RESEARCH ARTICLE

Assessment of Noise Pollution and its Impact on Human Health in Hilla City

Haydder Radhi Kadhim*, Khalid Raheem Kadhim, Maha Mahmoud Shaker

Al-Qasim Green University/collage of Ecology/ Ecological pollution department /Iraq.

*Corresponding Author: Haydder Radhi Kadhim

Abstract

Noise pollution is type of air pollution, it is unwanted sounds that reduce quality of person life via effect on normal activity like. It can disturb sleep, cause cardiovascular and psychophysiological effects, Material and method level of noise measured in five types of regions in hilla city during each season of year in two reading (morning and evening) with outside and inside building, then comparative the results with international and local level of sounds, in addition to estimate effect it on human healthy. This work is down by using a precision sound level meter digital instrument as noise meter. Result this study showed that some selected regions of hilla city were over normal level of sounds which make this regions suffered of noise pollution Conclusion this noise may be pollution lead to effects on physiological and psychological state of human.

Introduction

Noise pollution is one of problems that effect on human environment in different age and geographic area, after development this problem become more danger due to technological development which lead to increase its intensity and geographic area, as well as it is not limited on one city or one area, instead it is wide spread because of industrial development, extensive trade, poor planning, interference of activity weather industrial, commercial, educational, health, and other [1].

Noise pollution can be defined as type of air pollution that produce as wave form, another define it is unwanted sounds that reduce quality of person life via normal activity like work, sleep, and speaking [2].

Effect of pollution on healthy may be accumulative which associated with period of exposure and continuous of exposure, causing difficult in sleeping, didn't enjoy by private property, and may be interfered with education processes and disable performance tasks, noise that produce from different activity could be cause physiological and psychological effect on human so the noise consider one of environmental pollutions which contribute in increased of dangers that faced human in different its sources, level, and intensity.

According to WHO Excessive noise seriously harms human health and interferes with people's daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance and provoke annoyance responses and changes in social behavior, environmental noise exposure is responsible for a range of health effects, including increased risk of ischemic heart disease as well as sleep disturbance, cognitive impairment among children, annoyance, stress-related mental health risks [3].

Because of all thins mentioned above, the research aims to find out sources of noise pollutions in babil city and comparative its levels with international and locally permissible limits then detection of effect of noise pollution on human healthy, and suggested some solutions that limits or reduce of noise pollution.

Material and Method

This study included on measurement of noise pollution outside and inside building during

each seasons of year in babil city and comparative it's with international (table 1) and local (table 2) standards in addition to a reference to the impact of those levels on human health according Table (3) ac. It was selected 5 type of user site for monitoring and 3 site per user type, types of user site were: industry use, transportation use, housing use, health use, and education use. Each site in this study was taken two reading one at morning (7.5-9.5 oclock) and another at evening, evening reading was different

according to season (4.5-6.5 o'clock in autumn and winter) and (5.5 -7.5 o'clock in spring and summer). The noise measured seasonally: January represents winter, may represents spring, July represents summer, and October represents autumn. Noise was measured at 1.25m -1.5 m, while the distance between sours of noise and noise measuring device was (1m-3m) for period (1-5 min). measurement of noise was down by using a precision sound level meter digital instrument as noise meter as show in Figure (1).

Figure 1: Show digital sound level meter

Table 1: Show international limitation of noise level measuring by dB according to WHO

Type of region	Morning	Evening
Housing- outside building	55	45
Commercial- outside building	65	55
Industry- outside building	75	65
Education-outside and inside building	45	35
Hospitals- inside building	40	30

Table 2: Show the Iraq national limits for noise level are measured in dB according to Republic of Iraq, Law on Noise Control No. 41 of 2015

Type of region	Outside building		Inside building	
	Morning	Evening	Morning	Evening
Commercial region	65	60	60	55
Hospitals	50	40	50	35
Housing region	60	50	---	---
Education regions	55	45	50	35
Housing-industry regions	60	45	50	45

Table 3: show level of sound and its effect on healthy state of human/dB

No	Level of sound/dB	The effect
1	More than 120	Causing pain to the auditory system and serious repercussions on the cardiovascular system and leads to non-discrimination of sounds and trends
2	90-110	Decreased hearing loss and disorders in the nervous and cardiac systems
3	60-80	Bad effects on the nervous system and lead to severe pain in the head and effects in the work and vision of disturbing dreams
4	40-50	An adverse reaction is anxiety and tension. It affects the cortex, leading to psychological disorders

Result and Discussion

Winter Season

Table (4) referred to spatial and temporal variation in readings. Regarding outside building in morning reading, table (5) showed that highest value and mean was in site (1), because of this site represent industry area which contain workshop , machinery that use for repair car which increased in its intensity during the first

hours of morning [4], as well as this locus contain public road which connect between many governorates, in addition to, this site contain popular residential pool that characterized by popular concentrated, all this factor that mentoid above associated with increased in noise level [5]. While the lowest value and mean was recoded in locus (11) because this site represent agriculture area which characterized by decrease in number of person in addition to increase

green area and tree which contribute to lower noise effect on human, concerning the international and local limits [6], all morning site were over normal level. While the highest value during evening was in site (2) because of clinical concentrated which increased cars and persons transport, while the lowest value was in site (11).Regarding values inside building, from Table (4) the highest value and mean was recorded in site (1) during morning because of, because of this

site represent industry area which contain workshop, machinery that use for repair car which increased in its intensity during the first hours of morning, as well as this locus contain public road which connect between many governorates, in addition to, this site contain popular residential pool that characterized by popular concentrated, while the lowest value in site (11) because of green area and decreased number of persons. During evening the highest value was in site (2) while the lowest was in site (11).

Table 4: Showed noise pollution during winter 2018 in Hilla city

Values of noise (Db) inside building			Values of noise (Db) outside building			Type of use	Type of region	ت
Mean	Evening	Morning	Mean	Evening	Morning			
64	45.6	82.4	81.65	66.2	97.1	Industrial	Industrial District (Nader Third)	1
63.85	47.3	80.4	81.35	67.3	95.4	Industrial	Aluminum & Furniture Workshops	2
59.85	46.1	73.6	77.5	66.1	88.9	Industrial	Industrial Area (80th Street)	3
52.3	35.2	69.4	65.6	45.9	85.3	commercial	Great Hilla Market	4
50.9	40.3	61.5	64.55	52.3	76.8	commercial	Al-Tahmaziyah and 60th Street	5
48.3	35.3	61.3	61.9	49.3	74.5	commercial	Imam Ali Street	6
36.7	31.3	42.1	52.3	38.3	66.3	residential	Babel district	7
44.35	35.9	52.8	57.4	45.9	68.9	residential	University neighborhood	8
57.05	44.9	69.2	67.6	54.9	80.3	residential	District of Revolution	9
38	33.6	42.4	59.6	48.6	70.6	healthy	Republican Hospital Hay Al Iskan)(	10
30.8	30.5	31.1	42.1	32.6	51.6	healthy	Morjan Hospital (Algiers District)	11
41.85	35.5	48.2	65.9	55.5	76.3	healthy	Turkish Hospital	12
39.15	34.7	43.6	50.65	35	66.3	educational	Hilla Secondary School for Boys	13
40.35	31.3	49.4	58.6	41.3	75.9	educational	School Institute	14
57.4	43.2	71.6	79.4	63.2	95.6	educational	Secondary Revolution	15

Spring

Table (5) referred to spatial and temporal variation in readings. Regarding outside building in morning reading, table (6) showed that highest value and mean was in site (1), because of this site represent industry area which contain workshop , machinery that use for repair car which increased in its intensity during the first hours of morning [4], as well as this locus contain public road which connect between many governorates, in addition to, this site contain popular residential pool that characterized by popular concentrated, all this factor that mention above associated with increased in noise level [5]. While the lowest value was recoded in locus (11) because this site represent agriculture area which characterized by

decrease in number of person in addition to increase green area and tree which contribute to lower noise effect on human [6]. While the highest value during evening was in site (15) because of this this region contain public road [5] which connect between many governorates in Iraq, in addition to popular concentrated in this region, while the lowest value was in site (11).

Regarding inside building, in morning monitoring, table (6) showed that the highest value and mean was in site (1), because of this site represent industry area which contain workshop , machinery that use for repair car which increased in its intensity during the first hours of morning, as well as

this locus contain public road which connect between many governorates, in addition to, this site contain popular residential pool that characterized by popular concentrated, while the lowest value was in site (11). During evening, the monitoring was fluctuated, the highest was in site (2) because of this region contain interference between education use and housing use, as well as increased workshop like furniture industry and aluminum industry in addition to movement of cars and person, the lowest value recorded in region (11).

Table 5: Showed of noise pollution during spring 2018 in Hilla city

Values of noise (Db) inside building			Values of noise (Db) outside building			Type of use	Name of region	ت
Mean	Evening	Morning	Mean	Evening	Morning			
62.75	48.1	77.4	79.5	67.6	91.4	Industrial	Industrial District (Nader Third)	1
62.1	50.6	73.6	73	62.4	83.6	Industrial	Aluminum & Furniture Workshops	2
60.15	47.1	73.2	72.5	56.8	88.2	Industrial	Industrial Area (80th Street)(	3
44.7	40.5	48.9	65.95	42	89.9	commercial	Great Hilla Market	4
50.5	42.1	58.9	69.8	60.7	78.9	commercial	Al-Tahmaziyah and 60th Street	5
42.6	34.3	50.9	62.55	54.2	70.9	commercial	Imam Ali Street	6
35.75	30.7	40.8	52	43.2	60.8	residential	Babel district	7
44.6	39.6	49.6	61.2	52.8	69.6	residential	University neighborhood	8
52.75	49.2	56.3	66.15	56	76.3	residential	District of Revolution	9
36.3	31.2	41.4	65.15	58.9	71.4	healthy	Republican Hospital Hay Al Iskan)(	10
31.8	30.8	32.9	42.75	32.6	52.9	healthy	Morjan Hospital (Algiers District(	11
43	36.4	49.6	69.35	64.1	74.6	healthy	Turkish Hospital	12
38.55	31.3	47.8	51.2	40.6	61.8	educational	Hilla Secondary School for Boys	13
44.3	36.7	51.9	67.6	57.3	77.9	educational	School Institute	14
60.75	48.6	72.9	78.85	69.8	87.9	educational	Secondary Revolution	15

Summer

Table (6) referred to spatial and temporal variation in readings. Regarding outside building in morning reading, Table (7) showed that highest value and mean was in site (1),for the same reasons mentioned above. While the lowest value was recoded in site (11) . While the highest value during evening was in site (9) because of this this region contain road which connect between governorates Babil and Karbala in Iraq, in addition this site represent popular residential pool which lead to persons concentrated in this region, while the lowest value was in site (11). Regarding inside building, in morning monitoring, table (7) showed that the highest value and mean was in site (1), while the lowest value was in site (11). During evening, the monitoring was fluctuated, the highest was in site (15), while the lowest value recorded in region (11).

Table 6: Showed of noise pollution during summer 2018 in Hilla city

Values of noise (Db) inside building			Values of noise (Db) outside building			Type of use	Name of region	ت
Mean	Evening	Morning	Mean	Evening	Morning			
66.75	52.4	81.1	87.7	74.8	100.6	Industrial	Industrial District (Nader Third)	1
68.1	57.6	78.6	79.65	69.5	89.8	Industrial	Aluminum & Furniture Workshops	2
68.5	59.6	77.4	83.35	76.3	90.4	Industrial	Industrial Area (80th Street)	3
44.4	39.5	49.3	64.85	43.4	86.3	commercial	Great Hilla Market	4
55.3	44.7	65.9	78.55	76.3	80.8	commercial	Al-Tahmaziyah and 60th Street	5
46.65	37.9	55.4	69	60.9	77.1	commercial	Imam Ali Street	6
39.2	35.3	43.1	57.55	49.2	65.9	residential	Babel district	7
49.05	42.2	55.9	64.35	57.1	71.6	residential	University neighborhood	8
57.75	55.2	60.3	79.75	77.6	81.9	residential	District of Revolution	9
39.8	32.5	47.1	72.25	66.8	77.7	healthy	Republican Hospital Hay Al Iskan)(	10
32.1	30.3	33.9	46.35	34.1	58.6	healthy	Morjan Hospital (Algiers District)	11
44.7	38.1	51.3	79.95	72.8	87.1	healthy	Turkish Hospital	12
40.3	30.9	49.7	57.75	46.2	69.3	educational	Hilla Secondary School for Boys	13
48.95	40.4	57.5	74.55	61.3	87.8	educational	School Institute	14
69.2	60.7	77.7	85.5	72.4	98.6	educational	Secondary Revolution	15

Autumn

Table (7) referred to spatial and temporal variation in readings. Regarding outside building in morning reading, table (8) showed that highest value was in site (1), while the lowest value was recoded in site (11). While the highest value during evening was in site (9) because of this this region contain road which connect between governorates Babil and Karbala in Iraq, in addition this site represent popular residential pool which lead to persons concentrated in this region, while the lowest value was in site (11). Regarding inside building, in morning monitoring, table (8) showed that the highest value was in site (1), while the lowest value was in site (11). During evening, the monitoring was fluctuated, the highest was in site (15), while the lowest value recorded in region (11).

Table 7: Showed of noise pollution during autumn 2018 in Hilla city

Values of noise (Db) inside building			Values of noise (Db) outside building			Type of use	Name of region	ت
Mean	Evening	Morning	Mean	Evening	Morning			
64.95	49.4	80.5	81.7	64.3	99.1	Industrial	Industrial District (Nader Third)	1
64.65	53.7	75.6	71.5	61.8	81.2	Industrial	Aluminum & Furniture Workshops	2
64.75	56.6	72.9	73.15	56.7	89.6	Industrial	Industrial Area (80th Street)(	3
42.45	38.2	46.7	61.05	38.9	83.2	commercial	Great Hilla Market	4
53.05	45.7	60.4	67.5	59.6	75.4	commercial	Al-Tahmaziyah and 60th Street	5
44.1	34.3	53.9	63.5	50.9	76.1	commercial	Imam Ali Street	6
36	32.9	39.1	49.3	35.1	63.5	residential	Babel district	7
47.5	40.1	54.9	54.5	39.6	69.4	residential	University neighborhood	8
55	51.5	58.5	79.45	69.6	89.3	residential	District of Revolution	9
38.3	32.8	43.8	61.55	51.9	71.2	healthy	Republican Hospital Hay Al Iskan)(	10
31.2	31.6	30.9	41.1	34.4	47.8	healthy	Morjan Hospital (Algiers District)	11
41.1	34.9	47.3	73.05	61.2	84.9	healthy	Turkish Hospital	12
37.2	31.7	42.8	54.55	42.7	66.4	educational	Hilla Secondary School for Boys	13
48.6	40.1	57.1	68.25	53.6	82.9	educational	School Institute	14
67.4	57.9	76.9	80.15	66.6	93.7	educational	Secondary Revolution	15

Table 8: Represents regions which were over normal international and local level

Regions	Type of monitoring
All morning monitoring	During winter, in morning, outside building
1,2,3,10,12,15	During winter, in evening, outside building
All morning monitoring	During spring, in morning, outside building
4,6,7	During spring, in evening, outside building
1,2,3,5,6,9,14,15	During spring, in morning, inside building
1,2,3,4,5,9,14,15	During spring, in evening, inside building
All morning monitoring	During summer, in morning, inside building
All morning reading except (110)	During autumn, in morning,outside building
5,9,10,11,12,13,14,15	During autumn, in evening,outside building
1,2,3,5,7,8,9,14,15	During autumn, in morning, inside building

Table 9: Represent values of the results which effects on human health

Number of site	Type of monitoring	Number of Level and its impact on human health
1,2,15	Winter, outside building morning	Level (2) /Decreased hearing, disorders in the nervous and cardiac systems
1	Spring, outside building morning	Level (2) /Decreased hearing, disorders in the nervous and cardiac systems
1,3,15	Summer, outside building, morning	Level(2)/Decreased hearing, disorders in the nervous and cardiac systems.
1	Autumn, outside building, morning	Level (2)/ Decreased hearing, disorders in the nervous and cardiac systems
About 45 site	Most of reading	Level (3)/ Bad effects on the nervous system and lead to severe pain in the head and effects in the work and vision of disturbing dreams
About 49 site	Most of reading	Level (4)/An adverse reaction is anxiety and tension. It affects the cortex, leading to psychological disorders

Conclusion

- This result referred that some of geographic area of the study suffered from noise levels from mild to severe

- There are Spatial and temporal variation in noise pollution values

- Some regions recorded values over normal international and local level

- Green areas recorded lowest values as compared with other regions, which play role in sound dispersion

- It was showed that this regions suffered of noise pollution which later effect on healthy state of human whether during day

Recommendation

- School and hospitals must be to be surrounded by tree green place to reduce noise pollution

- Control on noise that produce from industry workplace via putting devices that produce noise on sound proofed floors which prevent spreading of noise.

- Attention to urban planning.

References

1. Hammer MS, Swinburn TK, Neitzel RL (2013) Environmental noise pollution in the United States: developing an effective public health response. Environmental health perspectives, 122(2): 115-119.

2. Garcia A (2001) Environmental urban noise. WIT press.

3. Geravandi S, Takdastan A, Zallaghi E, Niri MV, Mohammadi MJ, Saki H, Naiemabadi A (2015) Noise pollution and health effects. Jundishapur Journal of Health Sciences, 7(1).

4. Pathak V, Tripathi BD, Kumar Mishra V (2008) Evaluation of traffic noise pollution and attitudes of exposed individuals in working place. Atmospheric Environment, 42(16): 3892-3898.

5. Singh N, Davar SC (2004) Noise pollution-sources, effects and control. Journal of Human Ecology, 16(3): 181-187.

6. Margaritis E, Kang J (2017) Relationship between green space-related morphology and noise pollution. Ecological indicators, 72: 921-933.