
Araştırma Makalesi / Research Article

A Study of Noise Pollution by Traffic during Peak and Off Peak Hour in Dhaka City

*¹Riyadul Hashem RİYAD, ²Al AMİN, ³Milan MAZUMDER

¹European University of Bangladesh,, Faculty of Science & Engineering, Department of Civil Engineering, Dacca, Bangladesh, riyadhashem.aust@gmail.com, ORCID ID: <http://orcid.org/0000-0003-1436-1088>

²European University of Bangladesh,, Faculty of Science & Engineering, Department of Civil Engineering, Dacca, Bangladesh, alamin.ce18@gmail.com, ORCID ID: <http://orcid.org/0000-0001-6517-0105>

³ European University of Bangladesh,, Faculty of Science & Engineering, Department of Civil Engineering, Dacca, Bangladesh, milaneng.duet@gmail.com, ORCID ID: <http://orcid.org/0000-0002-9348-6753>

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Abstract

Noise may be a phenomenon that has physiological and psychological effects on human. It's a big environmental as well as health hazards in many suburbs. There are different sorts of noise sources. Traffic noise is extremely effective within the center of cities especially in Dhaka city. This phenomenon has not been properly acquainted until it's gradually growing in developing countries like Bangladesh. Now a day there are different studies to decrease the negative aspects of noise pollution on health of human being. The aim of this research is to work out the traffic noise in Dhaka city and to research possible solutions to scale back the traffic noise. Noise maps are one among these studies. These maps are a cartographic representation of the background level distribution during a determined area and period of your time peak (09.00 - 11.00) and off peak (12.00-15.00) hour. The minimum and maximum noise density measured at the main road is 78.1 dB and 119.7 dB respectively in peak hour and 57.4 dB and 89.3 dB respectively in off peak hour.

Keywords: Noise pollution, Peak hour, Off peak hour, Passenger Car Unit (PCU), Decibel (dB).

*¹Sorumlu yazar / Corresponding author

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Dakka Şehrinde Yoğun ve Yoğun Olmayan Saatlerde Trafikten Kaynaklanan Gürültü Kirliliği Çalışması

Öz

Gürültü, insan üzerinde fizyolojik ve psikolojik etkileri olan bir durumdur. Birçok yerleşim yerinde büyük bir çevre ve sağlık tehlikesi oluşturur. Farklı türde gürültü kaynakları vardır. Özellikle şehirlerin merkezlerinde ve Dakka şehrindeki trafik gürültüsü son derece etkilidir. Bu durumun önemi, Bangladeş gibi gelişmekte olan ülkelerde, sorun yavaş yavaş büyüyene kadar net olarak anlaşılamamıştır. Günümüzde gürültü kirliliğinin insan sağlığı üzerindeki olumsuz etkilerini azaltmak için farklı çalışmalar yapılmaktadır. Bu çalışmanın amacı, Dakka şehrindeki trafik gürültüsü sorununu çözmek ve azaltmak için olası seçenekleri araştırmaktır. Gürültü haritaları bu seçeneklerden birisidir. Bu haritalar, en yoğun (09.00 -11.00) ve yoğun olmayan (12.00-15.00) saatlerin belirli bir alan ve periyodu boyunca, arka plan seviyesi dağılımının kartografik bir temsilidir. Ana yolda ölçülen minimum ve maksimum gürültü yoğunluğu, en yoğun saatlerde 78,1 dB ve 119,7 dB, yoğun olmayan saatlerde ise 57,4 dB ve 89,3 dB'dir.

Anahtar kelimeler: Gürültü kirliliği, Pik saat, Pik olmayan saat, Binek Araç Eşdeğeri (PCU), Desibel (dB).

1. Introduction

Noise pollution could also be a big environmental hazards in many swiftly municipal areas. Within the 2000 Century we face the man-made disaster of environmental noise from which there's morally no escape for us, loud music, and people talking on phone, the traffic and even pets barking at any time of the day. of those activities became an area of the urban culture and sometimes disturb us. Like many other big cities of developing countries, noise pollution in Dhaka city of Bangladesh is a huge concern. Here noise is produced from different sources like traffic, loud speaker, people gathering etc. However, when of those sounds exceed the bounds and provides you a headache, it stops becoming just noise and start turning into noise pollution. In order to manage it, noise pollution has become an unfortunate fact of life worldwide. Hence, it is the necessity of the hour to recollect about the extent of noise in our surroundings soon be able to take correct preventive act and actions to avoid further increase within the extent of noise pollution. There's growing example that noise pollution isn't merely a molestation; like other kinds of pollution, its comprehensive adverse health, social, and economic issues. Because of the population growth and as sources of noise become more affluent and more cogent, there's thriving exposure to noise pollution, which has dormant public health impactions. Noise, even at levels that are not detrimental to hearing, is realized subconsciously as a jeopardy signal, even during sleep. The body arose to

noise with a "fight or flight" response, with resultant anxiety, hormonal, and vascular changes that have far reaching consequences.

1.1. Background study

A study of DOE indicates that noise pollution has aggravated in different portion of Dhaka City. The survey shows that at Shaheen School; noise level is 83 dB during day time (peak hour) and 74 dB at night time. Motijheel Government High School; noise level is 83 dB during day time(peak hour) and 79 dB at night time, Dhanmondi Government Boys School 80 dB during day time (peak hour) and 75 dB at night, Azimpur Girls' College 80 dB during day time(peak hour) and 74 dB at night, Tejgaon Girls' College 75 dB during day time(peak hour) and 67 dB at night, Bangabandhu Sheikh Mujib Medical University 82 dB during day time (peak hour) and 74 dB at night, Dhaka Medical College Hospital 80 dB during the day time (peak hour) and 69 dB at night, Mitford Hospital 76 dB during the day time (peak hour) and 73 dB at night, Shishu Hospital 72 dB during the day time(peak hour) and 69 dB at night (BEMP, 2005a). Banglamotor (highest average value 86.7dB and lowest average value 75dB), Shahbag - front of BSMMU and BIRDEM (highest average value 85.6 dB and lowest average value 75 dB), Maghbazar (highest average value 85 dB and lowest average value 76.7 dB), Mouchak (highest average value 85 dB and lowest average value 74.3 dB), Kakrail-Road Crossing (highest average value 84.6 dB and lowest average value 73.7 dB), Hotel Sonargaon (highest average value 84 dB

and lowest average value 72 dB), Malibag-Road Crossing (highest average value 84 dB and lowest average value 71.7 dB), front of Matsa Bhaban (highest average value 83.7 dB and lowest average value 73.7 dB), Sheraton/Ruposhi Bangla (highest average value 83 dB and lowest average value 71.3 dB), and Shantinagar-Road Crossing (highest average value 82 dB and lowest average value 72.2 dB) (Islam, 2012).

1.2. Objective

The research holds the matter of this sound pollution in terms of road traffic. The work begins with a background cover of sound pollution, its outcome among the individuals, and therefore the literature review with identical actions

1.3. Vehicular Traffic Noise

Dhaka is one among the foremost densely populated places within the world, with a density of 23,234 people per square kilometer within a complete area of 300 square kilometers. Traffic noise may be a leading contributor to overall sound pollution. Traffic noise from main roads generates problems for surrounding areas, especially when there are high traffic volumes at high speeds. Vehicular traffic noise is mainly contributed by automobiles such as cars, bikes, trucks and buses. Noise caused by

around the world and also in Bangladesh. This study is established to gather environmental data in reference to road. Traffic noise by process of monitoring and reserving them for further salvation, editing, and exploration and promoting their use for the simplest possible purpose:

- Knowing the explanation for sound pollution by traffic;
- To see various noise generating factors for his or her correlation with background level;
- Knowing the bad effect of sound pollution;
- To emulate the measurement of sound pollution.

traffic is proportional to the magnitude of traffic volume which depends upon urbanization, industrialization and growth in population. All automobiles generate noise. Various factors that affect the magnitude of noise includes size of the engine, maintenance of the engine, speed of vehicle, tyre quality and road condition. There are quite 771812 registered automobiles in Dhaka at the present the amount and sort of auto in Dhaka.

Table 1. Number of Motor vehicles in Dhaka in 2020

Types of vehicles	Number	Types of vehicles	Number
Ambulance	2891	Truck	55429
Bus	28628	Auto Rickshaw	65159
Covered van	17751	Pick up	469888
Delivery van	19160	Motor cycle	69588
Jeep	34010	Micro bus	34010

2. Materials and Methodology

2.1 Materials

The noise levels are surveyed with the assistance of a transportable precision digital sound level meter named Model-CEL-231. This apparatus is designed for community noise survey. An outsized alphanumeric display provides one value indication of the utmost ‘A’ weighted RMS (root mean square) instantaneous sound pressure level observed during the previous second. It’s prepared with high sensitivity Bruel and Kjaer Prepolarized capacitor microphone Type 4176. Measurements from 30 to 135 dB are often administered with this instrument.



Figure 1. Sound measured meter (Model-CEL-231)

2.2 Survey and Methodology

Noise levels and traffic density are measured at fifteen different locations

(fifteen spots), covered under main road, link road and residential road in Dhaka city. The noise levels are measured using noise meter software (mobile application) placed at 1.5m above the road surface. The surrounding noise level is tracked with Noise Meter during day timings in lean hrs. (09:00-11:00 hrs.) & peak hrs. (12:00-15:00 hrs.). The sound intensity is observed in sound pressure levels (SPL) and common measurement unit adopted worldwide is decibel, db. This measurement scale features the aural vibes of human ear and changes in loudness by variation in sound level are footnoted. Surveys are done at various locations in Dhaka city. Precautions are taken to avoid echo or resonance of sound by conducting the surveys at suitable distances from the sources. Noise level readings are recorded for an approximate duration of 6-10 minutes (as per standard practice). Classified traffic volume count is done manually at all the survey locations. The plotting of tile survey locations on map is done using GPS, the latitude and longitude points are noted down for exact measurement. The subsequent data is recorded at the site during day and night timings:

- Physical details of the roadway.

- Classified Traffic volume count.



Figure 2. Traffic and traffic noise measured in selected location.

Road condition of all the measuring points is flexible pavement with smooth surface. The details of measurement sites and their number spread over peak (09:00-11:00) and off peak (12:00-15:00) time in Dhaka city is shown in Table 2.

Table 2. Description of measured location and their number augmentation over peak and off peak time in Dhaka city

Location	Number of spots	Remarks
Main Road	05	Minimum of 05 and maximum of 25 noise measurements are taken.
Link Road	05	
Residence Area	05	

Table 3. Noise levels by air horn of motor vehicles in Dhaka (Shyamoli)

Types of Traffic	No. Of Observations	Average Sound Levels, (dB)	
		Min.	Max.
Motor Cycles	10	99.8	107.3
Buses	10	98.3	121.0
Private Car	10	85.0	92.3
Motor Van	10	91.2	101.3
Other	10	87.6	91.2

2.3 Traffic Volume Count and Classification

Table 4: Average traffic load and noise in the Mirpur road (Shyamoli) of Dhaka (peak hour)

Types of Vehicle	Traffic Load (Per Hours)	Passenger Car Unit (PCU)	Peak Hour (Noise)	
			Min. (dB)	Max. (dB)
Motor cycles	380	190	78.1	119.7
Buses	170	510		
Private car	320	320		
Motor van	110	330		
Other	60	42		
Total	1040	1392		

Table 5: Average traffic load and noise in the Mirpur road (shyamoli) of Dhaka (off peak hour)

Types of Vehicle	Traffic Load (per hours)	Passenger Car Unit (PCU)	Peak Hour (Noise)	
			Min. (dB)	Max. (dB)
Motor cycles	320	160	57.4	89.3
Buses	110	330		
Private car	60	60		
Motor van	55	165		
Other	30	21		
Total	575	736		

3. Result and Discussion

The vehicles sound observed at the location along main road, link road and commercial areas is shown in Table below. There have been altogether 15 locations chosen in Dhaka city which are

main, link and commercial area. The source is principally due to motorized vehicles. The allowable sound level for road vehicles noise is 70 dB.

Table 6. Traffic sound in the Main Road of Dhaka (peak & off peak hours)

S.L.	Location	No Of Observations	Sound Pressure Levels, dB			
			Peak Hours		Off Peak Hours	
			Min.	Max.	Min.	Max.
01	Jahangir Gate	15	78.0	120.2	54.2	90.5
02	Bangladesh Air Force Officers' Mess	10	75.5	117.2	53.1	88.5
03	Awlad Hossain Market	20	71.2	112.5	50.6	84.4
04	Farmgate Bus Stop	20	73.5	110.5	48.6	81.2
05	Bijoy Sarani	25	72.6	109.9	48.2	80.6

Measurements are done by at a range of 8-10 m between main road and therefore the closest building. the origin is vehicles density of traffic and every one the residents have an forthcoming

hazard from the patent noise levels. The mini. And max. noise levels noticed of the most road are 71.2 dB, 120.2 dB in peak time and 48.2 dB, 90.5 dB in off peak time respectable.

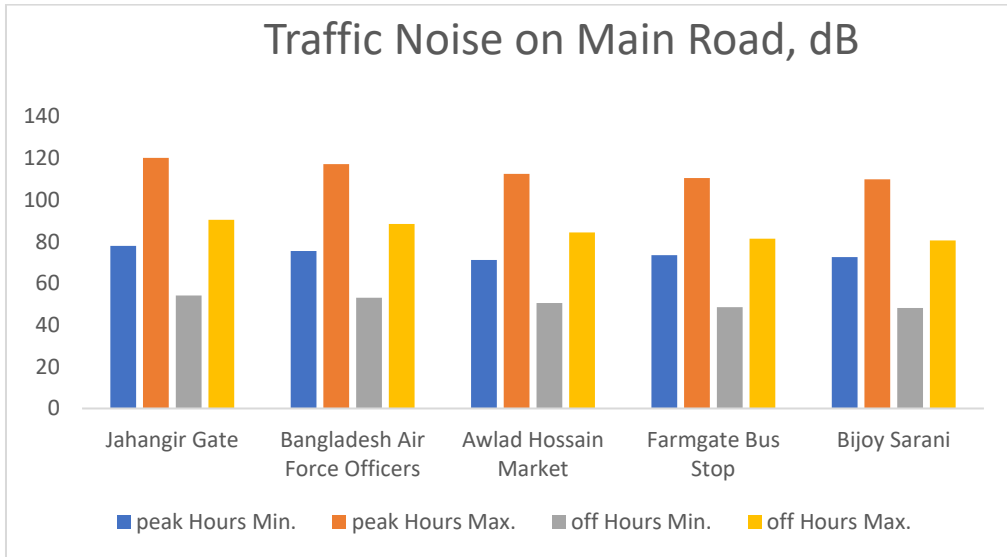


Figure 3. Different point noise pollution on main road in Dhaka city.

Table 7. Traffic noise density at the nearest house from the link road (peak & off peak hours)

S.L.	Location	No of observations	Sound Pressure Levels, dB			
			Peak Hours		Off Peak Hours	
			Min.	Max.	Min.	Max.
01	Indira Road	13	73.7	102.2	48.1	80.2
02	Khamar Bari Road,	15	65.5	106.5	45.4	75.7
03	Tejgaon Link Road	10	79.0	105.5	44.5	74.2
04	Bir Uttom Major General Azizur Rahman Road	15	69.0	109.5	43.6	72.7
05	Shaheed Sharani Road	20	75.5	107.0	42.2	70.4

Link roads are subways heading to and of the main road. The minimum and maximum noise

density measred of the link road are 65.5 dB, 109.5 dB in peak time and 42.2 dB, 80.2 dB in off peak time respectively.

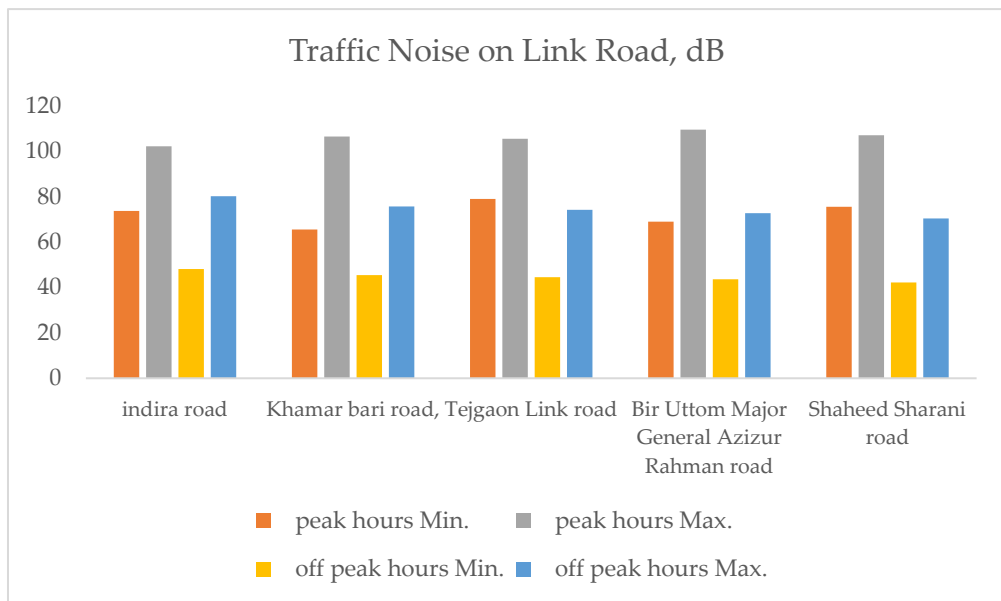


Figure 4. Different point noise pollution on link road in Dhaka city.

Table 8. Traffic noise density at the nearest house from the commercial area (peak & off peak hour)

S.L	Location	No of observations	Sound Pressure Levels, dB			
			Peak Hours		Off Peak Hours	
			Min.	Max.	Min.	Max.
01	Tejgaon college Bangabandhu Sheikh	14	68.2	98.5	53.2	88.4
02	Mujibur Rahman Novo Theatre Bangladesh	18	71.8	105.7	51.3	85.5
03	Agriculture Research council	20	70.8	94.8	50.5	84.3
04	Rangs bhaban	15	69.7	98.4	49.4	82.4
05	Suzuki Express Service	10	66.8	99.2	46.9	78.2

There are plenty of commercial shops located within the bus parking area which are liable of the noise levels. The mini. and Max. noise levels measured at

the most road are 66.8 dB, 105.7 dB in peak time and 49.4 dB, 88.4 dB in off peak time respectively.

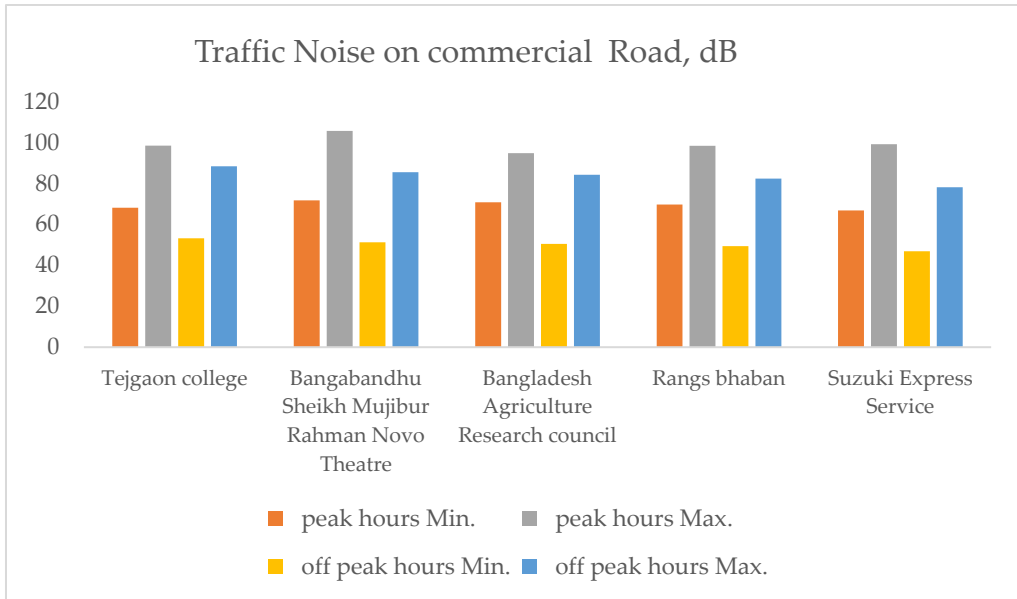


Figure 5. Different point noise pollution on commercial areas in Dhaka city.

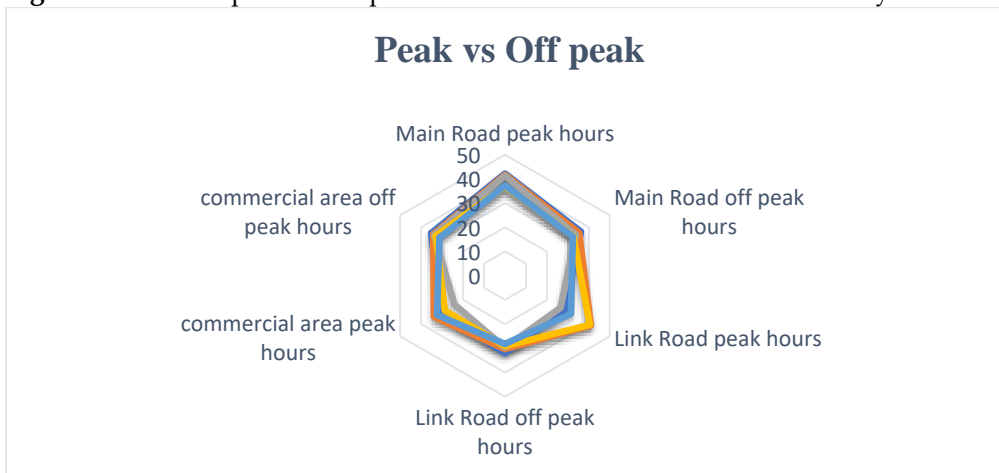


Figure 6. Difference peak and off peak time in three location.

4. Conclusion

The study is administered to gauge the environmental sound pollution within capital of Bangladesh; Dhaka. Very high environmental noise density is observed during the work causing oppression as well as numerous health hazards. Based on research findings that are often

deduced that there's an insistent got to found out sound standards within country to regulate the noise pollution. The resultant research of examining deafness and health survey is warranted. The epitome of short and brutality of sound pollution at Dhaka propagated by a well-liked article submitted to the national and native newspaper

Recommendations

Suggestions like plantation of trees on each side of the road, development streamlining of the roads, parking system, dejection of high noise conducting traffic, industries, public awareness could be conducive of diminishing of this background level in Dhaka city. If the govt. office as well as others office start in different times, the vehicles besides vehicles sound will

References

Ahmed, K. (1998). A study of noise pollution in Dhaka City. *Department of Environment (DOE), Bangladesh*.

Alam, M. J. B., Rauf, A. F. M. A. and Ahmed, M. F. (2001). Traffic induced noise pollution in Dhaka city, *Journal of Civil Engineering, IEB, Bangladesh*, 29(1), 55-63.

Bangladesh Environmental Management Project (BEMP). (2005a). The Dhaka Environment Programme: A One Generation Strategy to Save the City from Environmental Catastrophe. Report for Ministry of Environment and Forests and CIDA.

Haq, M. A., Islam, M. M., Ali, M. S., Haque, M. F., & Akhand, M. M. R. (2012). Status of noise pollution in mixed areas of Dhaka city: a GIS approach. *Journal of Environmental Science and Natural Resources*, 5(1), 09-17

Bond, M. (November, 1996). Plagued by noise. *New Scientist*, 152 (2056), 14-15.

Chowdhury, S. C., Razaque, M. M., Helali, M. M. and Bodén, H. (2010). Assessment of noise pollution in Dhaka city. *17th International Congress on Sound and Vibration (ICSV 17)*, Cairo, Egypt.

Dey, A. R. and Kabir, N. (2006). Noise pollution: Devastated life and suggested action, *Work for a Better Bangladesh and The Univ. of Asia Pacific, Dhaka*.

reduce and remain in constant traffic all day.

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Dey, A. R., Kabir, N. and Effroymsen, D. (2004). *Noise pollution in Dhaka: current situation and suggestions for action*. Work for a better Bangladesh, Dhaka.

G. H. Pandya. (2003). Assessment of traffic noise and its impact on the community – case study of Surat city, India. *International Journal of Environmental Studies*, 60(6), 595–602.

Murthy, V. K., Majumder, A. K., Khanal, S. N., & Subedi, D. P. (2007). Assessment of traffic noise pollution in Banepa, a semi urban town of Nepal. *Kathmandu University Journal of Science, Engineering and Technology*, 3(2), 12-20.

Golmohammadi, R., Abbaspour, M., Nassiri, P., and Mahjub, H. (2007). Road traffic noise model. *Journal of research in health sciences*, 7(1), 13-17.

Kiernan, V. (May, 1997). Noise pollution robs kids of language skills. *New Scientist*, 154(2081), 5.

Mohammadi, G. (1998). An Investigation of Community Response to Urban Traffic Noise. *Iran Journal of Environmental Health Science*, 2(4), 229-236.

Singh, N. and Davar, S. C. (2004). Noise pollution-sources, effects and control, *Journal of Human Ecology*, 16(3), 181-187. doi: 10.1080/09709274.2004.119057