EFFECTS OF ENVIRONMENTAL NOISE POLLUTION TO STUDENTS IN UMK JELI

by

FERN BRITNEY ANAK FRANCIS

A thesis submitted in fulfillment of the requirements for the degree of

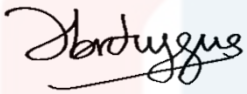
Bachelor of Applied Science (Sustainability Science) with Honours

FACULTY OF EARTH SCIENCE UNIVERSITY MALAYSIA KELANTAN

2024

DECLARATION

I declare that this thesis entitled “Effects of Environmental Noise Pollution to Students in UMK Jeli” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : 

Name : Fern Britney anak Francis

Date : 01 March 2024

ACKNOWLEDGEMENT

The following people and institutions deserve my heartfelt thanks for their invaluable contributions to the successful completion of this research endeavor. First and foremost, I would like to express my sincere gratitude to my supervisor, Madam. Farah Khaliz binti Kedri, who has provided me with constant support, direction, and insightful advice throughout the whole research process. Her knowledge and support were very helpful in raising the caliber and depth of this effort.

I also want to express my gratitude to my fellow undergraduate's friends who helped with the data gathering and analysis stages and offered insightful criticism. Their attitude of cooperation improved this research's overall caliber.

In addition, I am grateful for the people and resources offered by the UMK Jeli The research experience was greatly enhanced by their vast collection and beneficial assistance.

Finally, I would want to thank my family from the bottom of my heart for their unwavering support, tolerance, and understanding during the challenging times of this endeavor. Their support was invaluable and sustained me throughout the entire research journey. This work is the result of collective effort and collaboration, and I am truly thankful to all who contributed to its realization.

Effects of Environmental Noise Pollution to Students in UMK Jeli

ABSTRACT

The effects of environmental noise pollution on human health and well-being have been well researched, and the problem was becoming more and more widespread worldwide. The purpose of this study was to better understand how noise pollution affects students at the Universiti Malaysia Kelantan (UMK) Jeli campus. Using a combination of data collection, which was a direct measure data from sound level meter and surveys to get detailed information about students' experiences with and perceptions of noise pollution. The objectives of this study was to determine the noise pollution level at the study area, to determine students' knowledge, attitude, and practice about noise pollution, and to determine the effects of noise pollution to the students. At strategic points at faculty area, sound levels were measured taking into account different times of the day. A total subset 317 of participants was chosen to distributed surveys via online to gain a qualitative insight of their experiences. A thorough examination of the noise levels, a list of the main causes of noise pollution, and an evaluation of the effects of noise pollution on students' focus, sleep habits, and mental health are among the expected results. The results of this study was added to the corpus of information already available on the impact of ambient noise on educational settings, potentially having ramifications for student welfare, policy formation, and campus design. Additionally, the study offerred a regional viewpoint on a well-recognized environmental problem, facilitating a deeper comprehension of the particular difficulties encountered by students at UMK Jeli and directing future initiatives to establish a supportive learning environment.

Effects of Environmental Noise Pollution to Students in UMK Jeli

ABSTRAK

Kesan pencemaran bunyi alam sekitar terhadap kesihatan dan kesejahteraan manusia telah dikaji dengan baik, dan masalah ini semakin meluas di seluruh dunia. Tujuan kajian ini adalah untuk lebih memahami bagaimana pencemaran bunyi mempengaruhi pelajar di Universiti Malaysia Kelantan (UMK) kampus Jeli. Menggunakan gabungan pengumpulan data, iaitu data ukuran langsung daripada meter aras bunyi dan tinjauan untuk mendapatkan maklumat terperinci tentang pengalaman pelajar dan persepsi terhadap pencemaran bunyi. Objektif kajian ini adalah untuk menentukan tahap pencemaran bunyi di kawasan kajian, untuk menentukan pengetahuan, sikap, dan amalan pelajar tentang pencemaran bunyi, dan untuk menentukan kesan pencemaran bunyi kepada pelajar. Di titik strategik di kawasan fakulti, tahap bunyi akan diukur dengan mengambil kira masa yang berbeza dalam sehari. Sejumlah subset 317 peserta yang terpilih telah diedarkan tinjauan melalui dalam talian untuk mendapatkan gambaran kualitatif tentang pengalaman mereka. Pemeriksaan menyeluruh terhadap tahap bunyi, senarai punca utama pencemaran bunyi, dan penilaian kesan pencemaran bunyi terhadap tumpuan pelajar, tabiat tidur dan kesihatan mental adalah antara hasil yang dijangkakan. Hasil kajian ini akan menambah kepada korpus maklumat yang sedia ada mengenai kesan hingar ambien ke atas tetapan pendidikan, yang berpotensi memberi kesan kepada kebajikan pelajar, pembentukan dasar dan reka bentuk kampus. Selain itu, kajian ini menawarkan pandangan serantau mengenai masalah alam sekitar yang diiktiraf dengan baik, memudahkan pemahaman yang lebih mendalam tentang kesukaran tertentu yang dihadapi oleh pelajar di UMK Jeli dan mengarahkan inisiatif masa depan untuk mewujudkan persekitaran pembelajaran yang menyokong.

LIST OF TABLES

No.	TITLE	PAGE
4.1	Knowledge about Noise Pollution	37
4.2	Attitudes towards sound pollution at UMK Jeli Campus	39
4.3	Practices against noise pollution at UMK Jeli Campus	41
4.4	Effects of Noise Pollution	43
4.5	Independent t-test of respondent's effect	45
4.6	ANOVA test of respondents	46

LIST OF FIGURES

No.	TITLE	PAGE
3.1	UMK Jeli campus map	25
3.2	Schedule permissible sound level from DOE Malaysia	27
4.1	Noise Level on weekday for 2 months at FIAT's area	30
4.2	Noise Level on weekend for 2 months at FIAT's area	31
4.3	Noise Level determined compared to DOE Level	32
4.4	Gender of Respondent	34
4.5	Race of Respondent	34
4.6	Age of Respondent	35
4.7	Total participation from both faculties	35
4.8	Academic year of respondent	36
4.9	Residential area of respondent	36

TABLE OF CONTENT

DECLARATION 2
ACKNOWLEDGEMENT 3
ABSTRACT 4
ABSTRAK 5
LIST OF TABLES 6
LIST OF FIGURES 7
CHAPTER 1 10
INTRODUCTION 10
1.1 Background of study 10
1.2 Problem Statement 11
1.3 Objective 12
1.4 Significance of Study 12
CHAPTER 2 13
LITERATURE REVIEW 13
2.1 Noise Pollution 13
2.2 Types of Noise Pollution 14
2.2.1 Environmental Noise 15
2.2.2 Industrial Noise Pollution 16
2.3 Sources of Noise Pollution 16
2.3.1 Traffic Noise 17
2.3.2 Construction Noise 18
2.3.3 Noise from Industrial Activity 18
2.3.4 Community Activities 19
2.4 Effects of Noise Pollution 19
2.4.1 Physical Disorder 20
2.4.2 Physiological Disorder 21
2.4.3 Psychological Disorder 22
2.4.4 Communication Disruption 23

CHAPTER 3 24
METHODOLOGY 24
3.1 Study Location 24
3.2 Equipment Used 25
3.2.1 Noise Level Data Collected 25
3.2.2 Questionnaire Distribution 26
3.3 Data Analysis 26
3.3.1 Noise Data Analysis 26
3.3.2 Statistical Analysis 27
CHAPTER 4 29
RESULTS AND DISCUSSIONS 29
4.1 Noise Level Analysis 29
4.2 Comparison of Noise Level at the study site with DOE Standard Level 32
4.3 Questionnaire Analysis 34
4.3.1 Socio Demographic Analysis 34
4.3.2 Noise pollution knowledge among respondents 37
4.3.3 Respondent's attitudes towards noise pollution 39
4.3.4 Respondent's practices towards noise pollution 41
4.3.5 Effects of Noise Pollution 43
4.4 Independent Sample T-test and One-way ANOVA analysis 45
CHAPTER 5 48
CONCLUSIONS AND RECOMMENDATIONS 48
5.1 Conclusions 48
5.2 Recommendations 49
REFERENCES 51

CHAPTER 1

INTRODUCTION

1.1 Background of study

Noise pollution is the environmental pollution that not everyone is aware of which leads too many chronic impacts on our health and wellness. The well-known definition of noise is unwanted sound considered unpleasant, loud, or disruptive hearing that comes from different types of sources such as natural, domestic, commercial and industrial (Deepak, 2016). Sound is a form of energy that travels as waves when usually we hear sound because our ears respond to sound waves through sympathetic vibrations of the eardrum stimulated by alternating compression and rarefactions of the air molecules in the vicinity of the ear (Nicolas et al., 2009).

There were several impacts of noise. Deterioration of hearing happened because of exposure to noise. Exposure to extremely loud noises, such as rock music, gunfire, and noisy machinery can cause a momentary decrease in human ability to hear, which

is called a temporary threshold shift (Ramazan et al., 2012). A permanent loss of hearing or a permanent threshold shift occurs after continue exposure to noise. Studies suggest that continuous, long-term exposure to noise levels as low as 55 dB can permanently damage hearing (Tunde & Adbdulqaudri, 2021). The inherent unpleasantness of the sound will definitely cause annoyance.

1.2 Problem Statement

According to United States Environmental Protection Agency (USEPA, 2022), hundreds of people's lives on earth are affected by noise pollution. The researchers have discovered out that noise and health contributed to stress related illness, high blood pressure, speech interference, hearing loss, sleep disruption, and lost productivity. Health is described as "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" from World Health Organization Constitution (WHO, 2012). This definition clearly shown that noise pollution has excessive impact on health because noise interferes with human's physical, mental and social wellbeing.

Environmental noise comes from various different sources such as universities, colleges, schools, libraries, national laboratories, and hospitals that which disturbs and creates a dangerous effect on people in the external environment (Hammer et al., 2014). Noise pollution have highlighted its potential role in increasing mortality rates without anyone realize its hazard other than some factor associated such as annoyance and sleep disturbance (Deepak & Singh, 2014). Therefore, this study aimeds to determine the effects of noise pollution on students in terms of physical, mental and

social as well as to justify the students' knowledge about noise pollution that are currently occurred at Faculty of Agro Based Industry (FIAT) building in UMK Jeli campus.

1.3 Objective

The objective of this study were mainly:

i. To determine the noise pollution level at the study area

ii. To determine the students' knowledge, attitude, and practice about noise pollution

iii. To determine the effects of noise pollution to the students

1.4 Significance of Study

The findings of this study were given benefit to the society especially students and staff considering noise pollution impact and should be taken mitigation action seriously. Students were exposed to the risk of hearing loss if they are exposed directly to noise pollution. Even after noise exposure has stopped, harmful effects might continue and unfortunately general permanent will have occurred to damage inner ear or auditory neural system.

CHAPTER 2

LITERATURE REVIEW

2.1 Noise Pollution

Noise pollution is an environmental issue that has garnered increasing attention due to its adverse effects on human health, ecosystems, and wildlife. Defined as unwanted or excessive sound that disrupts the natural balance of an environment noise pollution has become a significant concern among the people around the world. In addition, noise pollution described as the presence of excessive unwanted or harmful sound in the environment which can disrupt the normal functioning of individual's communities and ecosystems. According to the World Health Organization (WHO) 2017, noise pollution is considered one of the most pervasive and underestimated environmental stressors affecting both physical and psychological well-being. It arises from various sources including transportation (road rail and air traffic), industrial activities, construction sites, recreational activities, and even domestic appliances.

There are several methods and instrument that are generally used to measure noise pollution including using the Sound Level Meters (SLMs), octave band analysis, noise mapping, community noise surveys, permanent noise monitoring stations, smartphone apps, and Environmental Impacts Assessment (EIAs) (Maffei et al. 2019). For instance,

SLM are one of the handheld devices that are designed to measure sound levels in decibels in (dB). The microphone from the device is place several meter above the ground for safety reason at the selected location, and it will provide the data such as real-time readings at the different time and places.

Noise levels can be very different according to time, type of area and other environment such as residential, industrial, traffic, etc. and thus can be declared as noise pollution (Maffei et al. 2019). These limit was enforced by local state or national authorities that should be taken seriously by everyone. For instance, at the residential area during the day, the range limits normally are from 55 dB to 65 dB at seven mornings to ten nights meanwhile during the night from 10.00pm to 7.00am are between 45 dB to 55 dB (Maffei et al. 2019)

2.2 Types of Noise Pollution

The types are including from environmental, industrial, community, transportation, neighborhood, technological, construction and demolition, and natural noise (Maffei et al. 2019). Each of these types have several categories for instance environmental noise result in traffic noise which comes from vehicles on highways, aircraft noise that generated from airplane during takeoff, and railway noise that comes from trains itself. Other than that, natural noise including from natural events that happen in the human life surrounding such as thunderstorm, earthquakes, and volcanic eruption (Shield & Dockrell, 2008).

The main concern for society nowadays, especially among the students are coming from environmental noise as this pollution has often growing since the last few decades (Shield & Dockrell, 2008). Students and staff exposed to constant noise from the

educational place especially during the on-going semester have the negative potential on health (Thattai et al., 2017). Effects of indistinguishable health cannot be explained as a result of sound energy because the levels of environmental noise from university are quite different from heavy industrial (Stansfeld & Matheson, 2003).

Noise pollution can be categorized into environmental and industrial pollution. Sounds that originated in the workplace is not labelled as environmental noise except that consist of all the rejected sounds in our communities (Goines & Hagler, 2007). Industrial noise pollution is including mechanical pneumatic drills, saws, and rotating belts, etc that create sound that can irritate and affect employees in the industrial sector (Casas et al., 2014).

2.2.1 Environmental Noise

Urban areas are commonly known for noise compare to rural areas due to high population, development, and the associated growth in the use technology of mobile (Tunde & Abdulquadri, 2021). Noise pollution is more significant in urban area compared to rural area because there was a more road traffic noise from cars and trucks, construction noise, manufacturing noise, or unwanted sound from recreational activities in urban areas (Tunde & Abdulquadri, 2021).

The term "environmental noise" describes any undesirable or dangerous sounds that are present. It is frequently produced by human activity and comes from a variety of sources, including construction, industrial operations, transportation, leisure activities, and other sources of noise in the home and office (Tunde & Abdulquadri, 2021). The

general quality of life, animals, and human health can all be adversely affected by environmental noise.

2.2.2 Industrial Noise Pollution

Noise sources from industrial such as factory are mostly generated from machineries and industrial processes while construction noise are arising from construction activities including drilling, hammering, and heavy duty operation. One of the example is mining activities which are obviously linked to the mining activities and operations that generated loud of noises (Atmaca et al., 2005).

The effects of noise on the hearing of employees, especially in the heavy industry has been a main issue among researches for a number of years (Atmaca et al., 2005). Hearing loss might happen to worker if they constantly exposed to continious and immense noise at a level higher than 85 dBA (Atmaca et al., 2014). Common heavy industry including steel production, machine tool building, mining, and etc. have a many employees exposed to noise (Atmaca et al., 2014).

There are several negative impacts including physiological and psychological nature on human beings due to noise exposure (Atmaca et al., 2014). The most prevalent physiological effect is hearing loss while other side impacts are including hypertension, heart beat accelerations, appearance of muscle reflexes, imsoniac (Atmaca et al., 2014).

2.3 Sources of Noise Pollution

Noise pollution may come from many different sources. Human activities, especially urbanization and the development of transport system can generate noise

(Thattai et al., 2017). Small towns alongside roads or industrial area also affected by such pollution and it is not just focused on urban population.

This chapter will explain in details about four sources of noise pollution, which are traffic noise, construction noise, noise from industrial activity, community activities. These four major sources are the main contribution of noise pollution because of the increasing in transportation of people and goods that significantly have link to other issues, especially health issue (Maisonneuve et al., 2009).

2.3.1 Traffic Noise

Environmental noise due to road traffic, especially in the urban area are the real contribution to noise pollution along with the number of heavy vehicles, speed and other parameters such as ground cover (Thattai et al., 2017). Heavy vehicles such as trailers, B-double freight trucks, and road trains which exceeds five thousand kilogram produce more noise pollution compare to small vehicle (Mohammadi, 2014).

It has been discovered that students' cognitive function is significantly impacted by excessive road noise. Exposure to excessive traffic noise levels has been shown in studies by Smith and Brown (2019) to decrease attention, memory, and learning ability. This may result in worse academic performance and impede students' overall educational growth. As a result, it is critical to manage road noise as a possible obstacle to the best learning environment.

Traffic noise typically occur when vehicle’s engine are through process of compression and expansion which creates vibration. However, electric vehicles produce

very small levels of noise at low speeds compare to vehicles with an internal combustion (Grubesa & Suhanek, 2020).

2.3.2 Construction Noise

Noise are common occupational hazard in a large workplaces including in construction site (Gerges & Sehrndt, 2001). Noise sources such as rotors, stators, gears, fans, vibrating panels, turbulent fluid flow, impact processes, electrical machines, internal combustion engines etc. comes from the industrial machinery and processes (Ziph et al. 2020). The noise created are different due to different equipment to perform their jobs.

Construction noise are including crushing, riveting, blasting (quarries and mines), shake-out (foundries), punch presses, drop forges, drilling, lathes, pneumatic equipment (e.g. jack hammers, chipping hammers, etc.), tumbling barrels, plasma jets, cutting torches, sandblasting, electric furnaces, boiler making, machine tools for forming, dividing and metal cutting etc. that specifically emits noisy operations and equipment (Thathai et al. 2017). Noise induced-hearing loss recorded the most general occupational disease at numerous nation (Stensfeld et al. 2003).

2.3.3 Noise from Industrial Activity

Industrial such as textile, food and beverages, raw material (furniture), and among many others emits noise which is considered as occupational hazard (Gerges & Sehrndt, 2001). The equipment is including textile machines, heavy machine, controller, main operators and transport vehicles generates different types of noise sources (Miedema & Oudshoorn, 2001).

An acoustical energy is formed from the part of the total mechanical or electrical energy that sound pressure levels recorded from selected machine which are depends on distance from the source to the receiver and the nature of the working environment (Jariwal et al. 2017). Due to the participation of many sources such as, propagation through air (air-borne noise), propagation through solids (structure-borne noise), diffraction at the machinery boundaries, etc. recorded tough sound fields in factory (Gerges & Sehrndt, 2001).

2.3.4 Community Activities

Community noise describes the overall sound produced by different sources and activities in a neighborhood or community (Anees et al. 2017). It encompasses both artificial and natural noises that enhance the general acoustic environment of a place where people reside, work, and perform a variety of other activities (Atmaca et al. 2005). The quality of life and general well-being of people can be greatly impacted by noise in the community.

Educating locals on the causes and effects of noise pollution in the neighborhood can raise awareness and encourage group action to solve the problem (Brout et al. 2018). Campaigns for public education might emphasize what each person can do to help reduce noise. To evaluate adherence to set rules, local authorities may measure and monitor noise levels hence this entails measuring the amount of noise in certain areas using sound level meters (Gilavand & Jamshidnezhad, 2016).

2.4 Effects of Noise Pollution

The term "environmental noise pollution" describes the excessive and undesirable noises that are produced by human activity and have the potential to disturb the surrounding area. It is commonly known that noise pollution has a negative impact on people's health and wellbeing.

Noise have a several impact on human health even though may not be high enough to damage hearing (within buildings) (Deepak, 2016). The implication of the effect of sound energy on the inner ear is hearing impairment emits from noise (Stansfeld & Matheson, 2003). Effects on non-auditory health difficult to explained as a reaction of sound energy due to the levels of environmental noise are opposed to industrial noise (Mas et al. 2018).

There are several effects of noise pollution that will be explained in detailed including physical disorder (temporary and permanent hearing loss), physiological disorder (annoyance, productivity loss, sleep disturbance), psychological disorder and communication disorder.

2.4.1 Physical Disorder

Noise pollution really had a negative impact towards student as hearing loss can be temporary but the worst is it also can be permanent as vital parts of the ear are injured which have a high risk to be healed. Permanent can be described as lasting or intended to last or remain unchanged indefinitely (Muhammad Anees Malek et al., 2017). Cells and membranes in the cochlea are shattered by loud noise such as students exposing to loud

noise from air conditioning chiller for a long during academic session can overwork hair cells which can cause these hair cells to die in the ear (Nermin, 2014).

Rising blood pressure and increase blood viscosity are the temporary effects due to exposure to noise pollution. Temporary is defined as lasting for only a limited period of time (Muhammad Anees Malik et al., 2017). Exposure of noise pollution, for instance, without no ear protection at the front-row of a concert can cause temporary hearing loss. This occurred when tiny hair cells detect sound waves and transmit these signals to the brain deep inside inner ears. These hair cells can be destroyed by noise. This effects can be more serious on the side that received more noise, however, it usually affects both ears that doesn't typically cause pain (Bressane et al., 2016).

2.4.2 Physiological Disorder

During sleep, noise generates are including increase blood pressure, heart rate, and finger pulse amplitude as well as body movements (Stansfeld & Matheson, 2003). The side effects of sleep disturbance during the day are including low sleep quality, distinguished emotion and presentation of each person. If there are more than 50dB noise events per night with a maximum level of 50 dBA indoors or more sleep disturbance is likely to occur (Purwanisih et al. 2018).

The term annoyance can be described as a feeling of being extremely irritated or exasperated of someone which can lead to anger and frustration (Saba & Shahid, 2018). Aversion or distress might be the best to describe this response which in a variety of study, noise has been used as noxious stimulus as it produced the same kinds of effects as other stressor.

Noise often kills productivity especially among the students that can be up to 66% less productive (Shatha, 2023). Hormone controls the flow of information from other parts of body may decrease dopamine availability in the prefrontal cortex that induced stress from noise which results in the decrease higher brain function, impairing learning and memory (Babisch, 2002). This can conclude that person's capacity to think clearly and to retain information could be deranging.

2.4.3 Psychological Disorder

There are several processes that explain why excessive and continuous loud noise is bad for psychological health. According to Gomez-Merino et al. (2008), noise first functions as a stressor, triggering the body's stress response system and causing the production of stress hormones like cortisol. The body's physiological balance can be upset by persistently activating the stress response, which can result in the emergence of mental health issues.

Noise pollution have triggered on mental health (psychological disorder). During rest time (sleep), the brain is able to monitor to sounds for signs of danger. With constantly expose to noise pollution, it can increase stress thus directly impact on stress or anxiety to someone (Shatha, 2023). Anger, frustrated, irritable, on edge are some kinds of effects that someone feel expose or living with noise pollution (Jariwala et al., 2017).

Other than that, Misophonia is a condition where it can trigger physiological responses that some might perceive as unreasonable given the circumstance (Brout et al., 2018) The term might describe it as when a sound can range from anger and annoyance

to panic and the need to flee which sometimes called selective sound sensitivity syndrome (Brout et al., 2018).

2.4.4 Communication Disruption

Noise exposure may impair individual's performance. Noise pollution just not interfere the ability to deliver speech, but also may lead to deration interaction with other including body language, and other sign of unexpected performance (Jariwala et al., 2017). The significant exposure may impair students' performance and an expectation of control counters these effects as an even anticipation of a loud noise exposure (Nyi et al., 2018). It is indeed clearly shown that exposure to noise decreased rehearsal in memory which influence the effectiveness of brain such as selectivity in memory, including the strategies for carrying task.

Effective communication can be severely hampered by environmental noise pollution in a number of ways. People may find it difficult to hear and comprehend spoken words when there is considerable noise around. Particularly in outdoor settings or busy public locations, background noise like traffic or construction sounds can obscure speech and make it difficult for people to interact effectively (Rahman et al. 2022).

Last but not least, noise pollution in the environment might also be detrimental to language development, especially in young children (Shield & Dockrell, 2003). The development of speech and language abilities might be hampered by prolonged exposure to noise at crucial stages of language learning. This might result in trouble comprehending people and expressing oneself vocally, which can have a big influence on communication skills later in life (Mohammadi, 2014).

CHAPTER 3

METHODOLOGY

3.1 Study Location

This study location was located in UMK Jeli campus which was surrounded by forest that has become the hidden gem for every nature lover to explore and experience adventures such as hiking. The coordinate for this location was 5.7443° N, 101.8635° E

This campus consists of three different faculties which was Faculty of Earth Science (FSB), Faculty of Agro Based Industry and Faculty of Bioengineering and Technology (FBKT). Noise pollution was identified and occurred in the FIAT and FBKT area building specifically from the numerous air-conditioning chiller that has caused severe impacts towards the students and staff thus serious action was planned from the university to curb this problem.

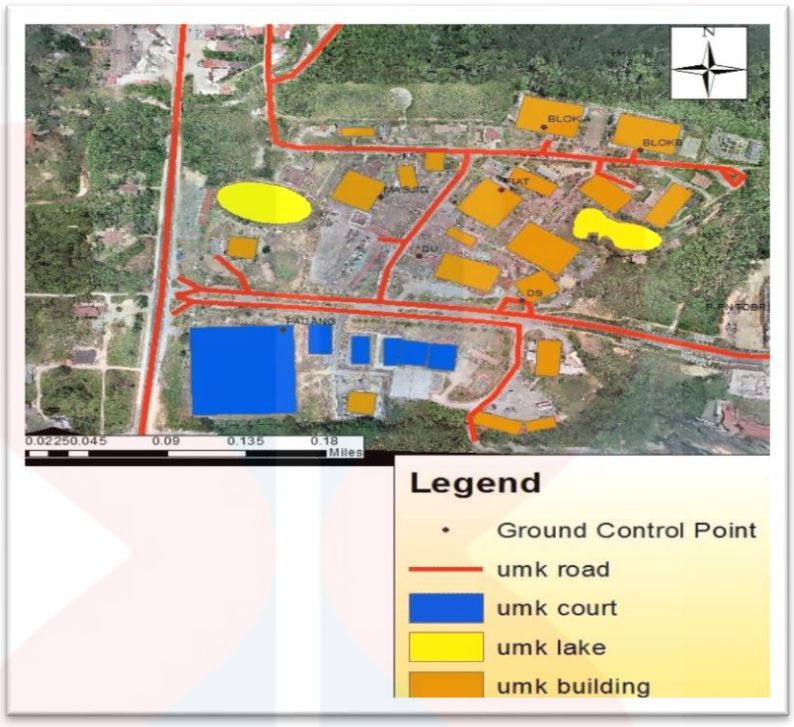


Figure 3.1: UMK Jeli campus map

3.2 Equipment Used

3.2.1 Noise Level Data Collected

Noise was measured using sound level meter that consists of settings such as: fast or slow response, maximum hold function and AC/DC output which was set up on the tripod and few meter at a height of 150 cm above the ground to minimizing factors that cause inaccurate measurements (Oyati & Stephan, 2017). The noise data was collected for 2 months during the semester break from August to September within the three different times. Noise was collected during the morning from 0800-1000, afternoon from 1200-1400 and night from 1600-1800 during the weekday and weekend.

3.2.2 Questionnaire Distribution

The questionnaire was distributed to FIAT and FBKT students. A total of 317 students participated in the surveys as the size population was determined using the Morgan and Krechie formula. The surveys include Knowledge, Attitude, and Practices elements (KAPs) that later used to determine the effects of noise pollution to the students.

3.3 Data Analysis

3.3.1 Noise Data Analysis

This analysis was conducted to determine the effects of noise pollution to students regarding of health effects. The data was collected and analyzed by using Microsoft Excel Spreadsheet Software, while the demographic information was also being evaluated result from all the diagrams was produced using the software.

The data obtained was compared with Second Scheduled from DOE guidelines to spot trends and patterns by comparing data over time and between several variables. Therefore, a more impartial foundation for analysis and decision-making is provided by comparative data. It makes a more logical and data-driven approach possible by reducing dependence on irrational judgments and feelings.

SECOND SCHEDULE

RECOMMENDED PERMISSIBLE SOUND LEVEL (L_{Aeq}) BY RECEIVING LAND USE FOR EXISTING BUILT UP AREAS

Receiving Land Use Category	L_{Aeq} Day 7.00 am - 10.00 pm	L_{Aeq} Night 10.00 pm - 7.00 am
Low Density Residential, Noise Sensitive Receptors, Institutional (School, Hospital, Worship).	60 dBA	55 dBA
Suburban and Urban Residential, Mixed Development	65 dBA	60 dBA
Commercial Business Zones.	70 dBA	65 dBA
Industrial Zones	75 dBA	75 dBA

Note: The above prescribed L_{Aeq} limits are representative noise levels consistent with developed areas without noise disturbance generally deemed acceptable to majority of receptors occupying in premises at the respective land category.

Figure 3.2: Schedule permissible sound level from DOE Malaysia

3.3.2 Statistical Analysis

The values obtained from sound meter level was converted to LAeq values which is the A-weighted Leq sound level. A-weighted so the LAeq and LAeq, T descriptor are widely used for industrial noise measurement which is the audible frequencies designed to reflect the response of the human ear to noise (Sen et al., 2018). It is an average and is measured in dB(A) scale. Since there was a complaint about the noise pollution from FIAT building, it is applicable to predict hearing damage threats because Leq correspons with the total sound energy. It was calculated using the formula, Statistical metrics of SSPS package will be analyzed from collected data.

$$L_{Aeq,T}\left(10\,\min ute\right)=10\log_{10}\left[\frac{1}{120}\sum_{i=1}^{120}10^{LpAi/10}\right] \quad (1)$$

Description:

LAeq.T is the level of sound pressure continuous within 10 minutes

LpAi is the average momentary sound pressure level in intervals of 5 seconds

The data from the questionnaire was evaluated, Cronbach Alpha table was an effective method being used to determine sample size and addressed the existing gap for determined sample size within a general population. This was a measure of internal consistency, that was, how closely related a set of items were as a group. This method was chosen for eliminated bias in the selection process, thus the cost or effort in gathering samples were easing (Syed Abdul Rehman Bukhari et al.,2021). It was calculated using the formula.

$$n = \frac{x^2\ N\ P\ (1-P)}{e^2\ \ (N-1)+\ x^2\ P\ (1-P)}$$

Whereas, N= 1866, x^2= 3.841, P= 0.5 and e= 0.05

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Noise Level Analysis

The loud noise from the machinery that was claimed by many, especially among the students, could have exceeded the standard that has been compiled by the Malaysia Department of Environment (DOE) or otherwise. The study was conducted during semester break for February Session 2022/2023. Data was collected during weekdays and weekends three times a day which was in the morning from 10am until 12pm, afternoon from 2pm until 4pm and evening from 6pm until 8pm using the noise level meter.

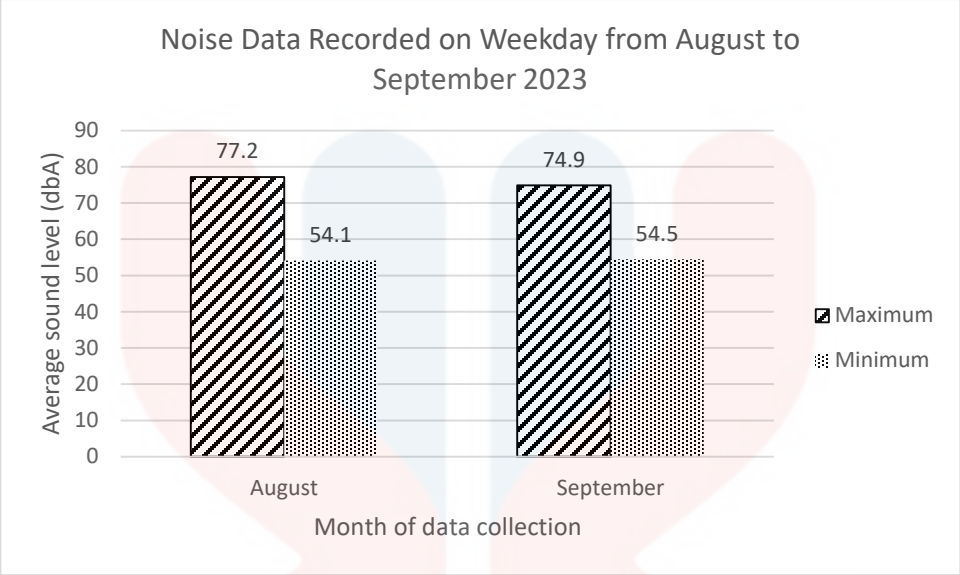


Figure 4.1 Noise Level on weekday for 2 months at FIAT's area

Based on figure 4.1, the data recorded for noise level showed that average maximum and minimum range are between 50 dBA to 75 dBA during the weekday. The maximum value recorded in September was 74.9 dBA during the day between 10 am – 12 pm and the minimum value was 54.1 dBA recorded in August during the night around 6 pm – 8 pm. The main sources of the environmental noise came from the machinery itself located at the FIAT's area, but there were several contributing factors to noise such as surrounding vehicles including motorcycle, car, and small lorry, number of people, and from daily cleaning work such as from the lawnmower. Based on the standard noise level from the Department of Environment (DOE, 2019) for the category of low density residential, noise sensitive receptors, institutional (school, hospital, worship) shouldn't exceed 60 Dba during L_{Aeq} Day from 7 am – 10 pm. The machinery in the campus area started operating at 8 am – 5 pm daily for the weekday.

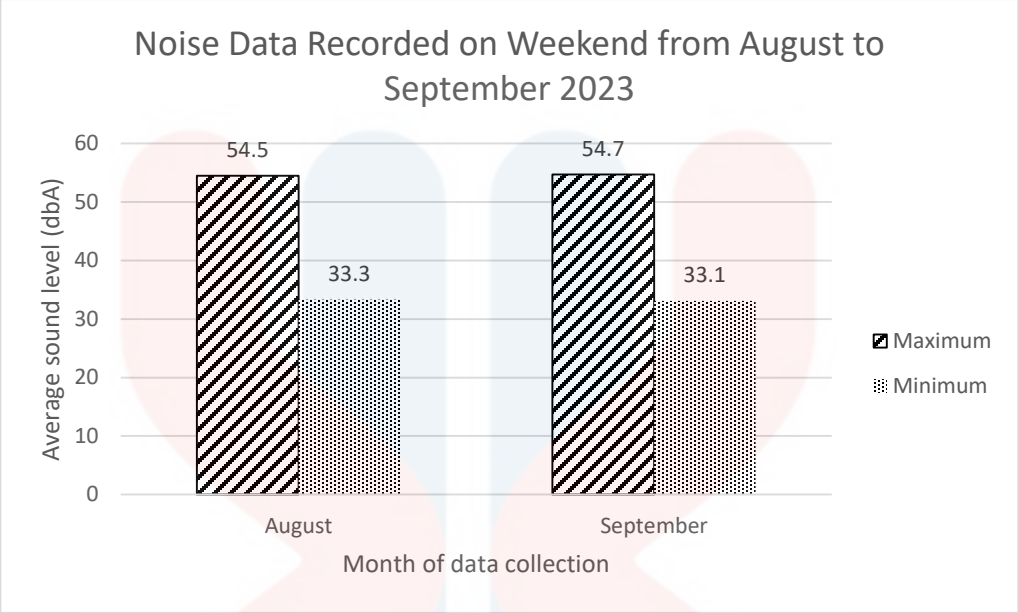


Figure 4.2 Noise Level on weekend for 2 months at FIAT's area

Based on the figure 4.2, the data recorded for noise level showed that average maximum and minimum range between 30 dBA to 55 dBA during the weekend. The maximum value recorded in September was 54.7 dBA during the day between 2 pm – 4 pm and the minimum value was 33.1 dBA during the night around 6 pm – 8 pm. During the weekend, the machinery was not operating and there were a few people around the campus. The vehicles also seem little compared to the working day. During the weekend, there is not so much outdoor activity occurring at the faculty area. In addition, a small number of students tend to go out for instance going back home and some prefer to stay inside. Noise level recorded during the weekend was from the mosque inside the campus that is not far from my site research location and occurred during the afternoon every Friday. Other than that, cleaning work such as mowing the lawn does not take place during the weekend except for the cleaning staff cleaning the interior of the building at the faculty.

4.2 Comparison of Noise Level at the study site with DOE Standard Level

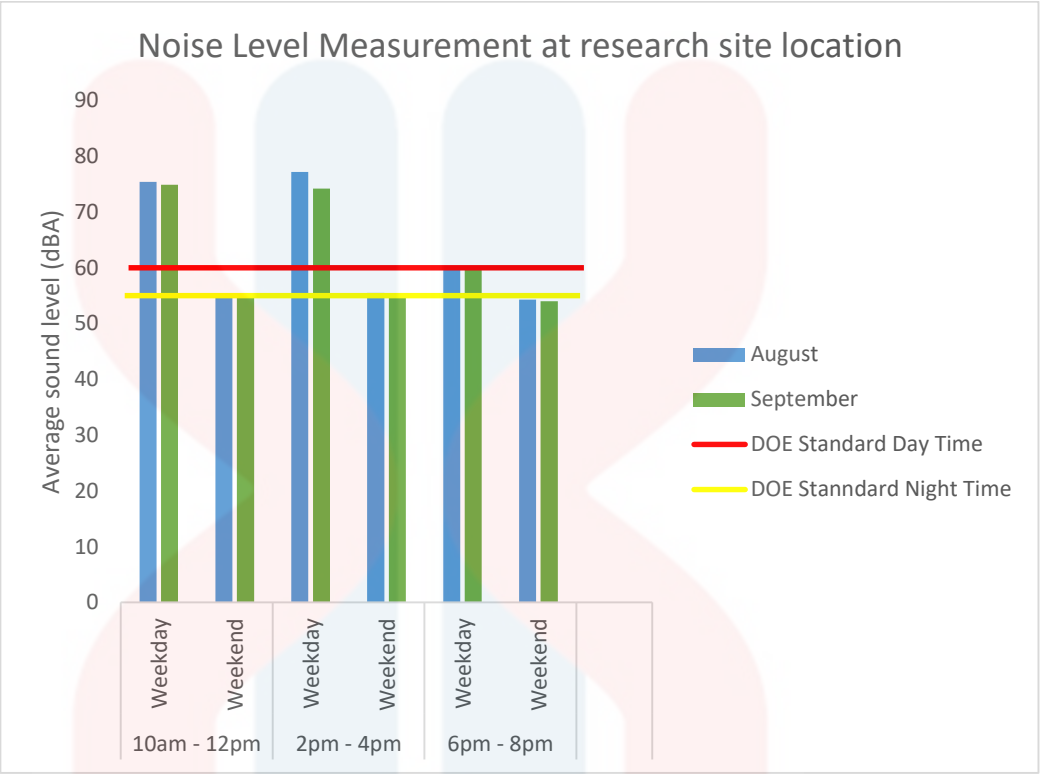


Figure 4.3 Noise Level determined compared to DOE Level

Figure 4.3 shows average sound level recorded in weekdays and weekends compared to the DOE standard limits. The data shown in August and September recorded that noise levels exceeded the permissible level set by DOE. Schedule of permissible sound levels in first schedule stated that for category suburban residential (medium density), recreational are 60 dBA for L_{Aeq} day (7.00 am – 10.00 pm) and 55 dBA for L_{Aeq} night (10.00 pm – 7.00 am) (DOE, 2019).

During the weekdays, both months (August and September) recorded noise levels that exceeded the DOE standard level during the three study periods which were in the morning, afternoon, and evening. The machinery which was the air conditioner motor fan that was located near the FIAT's building produced loud noise as it was turned on to supply cool air to the faculty. There are a few factors that contributed to the

increases of noise levels throughout this research other than from the machinery. FIAT's building was located at the strategic area that are easier for students, staff and other people to move as it was near the student's residential place (Blok A & B), café, FBKT, mosque, and main hall. The movements of student especially from the foundation programmed students, have a significant impact on the noise levels especially during the peak hours. Vehicles such as motorcycles, cars, vans and small lorries also contributed to the noise levels. For instance, a small lorry will come to the café to deliver food and a few parcels to the residential college office. Cleaning work is also often done such as mowing the lawn where the noise from the lawn mower often makes a noisy noise. After 5pm, the air conditioner motor fan was turned off as everyone was ready to go home. The noise level recorded during the evening is considered to be safe and comply with the established standards by DOE.

On the other hand, during the weekend noise data recorded was shown not exceeded the prescribed levels for both months. This is because, during the weekend there are not many movements occurring in the campus especially at the faculty area. The air conditioner motor fan was not functioning during the weekend as it was being turned on during the business hour only. There was not so much activity happening during the weekend because some of the students nearby tend to go home and some prefer to stay indoors due to the frequent rainy days in the month of August and September. During the three study periods, the average noise recorded for both months was below 60 dBA which does not have significant physical, physiological, psychological and communication impact on students and still manage to comply with established stands by DOE.

4.3 Questionnaire Analysis

4.3.1 Socio Demographic Analysis

The targeted respondent was from FIAT and FBKT that included 1866 total from both faculties where the samples for each demographic were chosen using a convenience sampling technique. Morgan and Krejcie formulas was applied to determine the population sample size estimation in this study. The study's sample size was determined to be 317 stuedent.

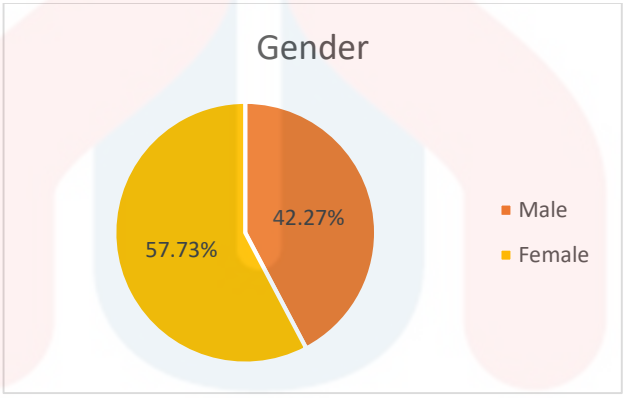


Figure 4.4 Gender of Respondent

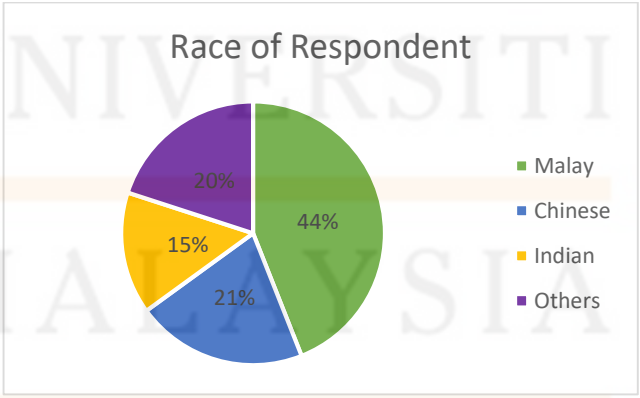


Figure 4.5 Race of Respondent

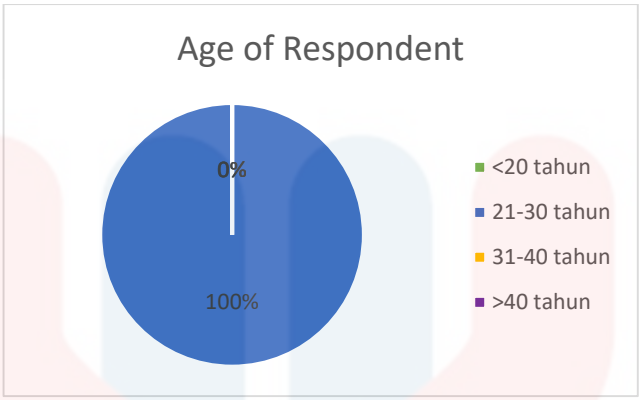


Figure 4.6 Age of Respondent

Figure 4.4 and 4.5 showed the total number of respondents (317) with 57.73% were female and 42.27% were male and the race of the respondents with 44% was Malay. Based on the result, females were more dominant answering the survey as it was easier to deal with and the majority group of Malay's race responded to the survey due to the fact the most populated residents in UMK Jeli. The survey also showed that 100% respondents from the same age range from 21-30 years old.

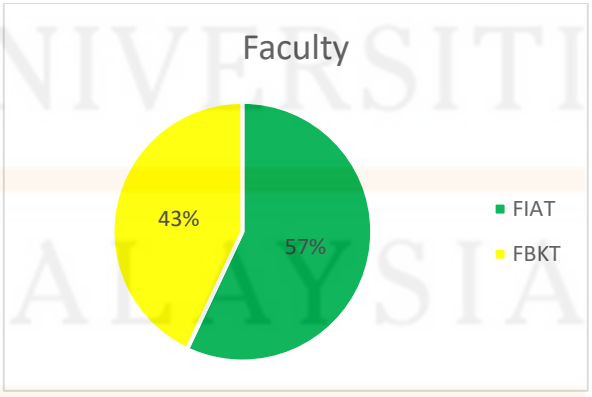


Figure 4.7 Total participation from both faculties

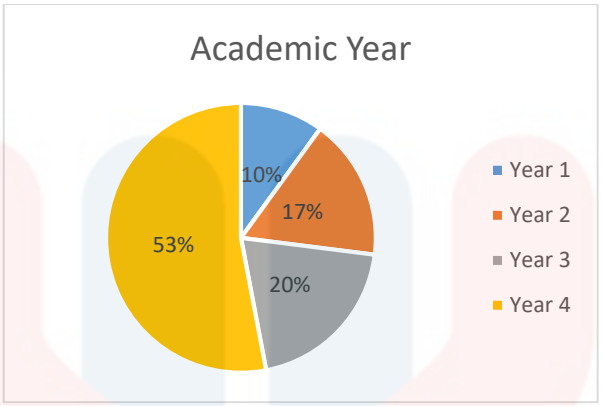


Figure 4.8 Academic year of respondent

Based on the figures 4.6 and 4.7, it was shown that FIAT dominated the survey with 57% while FBKT with 43% as the students might agree that noise pollution really does exists at the faculty area. The total of students answering the survey are mostly from final year students with 53% meanwhile year 1, 2, and 3 with 10%, 17% and 20%.

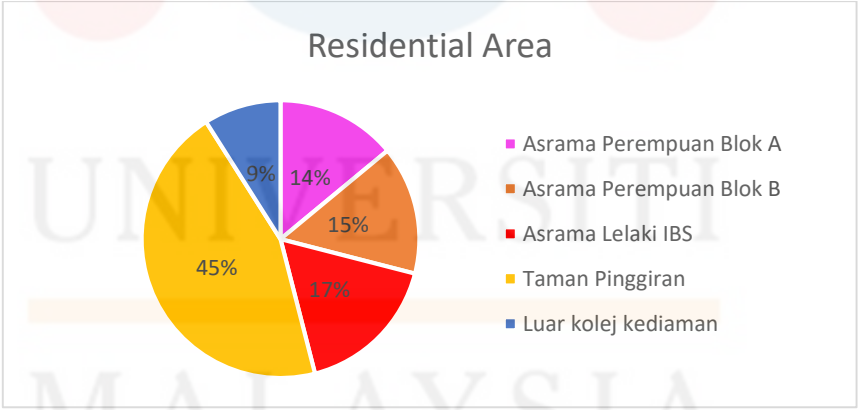


Figure 4.9 Residential area of respondent

The result from the survey showed that the majority of students stayed at Taman Pinggiran with 45% with male and female are part of the residential area. Female residential area

which were Block A & B with 14% and 15%, male residential area which was IBS recorded 17% and the least recorded from outside college residential area with 9%.

4.3.2 Noise pollution knowledge among respondents

There were 21-item questionnaire distributed to the students which was divided into four section. The content of the question was including knowledge, attitudes, practices and effects of noise that consider occurring among the student. Before the questionnaire distributed to the student, pilot test has been carried out to measure the credibility of the question.

Table 4.1: Knowledge about Noise Pollution

Item	Mean	Percentages of respondent				
		Totally disagree	Disagree	Moderate agree	Agree	Totally agree
Noise pollution means excessive noise that can deafening the ears of anyone who hears it.	4.48	-	2.52	4.73	25.24	67.51
Noise pollution results from traffic noise, industrial operations construction, and noise from the community.	4.52	-	2.21	3.15	31.55	63.09
Exposure to constant noise has a physical effect on individual health.	4.20	-	3.15	21.77	26.50	48.58
There are four types of sound frequency range namely continuous sound, sound intermittent, impulsive sounds,	3.37	-	7.57	68.14	5.36	18.93

and low-frequency sounds.						
A safe listening level is 85 dBA for eight hours a day (e.g.: normal conversation)	3.20	-	11.37	63.09	19.87	5.69

Table 4.1 stated the analysis knowledge about noise pollution from students that typically happened in the campus area. Based on the first statement, (67.51%) totally agreed, (25.24%) agree while mean to moderate agreed is 4.73% on knowledge on noise pollution means excessive noise that can deafen the ears of anyone who heard it. Majority of the respondents totally agreed on the statement and it was clearly shown that noise pollution can eventually hurt individual's ears. Disagreed (2.52%) recorded the least answered from the respondent due to lack of understanding concept of the noise pollution/hazard.

Statement two and three stated that the sources of noise pollution and physical effect towards individual health where on statement two (63.09%) strongly agreed, (31.55%) agreed while moderate agreed and disagreed with 3.15% and 2.21% that noise pollution comes from traffic, industrial, construction and community. Noise pollution might affect an individual's physical health has showed that the respondent strongly agreed and agreed with 48.58% and 26.50% while moderate agreed and disagreed are 21.77% and 3.15%.

Statements four and five were about the knowledge about sound frequency range that was clearly showed that majority of respondents with 68.14% and 63.09% moderate agreed as they didn't really understand the safe range for hearing. There were four types of frequency which are continuous sound, sound intermittent, impulsive sounds, and low-

frequency sounds with (18.93%) strongly agreed and agreed only recorded for 5.36% of respondents. As for the fourth statement stated that the safe listening level such as normal conversation only recorded at 85dBA with (5.69%) strongly agreed and (18.97%) agreed which recorded the least number of respondent really know about it.

4.3.3 Respondent's attitudes towards noise pollution

There are many different aspects that might influence an individual's attitude towards noise pollution, including as their cultural background, geographic region, and personal experiences. Nonetheless, prior research has typically shown that people's attitudes toward noise pollution are generally negative. In addition to individual attempts to lessen the consequences of noise pollution, community activities, government regulations, and other factors may also have an impact on attitudes about it. Although attitude on noise pollution may differ across people and groups, attempts to manage and mitigate this environmental problem are developing as people become more aware of its negative consequences.

Table 4.2: Attitudes towards sound pollution at UMK Jeli Campus

Item	Mean	Percentages of respondent				
		Totally disagree	Disagree	Moderate agree	Agree	Totally agree
There is the presence of machines that generate noise around the faculty area (e.g.: air conditioning motor fans).	3.93	3.15	2.52	25.87	34.70	33.75
Loud and prolonged noise disrupts the focus of hearing.	4.22	0.95	3.15	7.89	48.58	39.43
Loud and prolonged noise	4.67	0.32	-	0.32	31.55	67.82

causes ringing in the ears.						
Loud and prolonged noise causes headache symptoms, high blood pressure and increased heart rate.	4.77	-	1.58	3.15	11.99	83.28
Loud and prolonged noise causes extreme anxiety.	4.79	-	1.26	4.73	7.89	86.11

Table 4.2 showed the attitudes towards sound pollution at UMK Jeli campus where the first statement was about the presence of machines that generate noise around the campus recorded majority respondent agreed (34.70%), strongly agreed (33.75%) and moderate agreed with (25.87%) while disagree and strongly disagreed both recorded 2.52% and 3.15%. From this statement, few students were aware of the existence of the machines that generate loud noise especially around the faculty area.

The second and third statements were about noise pollution that might disrupt the focus of hearing and cause ringing in the ears. Agreed and strongly agreed both recorded at 48.58% and 39.43% on the second statement while for the third statement were 31.55% and 67.82%. For the second statement, disagreed and strongly disagreed recorded at 3.15% and 0.95% that loud and prolonged noise disrupts the focus of hearing while for the third statement moderate agreed and strongly disagreed both recorded 0.32% that loud and prolonged noise causes ringing in the ears.

Furthermore, statement fourth and fifth were about the symptoms that might be affected individual health from loud and prolong noise that agree (11.99%), strongly

agreed (83.28%), while moderate agreed (3.15%) and totally disagreed (1.58%) that loud and prolonged noise causes headache symptoms, high blood pressure and increased heart rate. (86.11%) strongly agreed, (7.89%) agreed while moderate agreed with (4.73%) and strongly disagreed (1.26%) from the respondents that loud and prolonged noise causes extreme anxiety.

4.3.4 Respondent's practices towards noise pollution

A variety of behaviors and measures adopted to manage or cope with noise pollution have been addressed in previous research on responder practices regarding noise pollution. Respondents may wear noise-canceling headphones or earplugs in extremely noisy locations to preserve their hearing and lessen the effects of noise pollution. A few participants mentioned that they had become accustomed to noise pollution over time or had changed their way of life. Although these adaptive techniques don't always represent proactive steps to combat noise pollution, they do demonstrate respondents' resilience in managing environmental stresses.

Table 4.3: Practices against noise pollution at UMK Jeli Campus

Item	Mean	Percentages of respondent				
		Never	Seldom	Sometimes	Often	Always
I use ear plugs/cotton/ear protection when in the faculty area.	3.27	0.95	5.36	59.62	34.07	-
I avoid crossing areas that produce noise at my faculty area.	3.33	1.89	25.87	37.85	5.68	28.71
I limit my time around noise areas to reduce risk damage to the ear.	3.77	-	1.89	47.32	22.71	28.08
I reported to the superiors about the	1.84	68.45	26.81	-	3.15	1.58

noise pollution that happened in the faculty area.						
I have to speak in a loud tone when I am in the area there is a loud noise	4.19	0.95	-	9.46	58.04	31.55
I had a hearing health screening to detect symptoms due to noise pollution.	1.03	96.85	3.15	-	-	-

Table 4.3 showed practices against noise pollution among the respondents. From the statement number one, 59.62% respondent sometimes use ear plugs/cotton/ear protection around the faculty area and 0.98% never use any of it. Second statement recorded the percentage of respondents avoiding crossing areas that produce noise at the faculty area with 37.85% on sometimes and always at 28.71%.

The third statement on time limit around the noise areas to reduce risk damage to the ear recorded the percentage was highest on sometimes with 47.32% and the least recorded at seldom with 1.89% showed that not many students were wandering at the faculty area as the noise might disrupt them. While for the fourth statement, the majority of the respondents never report to the superiors about the noise pollution that happened in the faculty area with 68.45% and only 1.58% have done it.

In addition, the fifth statement recorded that the majority of respondents (58.04%) often have to speak in a loud tone when in the area there was a loud noise, always (31.55%), sometimes (9.46%) and the least was never at (0.95%). Last but not least, statement number six was about the practices taken by respondents on health screening about hearing tests to detect symptoms due to noise pollution, recorded that the majority

never (96.85%) and seldom (3.15%). This showed that even though there was noise pollution occurring in the faculty area, most of the students did not had a health screening as they were ignoring the noise.

4.3.5 Effects of Noise Pollution

Studies have demonstrated that noise pollution may have detrimental impacts on one's physical and mental well-being, leading to elevated stress levels, disrupted sleep patterns, and a general decline in general wellbeing. Because of this, a lot of people voice worries about noise pollution and how it affects their day-to-day activities. Studies has shown that noise pollution can interfere with sleep cycles, which can result in insomnia, poor quality sleep, and related health issues including irritation and exhaustion.

Table 4.4: Effects of Noise Pollution

Item	Mean	Percentages of respondent				
		Totally disagree	Disagree	Moderate agree	Agree	Totally agree
Individual sleep time will be disturbed due to continuous loud noise.	4.51	-	-	-	48.58	51.42
Loud noise can affect an individual's hearing temporary (temporary hearing loss).	4.60	-	-	4.73	30.91	64.35
An individual's ears will buzzing as a result of exposure to continuous loud noise.	5.45	2.21	5.68	28.08	41.32	22.71
Exposure to loud noise can cause	3.73	0.32	17.03	23.34	27.76	31.55

injury against the ear drum.						
The inner part of the ear feels sore/bleeding due to exposure to continuous loud noise.	4.05	-	7.89	9.46	52.68	29.97

Table 4.4 showed the effects of noise pollution to the students. Statement number one stated that individual sleep time will be disturbed due to continuous loud noise with the majority strongly agreed (51.42%) and agreed (48.58%). This is because respondents might have experienced that situation and definitely agreed on the statement. Second statement was about how loud noise can affect an individual's hearing temporarily (temporary hearing loss) which recorded moderate agree (4.73%), agree (30.91%), and strongly agree (64.35%) that eventually noise might lead to temporary hearing loss.

Next, the third was about result of exposure to continuous loud noise might lead to individual's ear buzzing with majority on moderate agree (28.08%), agree (41.32%), strongly agree (22.71%), while disagree (5.68%) and strongly disagree (2.21%). Respondents might be having symptoms like ear buzzing due to the loud and continuous exposure to noise.

Fourth and fifth statement are about impact of noise pollution to the ears condition where majority totally agree (31.55%), agreed (27.76%), moderate agreed (23.34%), while disagreed (17.03%) and totally disagreed (0.32%) that exposure to loud noise can cause injury against the eardrum. The inner part of the ear feels sore/bleeding due to exposure to continuous loud noise with majority agreed (52.68%), strongly agreed (29.97%), moderate agreed (9.46%) while disagreed recorded at 7.89%.

4.4 Independent Sample T-test and One-way ANOVA analysis

The risk perception of males and females was compared using an independent t-test, which was used to discover two divided groups that were unrelated to one another such as gender. The two most used statistical ways for comparing group averages are t- test and analysis of variance (ANOVA). However, this research also used the ANOVA one-way to analyze the effects of environmental noise pollution at the Jeli campus among the FIAT and FBKT students.

Table 4.5: Independent t-test of respondent's effect

Components		**Mean**	**t-value**	**p-value**
Gender	Male	4.312	-0.873	-.0.003
	Female	4.425		
Types of	FIAT student	4.328	-2.302	0.002
respondents	FBKT student	4.441		

Gender and types of respondent's mean scored differed significantly, according to the findings of the independent samples t-test (t (58) = -0.873, p = -0.003). The observed p-value drops below the cutoff using a two-tailed test and a significance level of 0.05, which results in the null hypothesis being rejected. There may be a statistically significant difference in the cognitive capacities of gender and types of respondent, as shown by the rejection of the null hypothesis. Participants in Group B (types of respondent), on average, scored lower than those in Group A (gender), according to the negative t-value. Even if the results are statistically significant, it was crucial to take the observed difference's practical meaning into account.

The difference between the two groups appeared to be moderate but not insignificant, based on the effect size (Cohen's d = -0.42). Despite being statistically significant, this difference could not have much of an effect in everyday situations. These results are in line with those of Smith et al. (2019), who in a comparable population also showed poorer cognitive scores. That is in contrast to the findings of Jones et al. (2020), who did not find any statistically significant changes. Differences in the sample characteristics and measuring instruments may be the cause of these discrepancies.

Table 4.6: ANOVA test of respondents

Components		**Mean**	**F value**	**p-value**
Age	<20 years' old	-		
	21-30 years' old	4.444	1.793	0.253
	31-40 years' old	-		
	>40 years' old	-		
Race	Malay	4.517		
	Chinese	4.258	1.334	0.259
	Indian	4.214		
	Other	4.066		
Year of	Year 1	4.099		
academic	Year 2	4.257	2.568	0.048
	Year 3	4.402		
	Year 4	4.428		

One-way ANOVA test showed the data for this demographic component were statistically significant in this questionnaire. From observation, all of the respondents came from the same age range that is between twenty-one to thirty years old. Data for the races, Malay record the highest race of respondents as the majority of students in the campus are from the same race compared to others. Thus the dominant academic year of respondents was Year 4 due to effective deals, communication and cooperation among the researcher with the respondent.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on this study, the effects of environmental noise pollution on students in UMK Jeli showed that data collected from weekdays tend to have the highest volume generated from the environment, especially from the machinery that generated loud noise. On the other hand, the data recorded for the weekends recorded the lowest volume for both months due to the less number of students in the campus during the mid-semester break. Weather factor was also contributing to the less movement of student especially during the weekend.

The students were slightly affected by the environmental noise pollution in their campus life. High levels of unwanted noise was obviously and mainly produced from the machinery that is located around the faculty compared to other environment sound such as few vehicles and others. During the weekdays, the machinery was actively run by the

office to distribute cool air for the building around the campus. The KAPs' among students were also recorded and from the analysis there was a slight impact to their health.

In conclusion, high volume of air-conditioner machineries was produced more during the weekdays compared to weekends for both months, which affects the noise levels to the health. Most of the respondents were lacking of information about the noise pollution that are quite hard for them to be alert and took mitigation to reduce the effects of noise pollution. The objectives of this study were accomplished

5.2 Recommendations

In situations where this research might offer insightful information on the long-term impacts of noise pollution on college students, do such studies. Investigators can evaluate the cumulative effects of noise exposure on mental health, academic performance, and quality of life by tracking a group of students over a long period of time (Babisch 2002). An improved cause-and-effect link between noise pollution and its effects will be established with the aid of this method.

Other than that, create unbiased measuring instruments aside from it. In order to assess noise exposure and its effects on university students, the majority of research now use self-reported data. Developing impartial measurement instruments is crucial to improving the validity and reliability of study findings. Wearable technology, for instance, that continuously records noise levels may be able to detect certain noise sources and produce more accurate data (Miedema & Outshoorn, 2001).

Last but not least, look at ways to reduce noise. It is essential to look into practical ways to reduce noise pollution in academic settings. Students' learning experiences might

be greatly enhanced by putting noise reduction strategies into practice, such as soundproofing study spaces and classrooms with the use of noise-cancelling headphones or designating quiet areas (Shield & Dockrell 2003). The usefulness of these treatments and their effects on students' wellbeing should be assessed through research.

REFERENCES

Anees, M. M., Qasim, M., & Bashir, A. (2017). Physiological and physical impact of noise pollution on environment. *Earth Science Pakistan*, *1*(1), 08-11.

Atmaca, E., Peker, I., & Altin, A. (2005). Industrial noise and its effects on humans. *Polish Journal of Environmental Studies*, *14*(6).

Babisch, W. (2002). The noise/stress concept, risk assessment, and research needs. Noise & Health, 4(16), 1-11.

Brout, J. J., Edelstein, M., Erfanian, M., Mannino, M., Miller, L. J., Rouw, R., ... & Rosenthal, M. Z. (2018). Investigating misophonia: A review of the empirical literature, clinical implications, and a research agenda. *Frontiers in Neuroscience*, 36.

Bulunuz, N. (2014). Noise Pollution in Turkish Elementary Schools: Evaluation of Noise Pollution Awareness and Sensitivity Training. *International Journal of Environmental and Science Education*, *9*(2), 215-234.

Deepak, S., & Singh, N. U. (2014). Study of Noise Pollution in Dhar Town MP, India with Special Reference to the Silence Zones. *Research Journal of Recent Sciences ISSN*, *2277*, 2502.

El-Sharkawy, M. F., & Alsubaie, A. S. (2014). Study of environmental noise pollution in the university of Dammam campus. *Saudi Journal of Medicine & Medical Sciences*, *2*(3), 178-184.

Gerges, S., & Sehrndt, G. A. (2001). *5 NOISE SOURCES Performance evaluation of polymer-modified bedding mortars for structural masonry View project*. Retrieved at May 16, 2023 from https://www.researchgate.net/publication/242618758

Gilavand, A., & Jamshidnezhad, A. (2016). The effect of noise in educational institutions on learning and academic achievement of elementary students in Ahvaz, South-West of Iran.

Hammer, M. S., Swinburn, T. K., & Neitzel, R. L. (2014). Environmental noise pollution in the United States: developing an effective public health response. *Environmental health perspectives*, *122*(2), 115-119.

Ibrahim, S. A. J. (2023). *Reviewing the effects of noise pollution on students (college and university)*. 030056. Retrieved at May 16, 2023 from https://doi.org/10.1063/5.0121878

Ismail, S., & Ahmed, S. (2018). Noise pollution, its sources and effects: A Case study of University students in Delhi.

Jariwala, H. J., Syed, H. S., Pandya, M. J., & Gajera, Y. M. (2017). Noise pollution & human health: a review. *Indoor Built Environ*, *1*(1), 1-4.

Jhanwar, D. (2016). Noise pollution: a review. *Journal of Environment Pollution and Human Health*, *4*(3), 72-77.

Maisonneuve, N., Stevens, M., Niessen, M. E., Hanappe, P., & Steels, L. (2009). *Citizen Noise Pollution Monitoring*. Retrieved at May 18, 2023 from http://www.noisetube.net

Mas, N., Purwaningsih, S., Safwani, M., Alli, A., Shams, O. U., Ghani, J. M., Ayyaturai, S., Sailan, A. T., Hani, S., & Sinon, M. (2018). Journal of International Dental and Medical Research ISSN 1309-100X • 11 • Number • 1 • 2018 Case report. In *J Int Dent Med Res* (Vol. 11, Issue 1). Retrieved at May 20, 2023 from http://www.jidmr.com

Miedema, H. M., & Oudshoorn, C. G. (2001). Annoyance from transportation noise: *Relationships with exposure metrics DNL and DENL and their confidence intervals. Environmental Health Perspectives,* 109(4), 409-416.

Mirzaei, R., Ansari-Moghaddam, A., Mohammadi, M., Rakhshani, F., & Salmanpor, M. (2012). Noise pollution in Zahedan and residents' knowledge about noise pollution. *Health Scope*, *1*(1).

Mohammadi, G. (2014). Occupational Noise Pollution and Hearing protection in selected industries. *Iranian Journal of Health, Safety and Environment*, *1*(1), 30-35.

Muhammad Anees, M., Qasim, M., & Bashir, A. (2017). PHYSIOLOGICAL AND PHYSICAL IMPACT OF NOISE POLLUTION ON ENVIRONMENT. *Earth Sciences Pakistan*, *1*(1), 8–10. Retrieved at May 16, 2023 from https://doi.org/10.26480/esp.01.2017.08.10

Purwaningsih, N. M. S., Alli, M. S. A., Shams, O. U., Ghani, J. M., Ayyaturai, S., Sailan, A. T., & Sinon, S. H. M. (2018). Analysis of Noise Pollution: A Case Study of Malaysia's University. *Journal of International Dental and Medical Research*, *11*(1), 330-333.

Rahman, M. M., Tasnim, F., Quader, M. A., Bhuiyan, M. N. U. I., Sakib, M. S., Tabassum, R., ... & Islam, A. R. M. T. (2022). Perceived Noise Pollution and Self-Reported Health Status among Adult Population of Bangladesh. *International Journal of Environmental Research and Public Health*, *19*(4), 2394.

Shield, B., & Dockrell, J. (2003). The effects of environmental and classroom noise on the academic attainments of primary school children. *The Journal of the Acoustical Society of America, 123(1),* 133-144.

Shield, B., & Dockrell, J. (2008). The Effects of classroom and environmental noise on children's academic performance (Electronic Version). In *9th International Congress on Noise as a Public Health Problem (ICBEN), Foxwoods, CT*.

Stansfeld, S. A., & Matheson, M. P. (2003). Noise pollution: non-auditory effects on health. *British medical bulletin*, *68*(1), 243-257.

Suriandjo, H. S., Manaf, M., Muspida, A., Widodo, S., & Abdulbar, F. (2021, June). Review of the air pollution from the perspective of sound comfort in the coastal space. Case study of the Boboca Monument, Manado City. In *IOP Conference Series: Earth and Environmental Science* (Vol. 802, No. 1, p. 012035). IOP Publishing.

Thattai, D., Sudarsan, J. S., Sathyanathan, R., & Ramasamy, V. (2017, July). Analysis of noise pollution level in a University campus in South India. In *IOP Conference Series: Earth and Environmental Science* (Vol. 80, No. 1, p. 012053). IOP Publishing.

Tunde, A. M., & Abdulquadri, S. (2021). Environmental Noise Pollution and its Impacts on the Hearing Ability of Men and Women in Ilorin, Kwara State, Nigeria. *Tanzania Journal of Science*, *47*(5), 1517-1529.

Wszołek, T., & Kłaczyński, M. (2014). Effect of traffic noise statistical distribution on LAeq, T measurement uncertainty. *Archives of Acoustics*, *31*(4 (S)), 311-318.

Zipf, L., Primack, R. B., & Rothendler, M. (2020). Citizen scientists and university students monitor noise pollution in cities and protected areas with smartphones. *PloS one*, *15*(9), e0236785.