sampling method, which might limit the generalizability of the findings. Another limitation was the desirability bias. Respondents might have given any response they believed the researcher would receive supportive responses.

CONCLUSION AND RECOMMENDATIONS

In conclusion, knowledge, attitude, and perception regarding the effects of traffic noise pollution among medical students are moderately good. Based on the findings, 86.7% of students in the clinical year were affected by road traffic noise pollution, mainly due to improper planning of roads leading to clogged streets. Thus, to overcome this issue proper planning of infrastructure and the amount of traffic must be taken into

consideration before construction begins. It can also be seen that most of the respondents (86.7%) considered noise pollution as an irritation instead of having adverse effects on health. Therefore, one of the measures that can be taken to decrease noise pollution is to increase the knowledge level of the students regarding the adverse effects as knowledge is always the first step in solving any problem. Therefore, undergraduate students should be inspired to increase their knowledge regarding noise pollution through methods such as attending informational lectures and participating in awareness campaigns so that they could have a better understanding of the issue. The policymakers play a vital role in promoting knowledge and creating a suitable environment for students to learn. Consequently, to reduce the effects of noise pollution, increasing awareness regarding this ever-persistent issue, noise reduction within the vehicle design, and proper planning of infrastructure to reduce traffic flow should be emphasized. Solutions should always be researched to decrease the impact of noise pollution and to improve the general well-being of the population.

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