



Investigation of Noise Levels Within Al-Muthanna University in Al-Muthanna Province/ Iraq

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ABSTRACT

Noise pollution around the Al-Muthanna university in Al-Samawah city was measured to study the effects on the teaching-learning processes and performance of both teachers and students during November and December 2014. Digital Sound Level Meter (model a GM1351) was used to measure the noise level, In twelve selected buildings for the study as indoor sites and the park and main door of the university as outdoor sites . The measurements at the buildings were carried out in three different time intervals of the day i.e. in the morning 8:00-10:00am, 10:00-12:00 pm and 12:00-2:00 pm. Noise intensity was also measured in two points at an interval of half hour .After recording of daily measurements of noise level, the hourly average noise level for each point of the building and for the whole buildings were calculated. As well as the total average of noise levels was calculated in order to compare it with the allowable limits of EPA for educational institutions. The maximum noise level was found in college of education (81.8) dBl and the minimum value in college of nursing which was equal(73.3) dBl. The study results show that the rate of noise level in an indoor and outdoor sites is very high and not suitable for teaching-learning processes. Therefore Acts and regulations concerning noise pollution should be strictly adopted.

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التحري عن مستويات الضوضاء في جامعة المثنى في محافظة المثنى/ العراق

الخلاصة

في هذا البحث تم قياس التلوث الضوضائي في جامعة المثنى في مدينة السماوة لدراسة تأثيره على عملية التعليم والتعلم وكذلك على أداء كل من الاساتذة والطلاب .مستوى الضوضاء يجب أن يكون في حدود ٣٠ ديسيبل إلى ٤٠ ديسيبل داخل البنايات التعليمية وخارجها وفقا في هذه الدراسة تم تقييم التلوث الضوضائي في جامعة EPA ,لمحددات وكالة حماية البيئة المثنى خلال شهر نوفمبر وديسمبر ٢٠١٤ وقد استخدم جهاز قياس مستوى الصوت (نموذج GM1351) وفي هذا العمل تم اختيار اثني عشر موقع داخلي (المباني الدراسية والنادي GM1351) الطلابي) اضافة الى منطقتين خارجيتين هي المدخل الرئيسي للجامعة ومرآب للسيارات. قيس الضوضاء في ثلاث فترات زمنية مختلفة ٨-١٠ صباحا ١٠-١٢ مساء ١٢-٢ مساء. تؤخذ القراءات كل نصف ساعة اي قرأتين بالساعة الواحدة في كل نقطة (نقطتين لكل موقع). في كل مرة يحسب متوسط القيم لكلا النقطتين في الساعة. بعد تسجيل القياس اليومي للمتوسط بالساعة لكل نقطة من المبنى ثم تحسب للمبنى كله تقارن النتائج مع الحدود للمؤسسات التعليمية. اعلى قيم التلوث سجلت في كلية التربية وكانت (EPA) المسموح بها (٨١,٨) ديسيبل واقل القيم سجلت في كلية التمريض وكانت (٧٣,٣) ديسيبل. وقد دلت النتائج بوضوح على ان معدل مستوى الضوضاء في جميع المباني (داخل وخارج) مرتفعة جدا وغير مناسبة لعملية التعليم والتعلم وبناء على ذلك ينبغي اعتماد القوانين والأنظمة المتعلقة بالتلوث الضوضائي.

الكلمات المفتاحية

اصوات، تلوث، جهاز قياس الاصوات

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Introduction

submitted in either Arabic or English Noise pollution is now one of the most significant environmental issues in many large cities. Noise pollution adversely effects on human health, degradation of environment and quality of life. Since the seventies noise has been considered as a major problem of annoyance in cities [1]. It has been reported that exposure to excessive noise may lead to prematurity of new-born babies, disruption to the normal growth and development of premature infants, affecting the physical and psychological behavior of individuals, permanent hearing loss; cause nausea, vomiting, pain, hypertension, high blood pressure, cardiovascular problems, deterioration of sleep quality, restlessness, depression, fatigue, allergy, mental stress and annoyance [2 and 3] . In the literature it can be found that many large cities are now under the grip of noise pollution with noise levels much higher than the recommended values [4,5,6,7,8 and 9]. Effects of noise pollution on human health have not attracted much attention yet unlike other pollutants [10]. It is also observed that the control of noise pollution has been hampered by insufficient knowledge of its effects on humans and of dose-response relationships, as well as by a lack of sufficient data, especially in developing countries[3] . Noise can be defined as "disagreeable or undesired sound" or other disturbance. From the acoustics point of view, sound and noise constitute the same phenomenon of atmospheric pressure fluctuations about the mean atmospheric pressure, the differentiation is greatly subjective. What is considered a sound by somebody can be considered a noise by another person [11] . The recognition of noise as a serious health hazard is the result of development of the modern area. Modern industry and multitude of sources have accelerated noise-induced hearing loss. Amplified music also has its contribution to noise in modern life. It considered as sound (not noise) and even may give pleasure to many people, but considered as excessive noise by others [12]. Noises health effects are the health consequences of elevated sound levels. Elevated noise can cause hearing impairment, hypertension, heart disease, annoyance and sleep disturbance [13]. Changes in the immune system and birth defects have been attributed to noise exposure but evidence is limited. Elevated noise levels can create stress, increase workplace accident rates, and stimulate aggression and other anti-social behavior. It is clear that noise is not the only industrial hazard to hearing, exposure to certain chemicals such as toluene and trichloroethylene can produce hearing loss, also the reactions to certain drugs. Most importantly is the interaction between noise and chemicals may produce more hearing loss than expected by either one alone, i.e. the two factors act synergistically in causing the damage [14]. _The

present study measures the levels of noise pollution in Al-Muthanna university campus and tests methods of mitigation. In addition, the principles of campus planning in order to reduce noise pollution were tested for newly founded universities in Iraq.

Literature Review

In 1972 David and Jerome placed people in a noisy environment and either told them that they could control the noise (with a switch) or that they had no control over the noise. The group with control did not often use it, but when both groups were tested on a task afterward, the performance of the group who had control was significantly better. Glass and Singer proposed that noise is a source of stress and that uncontrollable stress leads to a feeling of helplessness. Thus, those in the group with control could relieve helplessness because of their belief that they could control its cause. This suggests that the psychological interpretation of environmental stressors, such as noise, crowding, or heat, play an important role in determining our reactions to them [15].

The noise level measurement was carried out to assess the traffic generated noise in Gauhati University Campus during April and May 2012 by Bhabananda and Kalyan . Exttech's Data logging Sound Level Meter (model 407764) was used to measure the noise level. The measurements were carried out in three different time intervals of the day i.e. in the morning 9-11am, midday 12-2pm and in the evening 6-8pm. Equivalent sound pressure level noise climate (NC) and noise pollution level were computed for statistical analysis of noise level. The study revealed that noise levels exceeded the prescribed noise standard set by the Central Pollution Control Board, India (CPCB, 1998). The results showed that the maximum equivalent noise level was in the morning 9-11am and minimum in the midday at 12-2pm [16]. A study reported by Al-kalidy, Khadim and Chabuck ,2010. Studied where during 2010-2011 Noise level measurement at classrooms, teaching staff rooms and the main courtyard of the building of the civil engineering department by using two sound level meters type (2237 fulfici). The measurements were carried out over 70 days of daily measurement. The results of this study showed that the average noise level for this building was 76.7 dB which is greater than the allowable limits that required range of 30-40 dB for such institutions compared with the allowable limits of Environment Protection Agency (EPA) for educational institutions [17] .

K. Essandoh ,et al.,2011, measured ambient noise levels in four halls of residence in the University of Cape Coast, Ghana .The results indicate that noise generated within the functional

units ranged from 30dB to 70dB. The same- sex halls (Adeyhe and Casford) were within the day and night permissible noise limits (55dB and 50dB respectively) set by the Ghana Environmental Protection Agency. However, the Oguua and Valco Halls (mixed halls) were non-compliant. Adehye Hall recorded the lowest for both day (49dB) and night (45dB). Valco Hall recorded the highest noise level for both day and night: 66dB and 60dB respectively. Most of the participants complained that the noise affects their studies and sleep in the halls and indicated that reducing noise levels could potentially make the halls more habitable [18]. In 2011, Kusag, et al, provided papers presenting the noise pollution in Al-shaheed Copper and Brass factories in Iraq at 33°06'04" longitude and 43°48'50" altitude. The factories are staffed by 1700 workers for 12 hours a day, 7 days a week. This study depended on the maximum permissible occupational noise exposure limit of International Standards Organization (ISO) and Occupational Safety Health Act (OSHA) as a comparison reference. The study proved that the half of the work sites in factories where unacceptable noise levels and all sites of comfort workers exceeded the limit of acceptable noise and the study also proved that the administration building factories sites within the levels of the noise surveys and administrative staff in safety from the impact of noise in factories. Also the Noise pollution has no effect on residential areas near the factories. About Half of workplaces in factories where unacceptable noise levels, The highest of these levels 120 dB(A) at the hard shear machine which was exceeded the highest permitted noise level of ISO and OSHA, the best workplaces is a store 55 dB(A) and the most forestry workplaces was at Acid exchange tank 84 dB(A). The Measurements in all workers comfort places had exceeded the acceptable limit of noise. The most dangerous workers comfort places was at the hard shear machine and crush cables machine of 101 dB(A) and the lowest workers comfort places was near the site of the crane reached of 55 dB(A). [19].

Materials and Methods

Al-Muthanna University is one of the most important educational institutions in Al-Samawah city. The present investigation on evaluation and analysis of environmental noise pollution was conducted in Al-Muthanna University during the period of November to December 2014. The city of Al-Samawah is the modern capital of the [Al Muthanna Governorate](#). It is located midway between Baghdad and [Basra](#), at the northern edge of the governorate with a population of 776 298 capita according to the 2006 census [30]. Fig.(1) shows the site of Al-Muthanna University with the locations of noise measurements. The study area is about 144331m² with 10000 capita. Table (1)

despite the indoor and outdoor locations taken in this study. Noise pollution at educational institutes depends on where the institutes are located where some colleges are located in high voltage noise pollution zones i.e. near main roads.

Table(1): Name and code of locations taken in this study

Sr. No.	Location Type	Name of Building	Code*
1	Indoor	College of Engineering	1
2		College of Science (No.1	2
3		College of Science (No.2	3
4		College of Agriculture	4
5		College of Law	5
6		College of Nursing	6
7		College of Basic	7
8		College of Physical	8
9		College of Education	9
10		College of Administration and Economics (No.1 near nursing college)	10
11		College of Administration and Economics (No.2 near of building the university presidency)	11
12	Outdoor	students Club	12
13		Main Entrance	O1
14		Park (near engineering college)	O2

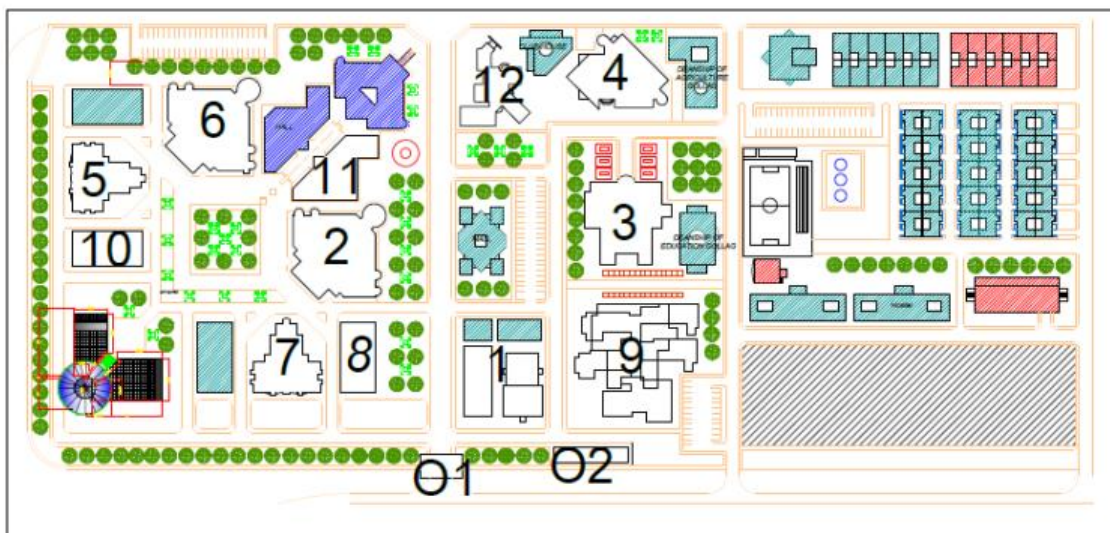


Figure.1 Measurement Sites in the Study Area

Experimental details

The samples were selected (Indoor) which were selected inside the buildings and the samples (Outdoor) at the main entrance and park near the College of Engineering a complete and comprehensive analysis was only possible and apprehensions of all the parties i.e. students, teachers as well as the staff were surveyed and studied. For analysis data was collected in two ways- by measuring noise level and with the help of questionnaire (figure 2).

Different sets of questionnaire were prepared for students, teachers & staff of the institutions to identity the right need. The key findings are presented in the form of tables, graphs, charts. All the findings are then compared with the EPA standard and guidelines according to Table 2. The measurements were obtained during 40 days for two months (November and December 2014) during the time period 8(am) to 2 (pm). Noise intensity was measured in the selected areas every half hour. The results are illustrated in the Table 3 and Figures 4 to 13. The sound level meter was placed at a height of 1.2 meter above the ground level. The average value of noise pollution compared with EPA standards.

Investigation Noise Level (Al-Muthanna University)							
Place:							
Month:		Year:		Date:			
Instrument:							
Weighting:							
Read No.	Point 1			Point 2			
	8:00-10:00	10:00-12:00	12:00-2:00	8:00-10:00	10:00-12:00	12:00-2:00	
Indoor							
1							
2							
3							
4							
Outdoor							
1							
2							
3							
4							

Questionnaire	Affect	Does not affect	Doesn't feel
Teachers			
1.			
2.			
Staff			
1.			
2.			
Student			
1.			
2.			

Figure .2 Questionnaire of Al-Muthanna University



Figure .3 Digital Sound Level Meter

The noise levels were measured using a Sound Level Meter (SLM) (model a GM1351) with a range of 30-130 dB, Figure (3) shows this meter.

Table 2: EPA Noise Guidance*

Location	Effects	Maximum (dB)	Time (hours)	Time of day
Bedroom	sleep disturbance, annoyance	30	8	night
Living area	annoyance, speech interference	50	16	day
Outdoor living area	moderate annoyance	50	16	day
Outdoor living area	serious annoyance	55	16	day
Outdoor living area	sleep disturbance, with open windows	45	8	night
School classroom	speech interference, communication disturbance	35	8	day
Hospitals patient rooms	sleep disturbance, communication interference	30-35	8	Day and night

Results and Discussion:

In the present work, an attempt was made for comprehensive study of noise problems at 14 sites in Al-Muthanna University. Indoor and outdoor noise pollution sources include motor vehicles noise, restoration work and many others, in addition to loudly speaking people. The total average rate recorded of indoor noise pollution was 73.9 dB . Figure 4 , 5 and 6 show the measurements that were obtained inside the buildings taken in this study . The results show that the highest noise intensity was 81.8 at the time 12:00-2:00 pm in the Education College (Table 3), because of its small area and this time was at the end of the lectures.

The number of students very high which are existence of preliminary and higher studies in all various departments. The lowest noise level was in the College of [Science](#) (building No.2 in front of Agriculture College) 67.7 dB. These noise levels are unacceptable according to the Environmental Protection Agency (EPA). Figure (7) shows the total range for all indoor locations (dB).

Table (3) : Maximum and minimum noise levels in different sites of the study area

Name of Site	Max. Noise Level in dB	Time period (Hrs)	Min. Noise Level in dB	Time period (Hrs)
Engineering College	80.0	8:00-10:00	68.9	10:00-12:00
College of Science No.1	75.7	12:00-2:00	73.8	10:00-12:00
College of Science No.2	75.4	12:00-2:00	67.7	8:00-10:00
College of Agriculture	75.3	12:00-2:00	70.6	8:00-10:00
College of Law	75.5	12:00-2:00	69.8	8:00-10:00
College of Nursing	73.3	12:00-2:00	72.5	8:00-10:00
College of Basic Education	77.5	10:00-12:00	75.9	8:00-10:00
College of Physical Education (Sport)	76.4	8:00-10:00	72.8	12:00-2:00
College of Education	81.8	12:00-2:00	73.7	10:00-12:00
College of Administration and Economics No.1	74.2	10:00-12:00	70.5	8:00-10:00
College of Administration and Economics No.2	74.8	10:00-12:00	70.4	8:00-10:00
Club of students	78.9	10:00-12:00	76.3	12:00-2:00
Main entrance	75.9	10:00-12:00	68.9	12:00-2:00
Park	67.5	8:00-10:00	65.7	12:00-2:00

The total average rate of *outdoor* noise pollution was 69.9 dB which unacceptable the EPA limits and the highest recorded value was at the main entrance 73.2 dB as this location is near the main highway. The lowest value 66.7 dB was found in the park (near College of Engineering) which is also unacceptable within the standards limit. Figure 8 shows the outdoor noise level with time period. From the analysis of the questionnaire it was clear that all the study area have noise problems. Noise problem in an educational zone mainly depends on where the institute is located. The university was located on the main road of the city, and thereby educational buildings were suffering from noisy environment creating disturbance in daily work. From the study it is also observed that people strongly supported the action from authorized committee to reduce noise pollution. Where some steps and regulatory measures should be taken [20, 21, 22, and 23]. In rapid industrialization and urbanization the transport sector is growing rapidly as the worker of vehicles number on road are increasing leading to overcrowding and noise pollution [24 and 25]. After analyzing the questionnaire it is observed that 83% respondents agree with noise pollution in the institutions and disturbance in teaching-learning processes, 10% disagree and 7% do not feel noise as is shown in Fig.9.

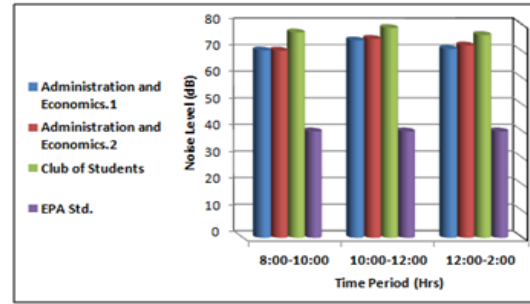


Fig.(6): Average Noise Level at Indoor Locations with Time

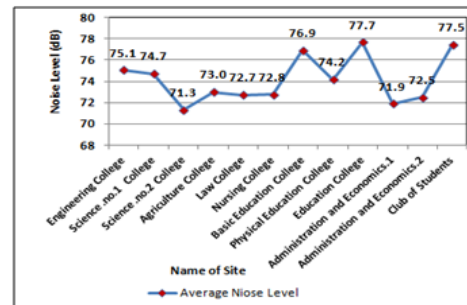


Fig.(7): Total Average Noise Pollution Level at all Indoor Sites

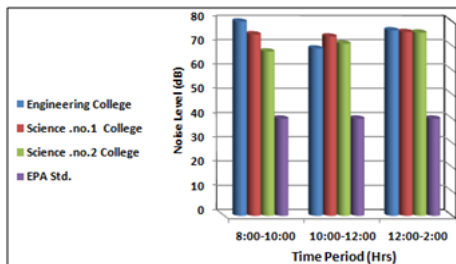


Fig.(4): Average Noise Level at Indoor Locations with Time

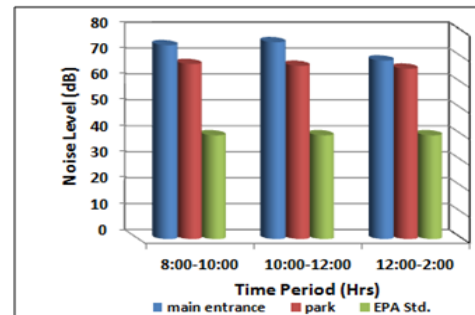


Fig.(8): Average Noise Level in the outdoor regions of Al-Muthanna

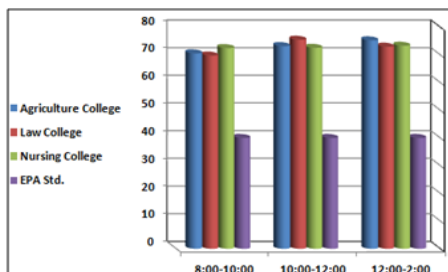


Fig.(5): Average Noise Level at Indoor Locations with Time

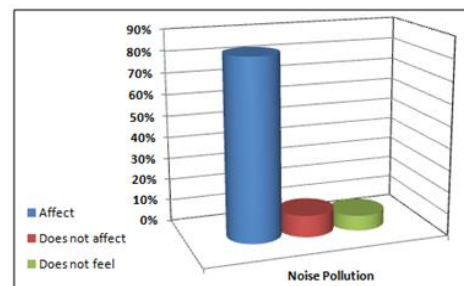


Fig.(9) :Noise pollution in Educational zone

Conclusions and Recommendations

This study revealed that there is a significant noise pollution in Al-Muthanna University. The study shows all the noise levels in Al-Muthanna University were exceeding EPA standards. Table 3 shows the average noise level, the sequence of indoor sites (in decreasing order) obtained were as follows: College of Education> Engineering College > College of Basic Education> College of Physical Education (Sport)> College of Science No.1> College of Law> College of Science No.2> College of Agriculture> College of Administration and Economics No.2> College of Administration and Economics No.1> College of Nursing. The sequence of outdoor sites (in decreasing order) obtained were as follows: Club of students> Main entrance> Park.

This increase in noise levels in all indoor sites over the allowable limit is due to several reasons:

1. Numerical increase for users of the buildings.
2. Some of the buildings are near the main roads.
3. Traditional construction does not contain insulation for sound.
4. The presence of heating and cooling equipment, in some buildings that contain fan made-noise.

The outdoor noise level is also unacceptable with the EPA limits because the university has not very large area of space and the absence of gaps and green areas between the buildings.

In rapidly urbanizing Al-Samawah city, the transportation sector and students themselves lead to overcrowded roads and noise pollution in educational zone in the city. The following range of measures may be taken to reduce noise pollution in the educational sites :

1. The educational zone should have criteria of good planning and should be located far from main roads, and other noise sources.
2. Educational zones should be provided with trees and vegetation because plantation can absorb (4 to 6) dB noise intensity depending on their characteristics.
3. A strict law about noise pollution in educational zones should be implemented.
4. Applying Speed limits for vehicles near the educational institutes.

The establishment of an agency under the name of Iraqi Environmental Protection Agency (IEPA) is essential for controlling this and similar hazards in the region.

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