**Journal of Environmental Impact and Management Policy**
**ISSN: 2799-113X**
Vol: 04, No. 04, June-July 2024
http://journal.hmjournals.com/index.php/JEIMP
**DOI:** https://doi.org/10.55529/jeimp.44.48.54

# Evaluation of Sound Pollution Near Several Government and Private Hospitals in Najaf City

**Mahmood Hameed Al-safi[1*], Lujain Ibrahim Hussain[2], Arjwan A Alsudani[3]**

*[1*,2,3]University of Al-Qadisiyah, College of Science, Unit of Environment Researches and Prevention of Pollution, Iraqi.*

*Email: [2]lujain.ibrahim@qu.edu.iq, [3]orjuwan.mahood@qu.edu.iq*
*Corresponding Email: [1*]Mahmood.hameed@qu.edu.iq*

**Received:** 06 March 2024 **Accepted:** 22 May 2024 **Published:** 04 July 2024

***Abstract:*** ***One notable aspect of the environment is sound pollution, which varies in intensity depending on where it comes from, it has varied degrees of impact on the nearby buildings and items like Hospitals are exposed to noise. Additionally, because most hospitals are situated on major thoroughfares, industrial activities and commercial activities. As a result, these structures are frequently subjected to high levels of environmental noise due to the work and care that hospitals give for their patients, which necessitates relaxation and tranquility. The purpose of this study is to determine how much noise pollution in the area around multiple hospitals in Najaf City is caused by various activities. An equipment known as the Sound degree Meter (IEC 61672-1 type 2) was utilized to measure the degree of noise pollution , three times a day—Sunday, Tuesday, and Thursday—during a period of four weeks, the months of June and July were used to measure the noise levels. These measurements were also made in the vicinity of the hospitals—three times in the morning, afternoon, and evening. According to the World Health Organization and Iraqi Determinants of Noise, the average noise levels measured outside the hospital on certain days were significantly higher than the environmental noise limit required. Ultimately, several recommendations for lowering the noise level in this vicinity were made.***

***Keywords: Sound Pollution, Noise, Hospitals.***

## 1. INTRODUCTION

Sound waves are mechanical stimuli that can be identified by their direction, speed, strength, and wavelength (in dB or Hertz)(1). Infrasonic (< 20 Hz), ultrasonic (> 20 kHz), and sonic (audible or ordinary in the range of 20 Hz–20 kHz) are the three categories into which sound is classified by human perception. Three methods exist for plants to perceive sound: direct contact or vibration, a medium borne in soil, water, or the air (2&3). Recent research has

**Journal of Environmental Impact and Management Policy**
**ISSN: 2799-113X**
Vol: 04, No. 04, June-July 2024
http://journal.hmjournals.com/index.php/JEIMP
**DOI:** https://doi.org/10.55529/jeimp.44.48.54

demonstrated that sound stimulation can cause physiological changes in defense and disease responses, hormone signaling, gene expression, epigenetic modification, seed germination, growth, and flowering, among other areas (4 and 5).

Humans have become aware of environmental pollution as a global issue because of its serious long-term effects and probable excessive influence on human health. Environmental pollution can be defined as the addition of any material (solid, liquid, or gas) or energy (heat, sound, or radioactivity) to the environment at a rate that is greater than its ability to be recycled, dispersed, diluted, decompose, or store in a harmless form (6). Due to the fast economic growth and dense population of cities, noise has a significant impact on the quality of life in metropolitan areas. As per the Ministry of Ecology and Environment in China's annual "Report on Prevention and Control of Environmental Noise Pollution in China (7 and 8).

Permissible noise intensity standards vary from country to country depending upon the environmental roles and, according to the WHO, the international determinants as in the below table. Patients in hospitals need rest and quiet places as one of the most important points for healing from various diseases, so the presence of unacceptable sounds and noise coming from different activities near government and private hospitals in Najaf can directly effect upon the patient's health (1).

## 2. RELATED WORK

Noise pollution poses an imperceptible risk. It is both visible and invisible, existing in both the air and on earth, noise pollution is any unwanted or bothersome sound that affects people's health and well-being as well as that of other living creatures, sound waves are vibrations in air molecules that go from a source of noise to the ear. Sound is typically described in terms of the wave's pitch (frequency) and loudness (amplitude). Loudness is measured in decibels (dB), which are logarithmic values also referred to as sound pressure level or SPL. (2). Noise can cause mechanical damage to cells, tissues, or even entire organs, which can affect hearing and other tissue damage. In addition to dB levels, other factors to take into account are the frequency and duration of noise exposure; this implies that sounds that we may not instantly perceive as being too loud could yet have an effect on our physical and emotional health (3). Long-term noise exposure can have a number of negative health effects, including irritation, disturbed sleep, negative effects on the cardiovascular and metabolic systems, and cognitive impairment in young people.

It estimates that, each year, environmental noise contributes to 12,000 premature deaths and 48,000 new cases of ischemic heart disease based on the information currently available. Furthermore, we estimate that 22 million people suffer from chronic high annoyance, and 6.5 million people have chronic high sleep disturbance. We calculate that the noise from airplanes impairs the reading abilities of 12,500 kids (5). Noise has been suggested to be the most bothersome stressor for patients (11). Another place where people are most likely to be around noise is hospitals. Patients are in regular contact with noise, whether it be from nursing chats or machines that assist in patient monitoring. Research has indicated that noise is a primary source of disturbance for patients while they are there. (10). Patients' recovery

**Journal of Environmental Impact and Management Policy**
**ISSN: 2799-113X**
Vol: 04, No. 04, June-July 2024
http://journal.hmjournals.com/index.php/JEIMP
**DOI:** https://doi.org/10.55529/jeimp.44.48.54

rates are ultimately impacted by the limited restorative advantages that result from their lack of REM sleep (12).

Table (1): Permissible noise intensity standards

| Area Type | Permissible limits during day ( DB ) | Permissible limits during evening (DB ) |
|---|---|---|
| Factories area and in the mid of the city | 55 - 65 | 50 - 60 |
| Living area near to the high way | 50 – 60 | 45 - 50 |
| Living area in city | 45 - 55 | 40 - 50 |
| Living areas in village, near to hospitals, parking | 35 - 45 | 30 - 40 |

## 3. METHODS AND MATERIALS

To detect the sound pollution problem exactly, researcher made a descriptive survey which including a daily measurements for noise pollution levels in the chosen places for government and private hospitals in Najaf after determining its geographic coordinates and record the levels of values of the noise using ( **Sound level meter IEC 61672-1 type 2)**, the researcher compared between the recorded results and the international determinants of the noise levels to find out the matching of the places and insure is the recorded results within the international determinants noise levels or not.

It's an instrument (sound level meter) used to measure the level of noise in the selected area by DB unit.

**Studying Area:**
Najaf city is very big and important city in center of Iraq about 160 km south Baghdad, it's one of the holiest city in Iraq, it is reputedly the burial place of Imam Ali son in law and cousin to the messenger of Allah Muhammad, also the location of the largest cemetery in the

**Journal of Environmental Impact and Management Policy**
**ISSN: 2799-113X**
Vol: 04, No. 04, June-July 2024
http://journal.hmjournals.com/index.php/JEIMP
**DOI:** https://doi.org/10.55529/jeimp.44.48.54

world ( Wadi-Al-salam ), many people from Iraq and another countries visit Najaf city within year, located within Iraq coordinates ( 32°01′44″N 44°20′23″E ) , a population is about 747,000 people , for that Najaf city have several government and private famous hospitals, also have an airport , in addition to a large number of universities, schools and kindergartens, and it also includes a number of major specialized visitors, (8 Hospitals ) have been selected from different places in Najaf city, as below table (2):

| Hospital Name | Location | Sample | GPS |
|---|---|---|---|
| Al-Sadeer Hospital | Kufa Street , najaf | A | 32.018249<br>44.37231 |
| Al-Frat alawst hospital | Al-sahala street, najaf | B | 32.036055<br>44.384303 |
| Al-Zhra altlymy hospital | Al- asckan street in najaf | C | 31.999953<br>44.351816 |
| German hospital in najaf | Baghdadi street , najaf | D | 32.037876<br>44.333538 |
| Aml alhyat hospital | Alkylydar street , najaf | E | 31.998645<br>44.344939 |
| Al-ghdyr alahly hospital | Kufa Street , najaf | F | 32.022394<br>44.386401 |
| Alamyr hospital | Al- asckan street in najaf | G | 32.001652<br>44.349558 |
| Almrkz alraqy hospital | Al-sahala street, najaf | H | 32.036303<br>44.385687 |

At the beginning researcher allocated two months in order to record the values of noise from 8 government and private hospitals in Najaf city, distributed 3 days weekly during 3 times for a scale ( 9:00 am , 3:00 pm and 9:00 pm ) 30 minutes in each location (Table 3).

Table (3) the measurement time of the study

| Time | Measurement time | Reason |
|---|---|---|
| Morning | 8:30 am – 9:00 am | Starting day and the first day of week |
| After noon | 2:30 pm – 3:00 pm | End time of schools and offices |
| Evening | 8:30 pm – 9:00 pm | Rest time and less traffic |

## 4. RESULTS AND DISCUSSION

The results indicate that the intensity of sound recorded in Decibels during the selected days of week from the selected times at morning (8:30- 9:00 am) was studied. The highest sound was recorded at the first day 89.8 at Aml alhyat hospital and the lowest sound was 68.9 at Almrkz alraqy hospital. The second day has recorded that Aml alhyat hospital has recorded the highest value, while Al-ghdyr alahly hospital record the lowest value. However, the third day has recorded that Aml alhyat hospital was the highest value that 78.0, but Al-ghdyr alahly hospital has been recorded the lowest value 70.4 (Table 4).

**Journal of Environmental Impact and Management Policy**
**ISSN: 2799-113X**
Vol: 04, No. 04, June-July 2024
http://journal.hmjournals.com/index.php/JEIMP
**DOI:** https://doi.org/10.55529/jeimp.44.48.54

Table (4) the intensity of sound recorded in Decibels during the selected days of week from the selected times at morning (8:30 am – 9:00 am).

| Location / day | Al-Sadeer Hospital | Al-Frat alawst hospital | Al-Zhra altlymy hospital | German hospital in najaf | Aml alhyat hospital | Al-ghdyr alahly hospital | Alamyr hospital | Almrkz alraqy hospital |
|---|---|---|---|---|---|---|---|---|
| Sunday | 77.4 | 85.1 | 79.2 | 74.5 | 89.8 | 74.5 | 86.4 | 68.9 |
| Tuesday | 78.5 | 75.5 | 76.1 | 74.3 | 81.2 | 70.5 | 75.4 | 74.2 |
| Thursday | 74.5 | 73.4 | 72.1 | 74.3 | 78.0 | 70.4 | 73.8 | 70.1 |

The results also indicate that the intensity of sound recorded in Decibels during the selected days of week from the selected times at the afternoon (2:30- 3:00 pm) was studied. The highest sound was recorded at the first day 90.2 at Al-Frat alawst hospital and the lowest sound intensity was 79.2 at German hospital. The second day has recorded that 83.2 has recorded the highest value which was 83.2, while Al-Sadeer, Aml alhyat and Almrkz alraqy hospitals have recorded the lowest value, which was 79.5. However, the third day has recorded that Al-ghdyr alahly hospital was the highest value that 88.0, but Alamyr hospital has been recorded the lowest value 78.1 (Table 5).

Table (5) the intensity of sound recorded in Decibels during the selected days of week from the selected times at afternoon (2:30 pm – 3:00 pm).

| Location / day | Al-Sadeer Hospital | Al-Frat alawst hospital | Al-Zhra altlymy hospital | German hospital in najaf | Aml alhyat hospital | Al-ghdyr alahly hospital | Alamyr hospital | Almrkz alraqy hospital |
|---|---|---|---|---|---|---|---|---|
| Sunday | 81.2 | 90.2 | 81.5 | 79.2 | 83.1 | 80.2 | 80.0 | 84.2 |
| Tuesday | 79.5 | 83.2 | 80.2 | 80.4 | 79.5 | 78.1 | 79.2 | 79.5 |
| Thursday | 78.5 | 79.2 | 79.4 | 79.8 | 78.8 | 88.0 | 78.1 | 79.5 |

For the evening time, the results showed that the intensity of sound recorded in Decibels during the selected days of week from the selected times at the evening (8:30- 9:00 pm) was studied. The highest sound was recorded at the first day 72.9 bat Al-Zhra altlymy hospital and the lowest sound intensity was 63.5 at Almrkz alraqy hospital. The second day has recorded that Al-Frat alawst hospital has recorded the highest value, which was 70.5, but Almrkz alraqy hospital has been recorded the lowest value, which was 60.2. However, the third day has recorded that Al-Frat alawst hospital was the highest value 72.5, but Al-ghdyr alahly and Almrkz alraqy hospitals have been recorded the lowest value 61.1 (Table 6).

Table (6) the intensity of sound recorded in Decibels during the selected days of week from the selected times at evening (8:30 pm – 9:00 pm).

| Location / day | Al-Sadeer Hospital | Al-Frat alawst hospital | Al-Zhra altlymy hospital | German hospital in najaf | Aml alhyat hospital | Al-ghdyr alahly hospital | Alamyr hospital | Almrkz alraqy hospital |
|---|---|---|---|---|---|---|---|---|

**Journal of Environmental Impact and Management Policy**
**ISSN: 2799-113X**
Vol: 04, No. 04, June-July 2024
http://journal.hmjournals.com/index.php/JEIMP
**DOI:** https://doi.org/10.55529/jeimp.44.48.54

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sunday | 72.0 | 69.2 | 72.9 | 65.2 | 69.1 | 63.8 | 69.4 | 63.5 |
| Tuesday | 69.2 | 70.5 | 70.2 | 64.2 | 64.5 | 65.2 | 68.0 | 60.2 |
| Thursday | 65.8 | 72.5 | 68.5 | 62.4 | 71.2 | 60.1 | 70.3 | 61.1 |

## 5. DISCUSSION

High noise levels near selected hospitals are higher than the international standards and specifications national permissible noise values near hospitals (according to Table No.1 ) about 43 decibels, and this is a result of the hospitals being located on main streets that are crowded during the period In the morning, the noise levels near Almrkz alraqy hospital were lower than the readings which belong to the other hospital located on a side street, but it is still higher than the international and national determinants About 33 decibels, from another side noting that the highest readings were recorded near Aml alhyat hospital, which is located near to the main street.

The recorded value near Al-Sadeer Hospital was also high and almost equal to a resident Located near the rest of the hospitals, Al – Najaf city has narrow streets and many cars, and these are the main reasons that increase crowding and increase noise in the city specially near the hospitals . Also, the difference in the recorded noise values on the three selected days of the week (Sunday, Tuesday, Thursday) did not differ much due to the large number of citizens and their movements to Al-Najaf city on weekdays.

Noting a slight difference in the readings between Sunday and Thursday, due to the beginning and end of the week and the official working hours. While high readings were recorded. during mid-day reading noise increased still higher than the international and national determinants about (40 db ) due to the end of the official time of schools and the other government institutes, this made the traffic crowded which increasing the noise near to the hospitals while during the night the noise readings deceased but it is still higher than the international and national determinants about ( 25 db ), from all of the above we got one main point that the noise value near to the hospitals in Al- Najaf city is high and unaccepted and may effect upon the patients so we have to find a good ideas or solutions to solve this issue.

## 6. CONCLUSIONS

The study concludes that sound pollution level near to government and private hospitals in Najaf city more than the standards and determinants recommended by the world health organization, and national determinants which determined by noise controlling law No.41 in 2015, due to the fact that this hospitals located near to the main streets which have a lot of traffics. Absences of urban planning and overlapping activities led to exposure of hospitals to high levels of noise. Lack of trees (which act as noise bumpers) beside the roads which near to the hospitals. Generators which used to supply electrical also increasing the noise in hospitals. Absences of buses and using taxies also increasing the noise. High noise level recorded near Almrkz alraqy hospital at morning because of the traffic near to same hospitals. Research found that hospitals most exposed to noise pollution are Aml alhyat hospital and Al-Frat alawst hospital

**Journal of Environmental Impact and Management Policy**
**ISSN: 2799-113X**
Vol: 04, No. 04, June-July 2024
http://journal.hmjournals.com/index.php/JEIMP
**DOI:** https://doi.org/10.55529/jeimp.44.48.54

## 7. REFERENCE

1. Neeraj Joshi, D.P.N., Dr. Gaurav Papnai, Varun Supyal and Kailash Singh, Render a sound dose: Effects of implementing acoustic frequencies on plants' physiology, biochemistry and genetic makeup. International Journal of Chemical Studies,2019.
2. Nathanson, J. A. and Berg, Richard E. (2023, March 28). noise pollution. Encyclopedia Britannica. https://www.britannica.com/science/noise-pollution.
3. Dort, P.van (2022) Noise pollution: Definition, causes, effects, and possible solutions, Noise Pollution: Definition, Causes, Effects, and Possible Solutions. Available at: https://www.rockfon.co.uk/about-us/blog/2022/noise-pollution/
4. Azgomi S, et al. The importance of sound rhythm: music and noise elicit different biological responses in Satureja hortensis L. Theoret Exp Plant Physiol. 2023. https://doi.org/10.1007/s40626-023- 00277-1.
5. Peris, E. (2021) Noise pollution is a major problem, both for human health and the environment, European Environment Agency.
6. Nathanson, J. A. (2022). Pollution. Encyclopedia Britannica. https://www.britannica.com/science/pollution-environment.
7. 2021 China Environmental Noise Pollution Control Report.
8. WHO. (2016). Environmental health. Retrieved from https://www.who.int/topics environmental health/en/.
9. [Kunc, H.P., Schmidt, R. (2019 ("The effects of anthropogenic noise on animals:a meta-analysis".
10. Delaney, L. J., Currie, M. J., Huang, H. C., Lopez, V., & Van Haren, F. (2018). "They can rest at home": an observational study of patients' quality of sleep in an Australian hospital. BMC health services research, 18(1), 524.
11. Delaney, L. J., Currie, M. J., Huang, H. C., Lopez, V., Litton, E., & Van Haren, F. (2017). The nocturnal acoustical intensity of the intensive care environment: an observational study. Journal of intensive care, 5, 41.
12. Delaney, L. J., Van Haren, F., & Lopez, V. (2015). Sleeping on a problem: the impact of sleep disturbance on intensive care patients - a clinical review. Annals of intensive care, 5, 3.