

Research Article

Assessment of Noise levels at Main Traffic Intersections in the Baghdad City

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Abstract

The aim of the research measures of the noise levels at the main traffic intersections in Baghdad city and to indicate their health effects on citizens and to identify their various sources which are difficult to control by using a noise level meter. The results of this study showed that the noise levels at all measuring sites are high, which compared with the permissible limits of the World Health Organization (WHO) and proposed determinants of the Iraqi environment Ministry. The highest level of noise is reached (94 dB) in the Al-Tahrir Square intersection in the Al-Rusafa side, while the lowest level of noise in Palestine Street, reached (77dB) in the Rock Restaurant intersection. In the Al-Karkh side, the highest level of noise reached (93 dB) in the Al-Bayah intersection, while the lowest level of noise reached (80 dB) in the Mr Milk intersection at Al-Mansur city.

The reason for these increases in noise levels is due to transportations and crowded traffic impact, besides, most of the Baghdad areas are densely populated with an increase in the service and commercial areas. Also, an increasing of vehicles and motorcycles number for all types that using the excessively alarm, especially by the young people who are driving the vehicles and some young people are using the sports vehicles or dual-exhaust. All measurements of noise levels in traffic intersections of Baghdad city It may adversely effect on the health of the city's residents, especially hearing sense; the nervous system and neurological tensions which could be lead to a mental breakdown — also causing unbalanced reactions such as straying mental and reduce the ability to concentrate, as well as high blood pressure and others.

Introduction

Noise pollution is a dangerous phenomenon which emerged with time and represented to the noise which kills our lives. The main noise sources are cars, trains, planes and road congestion and streets in traffic cities, and vehicles sound produces from the machine and exhaust, wheels and others. Noise levels depend on the quality, uses and mode of operation of vehicles, where the large vehicles such as trucks are the most vehicles causing the noise[1]. The noise level changes with the speed of the vehicle, and the traffic noise can be considered as non-continuous because its levels are not constant, where the noise from the vehicle whether large or small relative to instrument location which is measuring of noise gradually increased until it reaches to the highest value when the vehicle move from the measurement site, then, this noise is gradually decreased when the vehicle goes away, however, the continuous vehicle's movement generates a constant noise level, so the noise ultimately depends on the characteristics and conditions which surrounding the different types of vehicles[2]. For transportation, traffic noise linked with several factors, including traffic rate; cars speed; type of street paving and number of heavy trucks. The sound frequency is important because of its relationship with the noise effects on humans health as well as its relationship with the engineering costs to noise reduction [3]. Noise defined as the unwanted sound in hearing it that we are continuously exposed it in-home, on the road, and different work locations. Either the Sound is the sensation which the ear hears it and it caused by rapid changes in generated pressure by the vibration of a body in any transmits medium as waves. Hearing threshold is the smallest sound which a healthy young person hears at a 1000 Hz 20 Pascal [4].

Noise is the unwanted sound which is causing the disturbance and must be taken of the severe measures to reduce it [5]. It has been scientifically proven that continuous exposure to the noise has permanent or temporary effects on hearing and other influences on public health such as arterial contraction; insomnia; hypertension; production; lack of focus; persistent headaches; Anorexia;

increased heart rate and neurological physiological effects which effect on stomach contraction and glandular secretions such as pancreas. When the noise level reaches 130 dB, hearing loss inevitably occurs in addition to a feeling of contraction, fear, and congestion of the blood vessels [6].

In Iraq, some studies and researches refer to an assessment of noise levels and their health effects on Iraqi people and urban planning. Hadi (2017) pointed to the problem of noise pollution in most Iraqi cities caused by generators noise. The results of the study showed that the noise levels exceeded the allowed global environmental limits for all fields (educational, health, industrial) and general society. This is due to the random distribution of the civil generators in the research area (Mansouriya, Diyala governorate) [7]. Jinna(2016) assessed the noise levels in selected locations in Diwaniyah, Iraq, which included schools and medical centres. The results of this study showed that the noise levels exceeded the international limits, and most selected sites were under the effect of traffic noise [8]. Taher (2015), refer to the noise pollution is one of the most critical problems in urban areas in Dohuk city - Kurdistan Region of Iraq because of the increase in the number of vehicles and old streets, which have adverse physical and psychological effects on generally the population and particularly the traffic police. The results of the study showed that traffic policeman exposed to high noise levels during working hours, and the traffic people daily suffer from the fatigue after the completion their work, headache, anxiety and others [9].

A study by Al-Shauk (2014) determined the noise pollution levels in some primary and secondary streets in the Najaf city. Twenty-five streets selected at three locations, the noise levels were measured in the beginning, middle and end of each road during the morning hours, and comparing the average with the permitted limits. The results showed that noise levels of all study sites were exceeded the allowed limits by the World Health Organization (WHO), which required to measures of reducing the problem of noise pollution in the city [10]. Jaleel (2014)

pointed to the impact of road traffic noise on hospitals in Baghdad. One of the traffic intersections, which is near to the Al-Wasity, Al-Alwiya and Zayed hospitals, was selected. The noise level was measured during the daily working days and traffic movement volume at the same time during the morning. The results showed that the noise levels were higher than the permissible limits for hospitals [11].

In the study of Hassan (2013) on the healthy environment of cities, she refers to the change in the requirements of daily life and appearance of modern transports and the development of various modern industries, accompanied by a difference in the structure of the traditional urban. Al-Kadhimiya city selected as an example which still standing on conventional towns that have undergone a change in their usual urban structure and healthy environment. Two models studied within this city to compare the modern street style and traditional winding alleys. The results of the study showed a constant relationship between the audible sound intensity levels and voice preference, whenever increased of the sound level intensity, accepted by the recipients is less. It also found that the sound patterns are an

essential indicator in the definition of the acoustic environment compared with the sound intensity [12]. Aziz (2012) discussed the control and solutions of the noise pollution in the city of Erbil - Kurdistan Region of Iraq. He referred to the rapid development and an increase in the number of vehicles caused the rise of noise problems in the city. Noise levels were measured from sound sources in outdoor; indoor and roads traffic (e.g. aircraft, traffic, residential buildings, libraries, restaurants, classrooms, management offices, construction equipment and generators. The data were determined and compared with the specific criteria. Effect of the distance on noise pollution was studied and drawn a mathematical model to explain the impact of distance on noise intensity [13]. The aims of this research to conducting measurements of the noise levels at the main traffic intersections in Baghdad city, and indicating to their health effects on humans and identifying their different sources which are difficult to control it due to population increase and rapid economic growth, increasing transport vehicles, generators and business-industrial practices.

Methods and Materials

The rates of noise which are set by the World Health Organization (WHO) and for 8 hours as follows [14]:

- 25 -40dB acceptable in residential areas
- 30 -60 dB acceptable in commercial areas
- 40 -60 dB acceptable in industrial areas
- 30 -40 dB acceptable in the educational areas
- 20 -35 dB acceptable in hospital areas
- 80-90 dB acceptable in the areas of manufacturing and power generation

And the proposed national parameters for noise levels are measured in decibels dB [15]:

- Residential areas of 45-55 dB is acceptable

- Business areas of 60-65 dB acceptable
- Industrial zones of 65-70 dB acceptable
- Educational areas of 45-55 dB acceptable
- Areas of inhalers and schools of 40-50 acceptable (Arab Engineers Forum, 2010).

Noise levels measured at some traffic intersections which distributed in Baghdad city. Most measurements were made during the morning hours, using the Sound Level Meter. Twenty sites selected are distributed intersections in capital Baghdad, divided to (10) intersections in Al-Karkh and (10) intersections in Al-Rusafa with high traffic density and can be considered as major intersections (Fig.1).

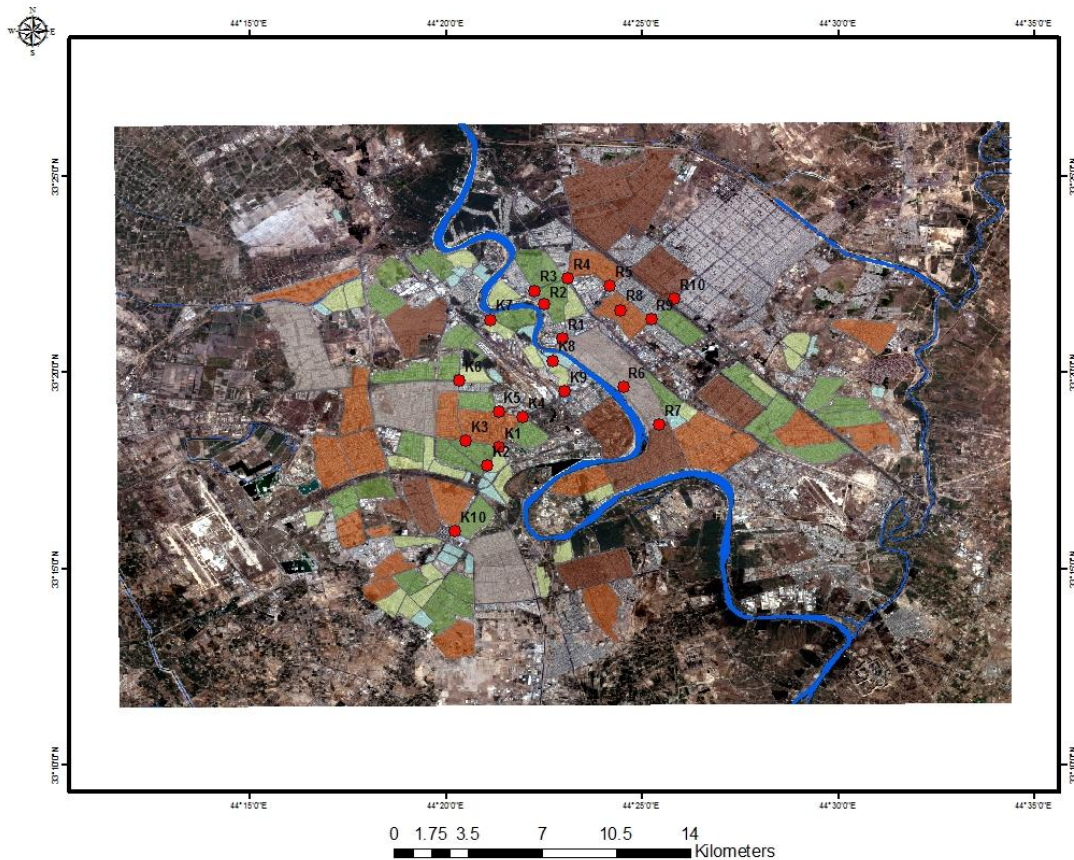


Fig. (1): Baghdad map showing selecting sites

Results and Discussion

Noise levels were measured at the main traffic intersections in Baghdad city. Table (2) and Figures (2) and (3) refer to the measurements results in the selected sites on both sides of Al-Karkh and Al-Rusafa in the city where high levels of noise values observed at some intersections, especially in densely populated areas and crowded traffic roads, also service and commercial sites in comparison with national and global limits. The reason for the high levels of noise in the Baghdad city due to the increase in the number of vehicles of all types, as well as a large number of motorcycles and many roads are the closure of in some areas, which leads to increased traffic jams in the main streets. In

addition to the use of vehicle alarm as excessively, especially by the youth and some young people use to the sports vehicles or double-exhaust, or some of them deliberately is punching in the exhaust of vehicle to get high voices when the squeeze on the brake. The highest noise level at the Al-Rusafa side was in Antar and Tahrir squares (94.2 dB) and (94.5 dB) respectively from 8:30, am to 10:30 am, (Table- 2 and Fig.2). In contrast, the highest noise level at the Al-Karkh side in Al-Bayaa and Al-Ruwad intersections (93.2 dB) and (90.2 dB) respectively during the period from 8:30 am to 10:30 am, (Table-2 and Fig.3), which are higher than the national and global limits in both sides.

Table (2): Noise levels were measured at the main traffic intersections in both sides (Al-RusafaandAl-Karkh) of Baghdad city

Site Symbol	Intersection name	Noise value (dB)	Site Symbol	Intersection name	Noise value (dB)
R1	Bab Al-Ma'adhum	Min. 64.5 Max. 91.2	K1	Al-Nisour Square / Harthiya	Min. 74.2 Max. 89.4
R2	Morocco Street / Al-Kasra	Min. 62.2 Max. 82.2	K2	Yarmouk Square	Min. 68.4 Max. 83.2
R3	Antar Square / Al-Adhamiya	Min. 67.8 Max. 94.2	K3	Mr. Milk/ Al-Mansur city	Min. 70.1 Max. 80.8
R4	Al-Nida Mosque / Cairo	Min. 60.9 Max. 89.5	K4	Baghdad International Fair	Min. 68.6 Max. 85.5
R5	Al Mawal Restaurant / Al- Mustansiriya	Min. 70.1 Max. 91.4	K5	Al-Rowad Square / Al- Mansour	Min. 70.8 Max. 90.2
R6	Al-Tahrir Square	Min. 65.5 Max. 94.5	K6	Al-Liqa Square/ Al-Mansour	Min. 71.3 Max. 83.6
R7	Kahramana / Karrada	Min. 64.8 Max.85.9	K7	Al-Atayefiyah Square	Min. 64.5 Max. 83.9
R8	Turkmen Brothers Club / Al-Mustansiriya	Min. 62.2 Max. 84.4	K8	Tala'i Square / Haifa Street	Min. 66.2 Max. 82.5
R9	Beirut Square / Palestine Street	Min. 75.4 Max. 81.6	K9	Alawi Garage	Min. 68.4 Max. 90.5
R10	Muzaffar Square / Sadr City	Min. 67.4 Max. 82.2	K10	Al-Bayah	Min. 65.9 Max. 93.2

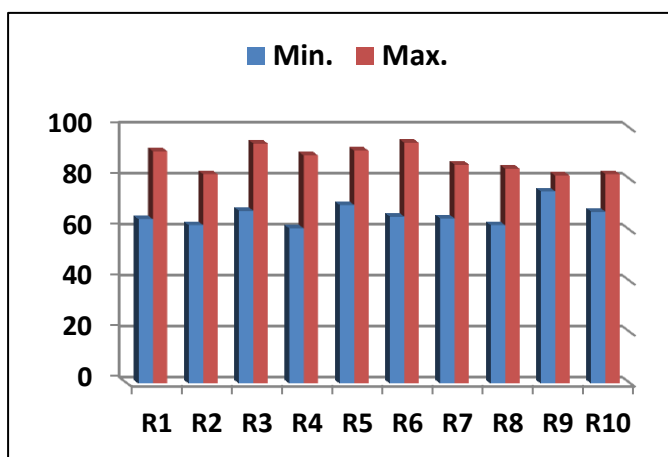


Fig. (2): Distribution of Noise values at measuring sites in Al-Rusafaside

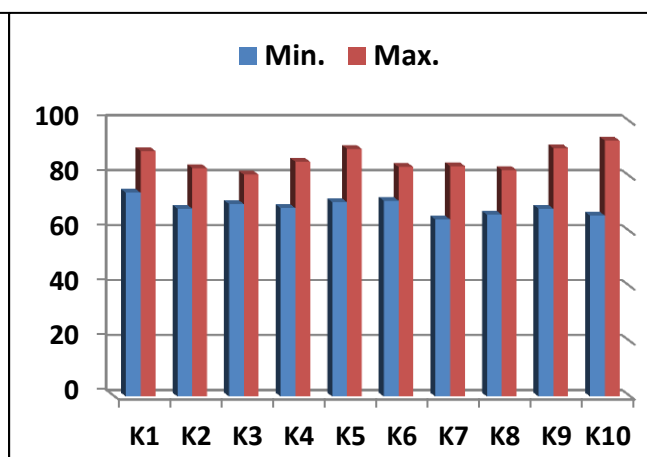


Fig. (3): Distribution of Noise values at measuring sites in Al-Karkhside

The percentage of noise pollution is relatively high at the main traffic intersections in Baghdad city. The distribution maps of the noise levels by using geographic information systems (GIS) are showing high and low levels in all sites under study, Figures (4) and (5). The noise Pollution exists in each region, but the distribution is random because of status and privacy of each area according to

the density of the population and period extended of big traffic jams as well as the exists of a lot service and commercial facilities and the car garages and maintenance shops within or near the residential neighborhoods. These rates were measured during the morning period, and according to other studies, the noise rates are lower at night [16].

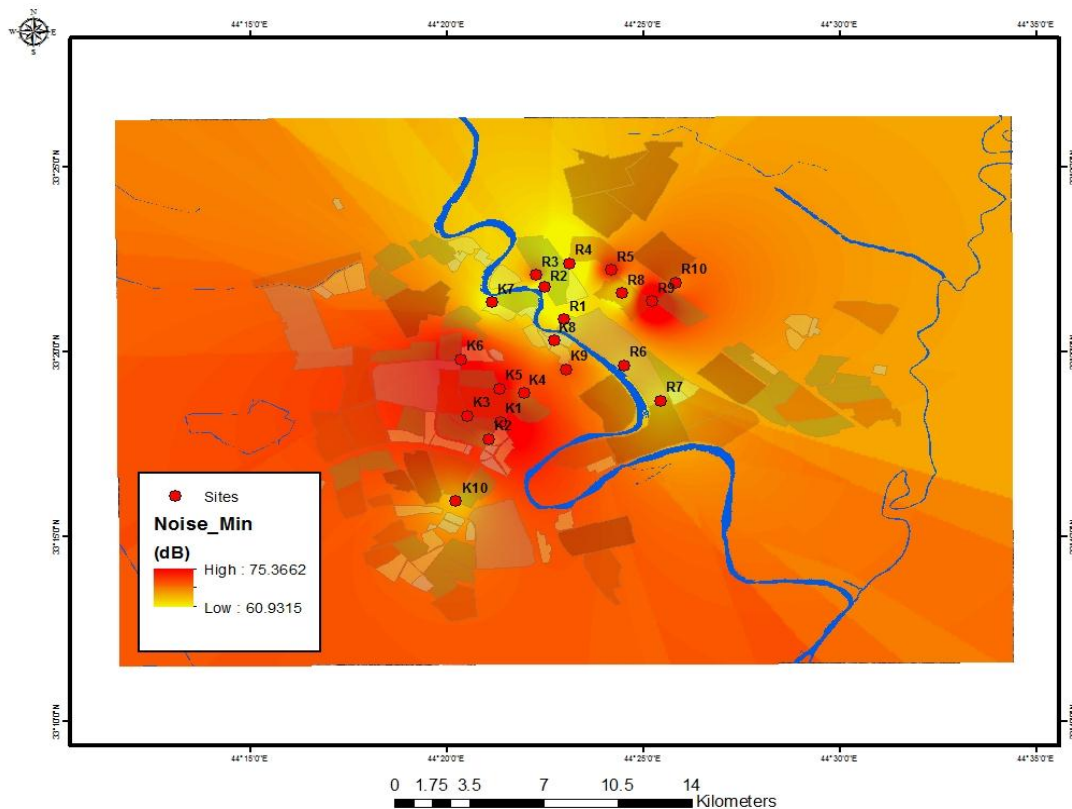


Fig. (4): Minimum Noise levels in both sides (Al-Rusafa and Al-Karkh) of Baghdad city

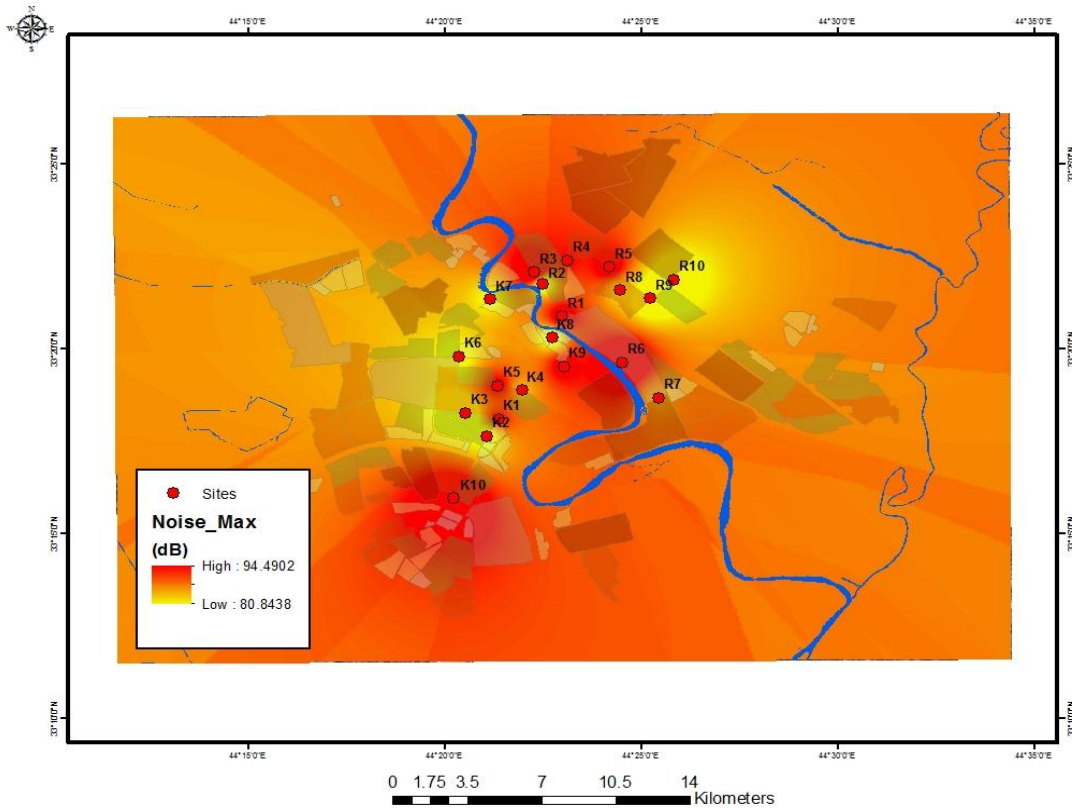


Fig. (4): Maximum Noise levels in both sides (Al-Rusafa and Al-Karkh) of Baghdad city

All levels of measured noise at the main traffic intersections in Baghdad city negatively affect human health, especially on hearing, nervous system and cause nervous tension that may lead to a mental breakdown, and cause imbalanced reactions such as mental spasms and reduced ability on the focus, which also causes to high blood pressure and excessive secretion of some

glands, causing high sugar, stomach ulcers, headaches, tiredness and insomnia. Because of most hospitals, health centers, schools and kindergartens built near to the main streets and intersections, and these rates certainly effect on the well-being of patients and their recovery speed as well as their impact on the learning ability of children and school students [17].

Conclusions

The following can be inferred:

- 1- Noise levels in Baghdad city and both sides are relatively high compared with the national and global determinants.
- 2 - Increase of the noise levels at the traffic intersections in the city in both sides due to the impact of transportation and crowded traffic roads, and the densely populated areas as well as service and commercial sites which greatly increased.
- 3- The reason for the high noise levels in the Baghdad city is due to the increase in the number of vehicles of all types and spread of vehicle garages, and maintenance shops in addition to a large number of motorcycles, as well as excessive use of vehicle alarm, especially by the young. Also, some young people use sports

vehicles or double-exhaust, or some of them are punching the exhaust pipe of vehicle deliberately to get high voices when the squeeze on the brake.

- 4 - Any increase in the noise intensity accompanied by an apparent rise in the tension of the personality of human and adversely affect his comfort, with a lack of mental accommodated and increase in cases of mental illness. Also, high noise levels effects on the people who stay in hospitals, schools and kindergartens, as well as in general impact on human health.
- 5- Most of the study results are much higher than WHO and proposed national limits based on the preservation of human health and his environment and ensuring survival in an atmosphere that guarantees of the psychological and mental integrity.

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