*Journal of* Genetic and Environmental Resources Conservation, 2023, 11(2):139-143.
www.gercj.com Print ISSN: 2306-8663, Online ISSN: 2306 – 8280

# Sound pressure level (SPL) of Al-Karkh University of Science second campus (Abo-Greab)/ Iraq

**Ibrahim M. Al-Sudani*, Amani I. Al-Temime and Aqeel D. Salman**
Collage of Renewable Energy and Environmental Science, Al-Krakh University of Science, Iraq.
***Corresponding author: ibrahemabd@kus.edu.iq**
**Received: May 9th 2023; Accepted: June 11h 2023**

## Abstract

Noise pollution become one of the health risk pressure due to nature of impacts on psychological behavior. Thus our study aim to estimate the sound pressure level SPL in different university building in the second campus (Abo-Greab) of Al-Karkh University of Science. For this purpose Sound level Meter type: Auto Range Ds-102 and the L_min and L_max was estimate. We chase randomly Seven location at three day time; then we selected tow conditions: 1- Without operation of the electrical generator 2- With operation of the electrical generator. The study result show tow group of result due to the sound emerge by operation of the electrical generator, the first group recording the highest SPL was detected in site 5 (passageway) reaching (78 dB); while the lowest was (41 dB) in the site 2 (staff room). When the electrical generator started the sound level up significantly to het (98 dB) in site 6 (The garden), while the site 2 (staff room) stay away due to the distance recording (45 dB). Some of the study site were noisily polluted in sometimes according to the standard noise level of EPA (Environmental Protection Agency); While, the WHO adopted (85 dB) as critical threshold between the safe sound level and the sound noise pollution, which risking human health. Our study shading the light on one of the update environmental issues and submit some advices to decrease the noise level to be safe for the university campus.

**Keywords: SPL, Iraq, Al-Karkh University of Science, Noise.**

## Introduction

Iraqi Governmental resolution No.41 in 2015 the Noise Control Act become in force. The legislators defined the noise as unwanted sound that affects the health and safety of specific people group or the general public and has a negative impact on the environment. Meanwhile; the 60 dB adopted to be the health risk threshold. The noise control act open the door to future studies in the noise pollution field, which is new branch of environmental studies. Also the law paved the way to labors to advocate those rights in safe work environment and compensation the health damages due to noise pollution (Schwela, 2021).

Exposure to direct noise may cause health problems, disturbance, and annoyance to individuals; under certain conditions, it can also affect work performances and quality of life. For example, sleep disturbance is generally associated with low noise levels, and levels higher than 70 dB can cause hearing impairment and ischemic heart diseases (Nijland and Van Wee, 2005). Gangwar et al. (2006) Described that the increasing number of automobiles; musical instruments; small scale industries; urbanization and human activities are the main sources of noise pollution. Hence, the term Noise refers to a sound without agreeable musical value or as an undesired sound. Noise is no less dangerous of the pollutant than the toxic chemicals in the environment. As a result of increasing machines using, the use of increasingly big and complicated machinery, equipment and the stepping up of the pace of production, the noise pollution is becoming an increasingly around world and serious source of discomfort and danger (Singh and Dev, 2010).

Most noise study focus on the noise caused by traffic in various stats (Ali, et al., 2021; Abo-Qudais and Alhiary, 2007; Agarwal and Swami, 2011; Al-Mutairi, Al-Attar and Al-Rukaibi, 2011; Barros and Dieke, 2008). Local studies deal with traffic noise (Aziz, 2012; Aziz et al., 2012); residential noise (Ali et al.,

2021; Admawi, 2021), industrial areas noise (Rashid and Ahmed, 2021) and university campus noise (Kanabe and Darogha, 2017).

The aim of this study to assess the sound level with in the building of Al-Karkh University of Science under different sound circumstances and predict the health risk.

## Materials and Methods

**Area of study:** Randomly we chase 7 site within the building of the second campus of Al-Karkh University of Science; the description and coordinate show in Table (1).

**Table (1) : Study site description and coordination**

| | Site name | Description |
|---|---|---|
| 1 | Classroom | Students class room with average capacity (50 persons) |
| 2 | Staff rest room | Small building near the classroom with average capacity four persons in 20 $m^2$ |
| 3 | Dean office | Four offices with average capacity 2 persons in 18 $m^2$ |
| 4 | Lab. room | 10 labs. with average capacity 20 persons in 36 $m^2$ |
| 5 | Passageway | The area between the labs. |
| 6 | Garden | Open space garden in front of the collage building |
| 7 | Student hall | In the interior of the collage open hall (400 $m^2$) with average capacity 60 persons. |

**Sound pressure level SPL detection:** Sound level meter type (Auto Ranging DS-102) has been used to measure the sound level (Figure 1). The SPL result compere with the national and international standard to classify to (Noisy or non-noisy SPL), (Table 2 ).

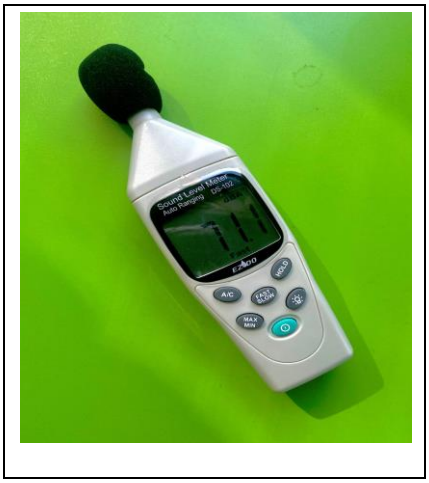

**Figure (1) : Photo of sound level meter type (Auto Ranging DS-102)**

**Table (2) : Classification of SPL to noisy or non-noisy sound level**

| SPL | Iraqi standard | WHO standard | EPA standard |
|---|---|---|---|
| 60 dB < | Safe | Safe | Safe |
| 75 dB < | Noise | If exposure for (24 hour) is noise | If exposure for (one hour) is noise |
| 85 dB < Exposure for (one hour) | Noise | Noise | Noise |

## Result and Discussion

The study result divided to tow group according to the electrical generators operation time (loud sound); thus we will show the result in two parts as below.

**SPL without electrical generators:** The result of the SPL and $L_{min}$; $L_{max}$ of the seven site without electrical generator show below in Table (3).

The result showing that the highest $L_{max}$ -SPL recorded in the site No.5 (passage way) reaching (78 dB) at 11:00 A.M which consider noisy sound and may cause health disordering; While the lowest $L_{min}$ –SPL was recorded in the site No.2 (Staff room) reaching (41 dB) at 8:00 A.M; which is safe sound level.

It is worth mentioning that the results of our study are consistent with what (Kanabe and Darogha, 2017) obtained in his study of the sound level in the facilities of the Faculty of Science, University of Zakho; they had attributed this to the students talking together after the first class.

**SPL with electrical generators:** The result of the SPL and $L_{min}$; $L_{max}$ of the seven site with electrical generator show below in table (4).

**Table (3) : The SPL and $L_{min}$-$L_{max}$ of the seven site without electrical generator**

| | SPL at different day time | | | | |
|---|---|---|---|---|---|
| **Site No.** | **8:00 A.M** | **11:00 A.M** | **1:00 P.M** | **$L_{min}$** | **$L_{max}$** |
| 1 | 67 | 75 | 77 | 67 | 77 |
| 2 | 41 | 58 | 60 | 41 | 60 |
| 3 | 48 | 56 | 55 | 48 | 56 |
| 4 | 46 | 67 | 57 | 46 | 67 |
| 5 | 53 | 78 | 75 | 53 | 78 |
| 6 | 59 | 70 | 52 | 52 | 70 |
| 7 | 63 | 73 | 60 | 60 | 73 |

**Table (4) : The SPL and $L_{min}$- $L_{max}$ of the seven site with electrical generators**

| | SPL at different day time | | | | |
|---|---|---|---|---|---|
| **Site No.** | **8:00 A.M** | **11:00 A.M** | **1:00 P.M** | **$L_{min}$** | **$L_{max}$** |
| 1 | 72 | 79 | 87 | 72 | 87 |
| 2 | 45 | 58 | 65 | 45 | 65 |
| 3 | 50 | 56 | 61 | 50 | 61 |
| 4 | 50 | 67 | 72 | 50 | 72 |
| 5 | 55 | 78 | 75 | 55 | 78 |
| 6 | 59 | 98 | 90 | 59 | 98 |
| 7 | 65 | 77 | 58 | 58 | 77 |

Our result showing that the highest $L_{max}$ -SPL recorded in the site No.6 (gardne) reaching (98 dB) at 11:00 A.M which consider noisy and risky sound and may cause health disordering; While the lowest $L_{min}$ –SPL was recorded in the site No.2 (Staff room) reaching (45 dB) at 8:00 A.M; which is safe sound level.

The results of our study are consistent with (Kanabe and Darogha, 2017) study result of the sound level in the facilities of the Faculty of Science, University of Zakho; they found that the sound level range (63.3 dB- 73.7 dB).

The SPL up over the allowable threshold may make the student annoyed, catch with headache and may cause problem with hearing. WHO consider the sound level go over (100 dB) as dangerous to human hearing and cause hearing damage or hearing loss if your exposure to it exceed 15 minutes (Van Hirtum et al., 2023).

According to the WHO standard, noise levels should not exceed 35 dB in the classroom and 55 dB in the building. Thus, the noise level recorded in all the 7 locations were exceeded the allowable standard level of 55 dB may due to the existence of large electricity generators near the building without sound silencer (Kanabe and Darogha, 2017).

In order to illustrate the impacts of operation sound of the electrical generator on the SPL at the seven study sites, Figure (2) show the comparison between the two groups of the study results

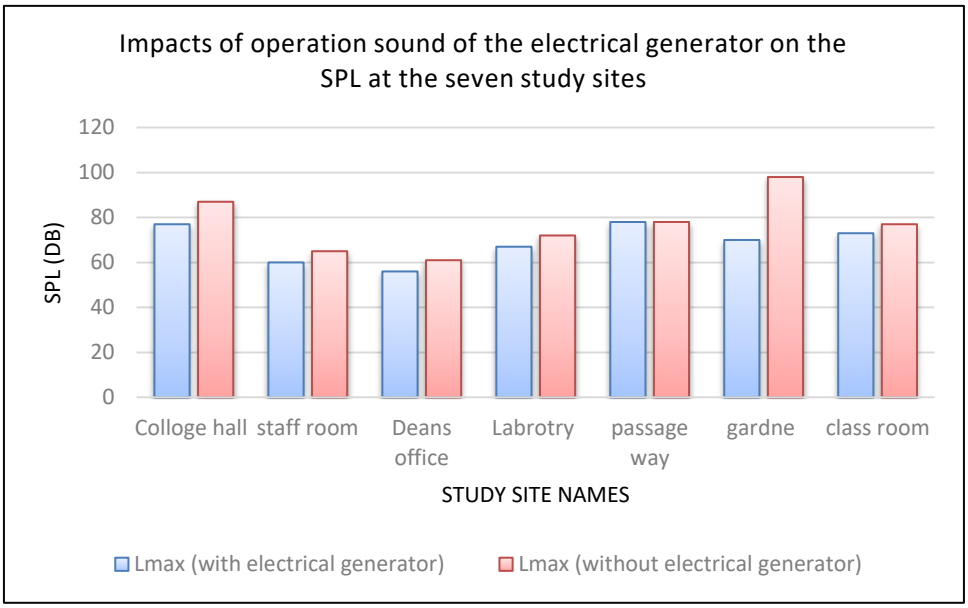


**Figure (2): The comparison between the two groups of the study.**

## Conclusions

1- Noise pollution has a significant impact on students' physical and mental health risk during their university studies periods.
2- The WHO recommends that SPL should be under 35 dB in the classroom. Thus, university students must be aware about the dangers of noise pollution.
3- The SPL in different site of the Al-karkh university of Science building- second campus (Abo-Greab) were safe unless the electrical generator operation start.
4- Sign to decrease the loud should be distributed in different university sites.

## References

Abo-Qudais, S., and Alhiary, A. (2007). Statistical models for traffic noise at signalized intersections. Building and Environment, 42(8), 2939-2948.

Admawi, H. K. (2021). Assessment of electromagnetic pollution in some hospitals and schools in al-najaf city. Journal of Engineering, 27(3), 1-14.

Agarwal, S., and Swami, B. (2011). Comprehensive approach for the development of traffic noise prediction model for Jaipur city. Environmental monitoring and assessment, 172, 113-120.

Al-Mutairi, N., Al-Attar, M., and Al-Rukaibi, F. (2011). Traffic-generated noise pollution: exposure of road users and populations in Metropolitan Kuwait. Environmental monitoring and assessment, 183, 65-75.

Ali, A. H., Abed, M. M., Mahdi, B. H., Hussain, W. D., and Mohaisen, A. M. (2021). A Study of Some of the Indicators of Noise Pollution in Certain Residential Districts in Fallujah City. Iraqi Journal of Science, 2571-2579.

Aziz, S. Q. (2012). Environmental noise pollution in Erbil City, Iraq: Monitoring and solutions. Caspian Journal of Applied Sciences Research, 1(2), 14-22.

Aziz, S. Q., Lulusi, F., Ramli, N. A., Aziz, H. A., Mojiri, A., and Umar, M. (2012). Assessment of traffic noise pollution in Bukit Mertajam, Malaysia and Erbil city, Iraq. Caspian Journal of Applied Sciences Research, 1(3), 1-11.

Barros, C. P., and Dieke, P. U. (2008). Choice valuation of traffic restrictions: Noise, pollution, and congestion preferences. A note. Transportation Research Part D: Transport and Environment, 13(5), 347-350.

Gangwar, K., Joshi, B., and Swami, A. (2006). Noise pollution status at four selected intersections in commercial areas of Bareilly Metropolitan city. Himalayan journal of environment and zoology, 20(10), 75-77.

Kanabe, L. O., and Darogha, S. N. (2017). Epidemiology of Cryptosporidiosis among

diarrheic children of Raparin Pediatric hospital, Erbil province-Kurdistan Region, Iraq. Ciha Uni Erb Sci J, 1(1).

Nijland, H. A., and Van Wee, G. (2005). Traffic noise in Europe: a comparison of calculation methods, noise indices and noise standards for road and railroad traffic in Europe. Transport reviews, 25(5), 591-612.

Rashid, S. O., and Ahmed, M. H. (2021). The Levels of Environmental Pollution by Noise in the Industrial Areas of Sulaimani City in Kurdistan Region of Iraq. Journal of Kurdistani for Strategic Studies(11).

Schwela, D. (2021). Review of environmental noise policies and economics in 2014-2016. South Florida Journal of Health, 2(1), 46-61.

Singh, V., and Dev, P. (2010). Environmental impact of noise pollution, a case study in Ssaharanpur City, Western Uttar Pradesh, India. International Journal of Earth Science and Engineering, 3(6), 869-874.

Van Hirtum, T., Somers, B., Dieudonné, B., Verschueren, E., Wouters, J., and Francart, T. (2023). Neural envelope tracking predicts speech intelligibility and hearing aid benefit in children with hearing loss. bioRxiv, 2023.2007. 2003.547477.