# EFFECTS OF NOISE POLLUTION ON ZAKHO UNIVERSITY STUDENTS AT TWO FACULTY OF SCIENCE BUILDINGS

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**ABSTRACT:**

Noise is a type of pollution that has a negative impact on human health and well-being. Because of population growth and urbanization, the magnitude and severity of noise pollutionare increasing. This study examines the level of noise throughout Zakho university-faculty of science buildings. Noise levels were measured using a sound level meter at two campus buildings at five different times (9:00 AM –2:00 PM). A total of 180 students (98 females, 82 males) were questioned to collect data. The noise levels were highest at the ground floor of building one were at (11:00AM-12:00PM) and (12:00-1:00 PM), respectively, changing from 60.6 to 73.7 dB at (11:00 AM-12:00 PM) and 63.3-73.8 dB at (12:00-1:00 PM) (12-1:00 PM). These results could be due to students taking a lunch hour after 12:00PM and visiting a café at this site. The most prevalent direct impact of noise on students was feeling annoyed, which affected 23% of students, followed by headache (18%) and so on. Noise has psychological effects on students such as anxiety (6%) and sleep problems (4%) which all have a low percentage. Lastly, memory lapse (2%) and fatigue (3%) impact on students had a lower proportion when compared to other impacts. However, there was 22% of students did not affect by noise.

**Keywords:** Noise pollution, Physical and Psychological effects, Sound pressure level.

## 1- INTRODUCTION

Noise is defined as unwanted sound with high-energy waves that have a significant impact on the humans (Qzar, 2020). Noise levels are measured in decibels (dB) which is the unit of Sound pressure level (SPL), and not all sounds are considered noise pollution (Caddick, 2018). The World Health Organization (WHO) describes noise the background sound pressure level should not exceed 35 dB "equivalent" sound level (Leq) during teaching class; and for outdoor playgrounds, the sound pressure level of the noise from external sources should not exceed 55 dB Leq, the same value given for outdoor residential areas in daytime (Berglund, 2000). Noise pollution is one of many environmental problems near the university campus. The negative relationship between learning outcomes and the noise level of the education centre was confirmed, and it was found that noise pollution reduces learning ability (Woolner, 2010).

In many rapidly urbanizing areas, environmental noise pollution is becoming a global problem. Noise has a physical, psychological, and social influence on human health. Furthermore, increased blood pressure, noise-induced hearing loss, sleep and behaviour, in addition to respiratory rate, and oxygen intake is associated with noise levels (Hamoud, 2020). Noise comes from a variety of sources, including automobiles, machinery, home devices, industrial, commercial, and residential generators. There are two types of noise pollution effects: auditory and non-auditory. The reported negative consequences of noise pollution are the result of on-going constant exposure to it. Auditory effects, also known as physical effects hearing abnormalities, are a type of hearing abnormality (Basner, 2014). Non-auditory effects have been linked to negative impacts on work performance, such as decreased productivity and misinterpreting what is heard. It is the most frequent cause of hearing loss; patients may not know their hearing loss has progressed to the point that it is no longer treatable (Basner, 2015).

All of the illnesses listed above, with the exception of sleep disturbance can have a negative influence on university teaching and research (Schlarb, 2017). Noise pollution causes high resting blood pressure, high stress levels, and learning difficulties in children, according to research (Münzel, 2018). The noise level is often converted into a single number called the. The Leq (A) indicator is defined as the average acoustic intensity over time (Kamil, 2016). Noise exposure over a long period can lead to a variety of health problems. The National Institute for Occupational Safety and Health (NIOSH) describes the definition of hazardous noise as sound that exceeds the time-weighted average of 85 dB, meaning the average noise exposure measured over a typical eight-hour workday (Nzilano, 2018).

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Many schools and universities are currently located in congested locations of cities, such as near marketplaces and restaurants, due to a lack of appropriate sites or the rapid growth of neighbouring viable school sites. Universities should ideally be in a calm setting since noise in the university environment affects activity within the university or school (Christensen, 2021).

Therefore, the aim of this research is to assess noise pollution levels and their sources in some locations in the University of Zakho and their possible adverse effects on the populace in that selected region. The most essential aspect of controlling noise pollution is to monitor the noise pressure level and the parameters and compare them to standard parameters.

## 2- MATERIALS AND METHOD

This study assessing environmental noise pollution was conducted within two buildings of the Faculty of Science at the University of Zakho. The study ran over a period of two months from October to November.

### 2-1 Area of Study

This research was conducted within two buildings of the Faculty of Science at the University of Zakho (UoZ) located in Zakho, Iraqi Kurdistan, Northern Iraq.

### 2-2 Methodology

Information was collected using questionnaires, conducting physical observations and through conducting interviews. A total of 180 students (98 females, 82 males) were asked to collect data. Data collection occurred in the Faculty of Science. The location ensured there was sound pollution.

The age range of students varied from 18-25. Thus, noise measurements were conducted at different times, between the hours of 9:00 AM – 2:00 PM.

A sound level meter or sound pressure level meter (SPL) (PeakTech 8005) was utilised to make acoustic measurements Maximum and Average in unit (dB). The sound level meter was used to measure the level of noise from generating sets in the Campus of the Science buildings. We use the table and graph to analysis the data. The surveys comprised of numerous questions designed to survey health and learning related conditions (symptoms).

Questions were an observational checklist, utilized by field professionals to evaluate the natural health markers or the college situations. Finally, data from completed surveys were entered in Microsoft Excel spreadsheets and then analysed for further investigation.

## 3- RESULTS AND DISCUSSION

Table (1) shows the results that were carefully chosen for noise measurements in two buildings of the Faculty of Science at the University of Zakho. The values of the maximum and average noise levels recorded in the measurement locations were highest at (11:00 AM until 1:00 PM) respectively at the ground floor in building one. From 11:00 AM – 12:00 PM, the SPL average was 60.6 dB and SPL maximum was 73.7 dB, similarly, at (12:00-1:00PM) the SPL average was 63.3 dB and SPL maximum was 73.8 dB.

Table 1: Sound pressure level ( SPL) measurements of two buildings

| Time | ( 9-10 AM ) | | ( 10-11 AM ) | | (11 AM -12 PM) | | (12-1 PM) | | (1-2 PM) | |
|---|---|---|---|---|---|---|---|---|---|---|
| SPL Site Name | AVG (dB) | SPL Max (dB) | SPL AVG (dB) | SPL Max (dB) | SPL AVG (dB) | SPL Max (dB) | SPL AVG (dB) | SPL Max (dB) | SPL AVG (dB) | SPL Max (dB) |
| Building 1 Ground Floor | 58.3 | 69.2 | 59.8 | 73.3 | 60.6 | 73.7 | 63.3 | 73.8 | 59.4 | 69.9 |
| Building 1 1st Floor | 54.1 | 61.7 | 60 | 70.4 | 60.5 | 71.8 | 59.9 | 66 | 51.5 | 59.3 |
| Building 1 2nd Floor | 50.6 | 59 | 53.8 | 68.6 | 63 | 70.5 | 55 | 65 | 50.6 | 55.7 |
| Building 2 Ground Floor | 59 | 70 | 64.3 | 72 | 61.5 | 71 | 60.6 | 66.3 | 60.6 | 66.3 |
| Building 2 1st Floor | 57.1 | 66.3 | 64 | 69.7 | 55.1 | 66 | 56.6 | 66 | 55 | 64.4 |

The reasons for these observations maybe those students break for lunch after 12PM and attend a café at this location. The main hall is large in that area, which allows students to gather there and walk around. In addition, there are many departments, a study hall and laboratories. Furthermore, the air-conditioning machines and electricity generators at ground level produce a lot of noise along with the car park in front of the building 1.

In contrast, at (9:00-10:00AM) the values of maximum and average noise levels recorded were lowest as students were in their classrooms taking lessons. The exception was at a few minutes before 9:00AM when there was maximum SPL at the main entry gate (inquiry desk) as many students arrive to study at this time.

The maximum value of SPL Max and average for the 1st floor building one was between 11:00 AM and 12:00 PM. The library is located on this floor and at this time, students sit and take a rest here. As there is a very limited seating area to accommodate a large number of students from three departments and many laboratories, a lot of noise is generated. Similarly, for the 2nd floor, which is close to the 1st floor (just above it and open indoor balcony), the values were 63-70.5dB at (11:00 AM-12:00 PM). In contrast, (9:00-10:00 AM) and (1:00-2:00 PM) are the quieter hours for the second floor as students are in classes and at the end of the study. Furthermore, there are fewer laboratories on the third floor and only one department there (Mathematics department). At the end of the day, the maximum value of SPL average and Max was about 50.6 -55.7dB that is comparable to standard values.

For the building two-ground floor, similar to building one, table (1) shows that the value of average was 64.3 dB and the maximum noise levels was 72 dB which is the highest value at (10:00-11:00 AM) and similarly between 11:00 AM and 12:00 PM, the value of SPL average was 61.5 dB and SPL maximum was 71 dB. However, at 9:00 AM and a few minutes before that, there were high noise levels occurring at the entrance gate that is narrow and two departments' students (Biology and Chemistry departments) have lectures in building 2. Similar to the first floor, the high value of SPL average and Max were 64-69.7 dB at (10:00-11:00 AM). Furthermore, the first floor where the average noise level ranged from 55dB to 64dB was comparable to the average noise level to the ground floor –building 2. Thus, the average noise level (SPL average) for building 2 was comparable or sometimes more than the SPL average for building one as there are lots of students in building two especially on the ground floor. Additionally, there are many laboratories there for chemistry departments and students came down to the ground floor through break time and walk there.

It was observed that the equivalent sound levels were high on the first floor for both buildings. Comparing LAeq data recorded in grounds with WHO standards, the levels were found to be unacceptably high. According to the WHO, noise levels should not exceed 35 dB in the classroom and 55 dB in the building. Thus, the noise level recorded in all the locations of the two buildings exceeded the prescribed standard level of 55 dB due to the existence of two large electricity generators near the departments [6]; the two buildings are in close about (100 m) to the highway street (Zakho International Highway). Furthermore, there are a huge number of students in each department, about 140 students, so more than 77 students in each class. The unsuitable design of narrow corridors and hall areas between the buildings contributes to the increase in noise. However, the university is located in an unpopulated and open area.

In general, the major source of noise within the university emanated from the following; students conversation during rest time, electricity generators, the large number of students (1450 students from six departments) in two buildings with narrow corridors and small class-room sizes, air-conditioners, the close proximity to the busy highway, and unsuitable design of car parks in front of each building.

Students were given a total number of 10 questions (see figure 1) to assess their perspective towards environmental noise. The Pie chart shows that the highest percentage (23%) of students considered feeling annoyed when they were exposed to the high noise during the study in both buildings and this might affect the learning and hard to understand lessons. Only 22% (n=39) of students had the opposite opinion towards these questions. They were normal and were not affected by noise. Thus, the impact of noise was found to affect women more than men as two thirds of males reported they were normal. However, it is unclear whether the traffic noise affects women and men differently according to Frei, Mohler & Röösli in 2014 study (Frei, 2014).

14% of students cannot concentrate in classroom teaching and they lose interest in studying. In addition, the most common physical impact of noise on students was headache, 18% of students suffered from the headache, stress (3%), and 5% dizziness. There are psychological impacts of noise on students such as anxiety (6%), sleep disturbance (4%), all of which have low percentage. Finally, there were memory
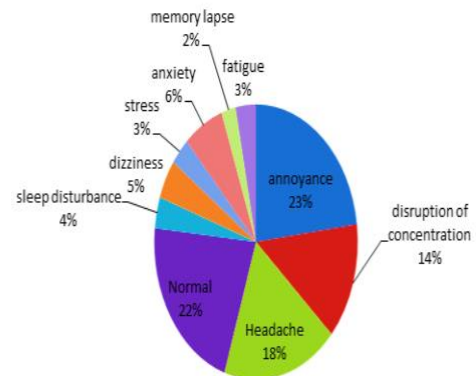
Figure 1 The Impact of Noise twoards student statement questionnaire results

lapse (2%) and fatigue impacts on students (3%), that had a low percentage compare to other impacts.

## 4- CONCLUSION

Noise pollution has a significant impact on students' physical and mental health throughout their university studies. People are unaware of the significant impact it has on students, and minor changes can be implemented to address these issues. The WHO recommends should not exceed 35 dB in the classroom. Thus, university students must be made more aware of the dangers of noise pollution. The high indoor sound pressure levels observed in our study are due to hundreds of students circulating in university buildings every day, as well as students conversing in hallways and especially at the ground floor.

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