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COMMUNITY NOISE IN GREATER CAIRO

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Abstract

Noise is unwanted sound. Community (environmental) noise is defined as noise emitted from all sources except noise at the work place. Sources include road traffic; rail and air traffic; industry; construction; public works and neighbourhood noise. LAeq,T is the energy average equivalent level of the A-weighted sound over period T. Hazardous effects of community noise have been known for ages, however, noise problems of the past are not to be compared with those of modern society. Studies in the European Union have indicated that noise is one of the major sources of coronary heart disease. In Egypt, as in other developing countries, community noise is a serious problem. Health effects of community noise include hearing impairment; effects on speech intelligibility; sleep disturbances; effects on blood pressure, heart rate, and other physiological functions; effects on performance and on mental health; behavioural effects and annoyance. Control of noise in Egypt is regulated by environmental law 4/1994 and its executive regulations. A study of community noise in the three Governorates of Greater Cairo indicated that the sound pressure levels in most of the studied areas were above the Egyptian standards. In and around schools, sound pressure levels exceeded the Egyptian standards. On Cairo streets community noise was found to be related to the width of the street, number of lanes and traffic density as well as the behaviour of drivers. Standard sound pressure levels for special environments were also referred to. Sources of community noise in the Egyptian environment were discussed. Control of community noise included measures related to the means of transportation, urban planning, architectural design of buildings, social activities and government actions.

Key words: Community noise, Hearing impairment, Speech intelligibility, Annoyance, LAeq,T , Noise barriers and Acoustic screens.

Introduction:

Noise is unwanted sound. Sound becomes unwanted when it either interferes with normal activities such as sleeping and conversation or disrupts or diminishes the quality of life.

Community noise (also known as environmental noise, residential noise or domestic noise) is defined as noise emitted from all sources, except noise at the workplace. Main sources of community noise worldwide include machines; road, rail and air traffic; industries; construction and public works and neighbourhood noise. The latter includes noise coming from premises and installations related to the catering trade (restaurants, cafeterias, discotheques, ets...); wedding halls ; live or recorded music; radio and T.V.; sporting events including motor sports; play grounds and car parks; domestic animals and barking dogs among others. Indoor sources include ventilation systems; office machines; home appliances; and neighbours. Community noise has been intensified during the industrial revolution; with the progress and use of modern technology; with the increase in development and use of different means of transportation (traffic being the most important source of community noise); with the enlargement of the highway systems, international airports and railway systems; and with increased urbanization and the continued growth of the world population. The problem is further complicated by poor urban planning; side-by-side residential areas and industry, airports and heavy traffic highways can result in marked annoyance to the inhabitants of the residential buildings.

Chronic exposure to environmental noise has been known to cause noise-induced hearing impairment in primitive tribesmen who were not significantly exposed to transportation or industrial noise.

In Egypt, environmental noise is a serious problem. Results of noise measurements carried out by "The National Network for Noise Level Measurement in Greater Cairo" showed that in most of the areas examined, noise levels exceeded standard permissible levels stated in the Environmental Law 4/1994 and its executive regulations (Egypt State of

the Environment report, 2010). Traffic noise is the most important source of noise on Cairo streets. The problem is expected to continue increasing since the number of cars on Cairo streets is on the increase. In Egypt, a complaint survey showed that noise ranks second among environmental pollution issues (Egypt State of the Environment report, 2006). Pollution problem is also severe in cities of other developing countries. Densely travelled roads in Thailand were found to have equivalent sound pressure levels for 24 hours of 75 – 80 dBA (Berglund et al., 1999).

Data indicate that in the cities of the European Union, 245000 of the inhabitants suffer from coronary heart disease due to noise, 94% of which is traffic noise; and that 5000 die of heart disease every year (den Boer and Schroten, 2007).

Worldwide, noise pollution is the third most severe environmental problem, after air and water pollution; however, it does not enjoy the same interest as other environmental pollution problems. It is likely to continue to grow.

In order to be able to set standards for noise exposure, it is necessary to define noise, the characteristics of sound and the units of measurement.

Noise is usually a combination of notes of different frequency and sound pressure.

Sound is a disturbance which travels in the medium (usually air) and consists of successive waves of compression and rarefaction in the molecules of the medium.

Sound waves have two characteristics:

1. Frequency (f): is the number of complete cycles of sound waves that take place in one second; and is measured in Hertz (Hz) which is equal to one cycle per second.

The audible frequency range of the human ear varies considerably among individuals. A healthy young person with normal hearing will be able to perceive sounds of frequencies between 20 and 20000 Hz. With increasing age the upper frequency limit tends to decrease, which is known as presbycusis.

Frequencies between 500 and 2000 Hz are the most important for hearing

speech. Frequencies between 3000 and 4000 Hz are the earliest to be affected by noise; if noise exposure continues, lower frequencies and hearing of speech will be affected.

The wave length is the distance between two similar points along the path of the sound waves and is measured in meter or foot. Frequency = 1/wave length.

2. Amplitude or sound pressure level : is the increase or decrease of pressure above or below the atmospheric pressure and represents the sound energy. Sound pressure level is measured by a logarithmic unit called the decibel (dB), therefore, decibel values cannot be added since an increase of 3 dB means doubling of sound pressure.

Loudness is the subjective human response to sound and is dependent on the sound pressure (primarily) and the frequency.

The human ear is more sensitive to high-frequency sounds (2000 – 8000 Hz) than it is to low-frequency sounds. Therefore, when measuring sound pressure level of noise, acoustic filters are used which makes it possible to do the measurement at different frequency ranges (weighting networks A, B, and C). Usually, whenever the human ear is concerned measurement is carried out using weighting network (A) and the unit of measurement is then called {dB(A)}. (C) network is intended to measure low-frequency sounds.

The sum of the total energy of noise of the A-weighted sound averaged over some time period T is referred to as LAeq,T and is used to measure continuous sounds such as traffic noise. However, when there are distinct events to the noise, as with aircraft or railway noise , measures of maximum noise levels (LAmax) of individual events should be obtained, in addition to LAeq,T.

Health effects of noise (Berglund et al., 1999):

Hearing impairment: is an increase of the threshold of hearing; and may be accompanied by tinnitus (ringing in the ears). Noise-induced hearing impairment starts predominantly in the frequency range of 3000-6000 Hz, with the largest effect at 4000 Hz. At this stage hearing of speech is not affected.

But as exposure continues, and with increasing LAeq,8h, impairment occurs at lower frequencies (2000 Hz) and then hearing of speech is affected.

Noise-induced hearing impairment is cumulative and is the most prevalent irreversible occupational hazard. It is dependent on the value of LAeq, 8h, duration of exposure and individual susceptibility; men and women being equally at risk. It is expected that environmental and leisure-time noise with an LAeq, 24h of 70 dB (A) or below will not cause hearing impairment in the large majority of people even after a lifetime exposure. For impulse noise, the permissible limit is set at peak sound pressure level of 140 dB, Lmax, for adults and 120 dB for children (Berglud, et al., 1999).

Small values of hearing impairment (10 dB averaged over 2000 and 4000 Hz and over both ears) can interfere with speech comprehension.

Effects on Speech Intelligibility: Speech intelligibility is the quality of sound being easily understood. Interference with speech is basically a masking process in which noise renders speech incapable of being understood. Besides speech, environmental noise can also mask acoustical signals that are important for daily life, such as door bells; telephone signals; alarm clocks; fire alarms and other warning signals; and music.

Speech intelligibility in every day living conditions is influenced by speech level; speech pronunciation; talker-to-listener distance; and sound level and other characteristics of the interfering noise. Indoors, speech communication is also affected by reverberation characteristics of the room. For full sentence intelligibility in listeners of normal hearing, the signal-to-noise ratio (i.e. the difference between the speech level and sound pressure level of the interfering noise) should be at least 15 dB(A). Since the sound pressure level of normal speech is about 50 dB(A), noise levels in smaller rooms should not exceed 35 dB(A) for speech intelligibility. For vulnerable groups (the hearing impaired; the elderly; children in the process of language and reading acquisition; and individuals who are not familiar with the spoken language) even lower sound pressure level of noise is needed.

Sleep disturbance: Uninterrupted sleep is a prerequisite for good physiological and mental functioning. Noise causes difficulty in falling asleep; awakenings and alterations of sleep stages or depth; and certain physiological changes. The after-effects the next morning or day (s) include fatigue; depressed mood or well-being and decreased performance. For a good night's sleep, equivalent sound pressure level should not exceed 30 dB(A) for continuous background noise ; individual noise events exceeding 45 dB(A) should be avoided.

Disturbance of Physiological Functions : Temporary effects of noise include increased secretion of stress hormone resulting in tachycardia, arrhythmia, increased blood pressure, tachypnoea, increased viscosity of the blood, increased blood lipids and peripheral vasoconstriction. If noise exposure continues, permanent effects are expected which include hypertension and ischemic heart disease. The magnitude and duration of the effects of high noise are determined by the duration of exposure, individual characteristics of noise, lifestyle and environmental conditions. Ischemic heart diseases are 20% more prevalent in people living on streets where sound pressure level exceeds 60 – 70 dB(A) compared to those living on quieter streets; the risk is greater the longer the duration of exposure (den Boer and Schroten, 2007).

Mental Illness: Exposure to noise is not believed to cause mental illness, but it can accelerate and intensify the development of latent mental disorders among those who are more sensitive to noise exposure. More vulnerable are children and those who suffer from other diseases especially depression.

Effects on Performance: Although noise-induced arousal may produce better performance in simple tasks in the short term, cognitive performance substantially deteriorates for more complex tasks that require attention and concentration. Reading, attention, problem solving and memorization are among the cognitive effects most strongly affected by noise. Noise can also act as a distracting stimulus and impulsive noise events may produce disruptive effects as a result of startle responses. Noise may also produce

impairments and increase in errors at work, and some accidents may be an indicator of performance deficits.

In schools around air ports, children chronically exposed to aircraft noise under-perform in proof reading, on persistence on challenging puzzles, in tests of reading acquisition and in motivational capabilities.

Social and Behavioural Effects; Annoyance: These effects are often complex, subtle and indirect. Noise makes a person less comfortable, unable to enjoy his leisure time or to watch T.V. Of all the adverse effects of traffic noise, the most widespread is annoyance (den Boer and Schroten, 2007). During the day, few people feel severely annoyed at average sound pressure level of less than 55 dB(A) , while a few people are moderately annoyed at average sound pressure level of less than 50 dB (A) ; at night, average sound pressure level should be 5 dB(A) less. Annoyance varies with the characteristics of the noise , including the noise source, and it depends on many non-acoustical factors of a social, psychological, or economic nature. Annoyance is also greater if the person is afraid of the source of noise or if he feels that some one who can reduce the noise does not. Noise above 80 dB (A) may reduce the morale; make the person more introvert, less able to enjoy life; reduce helping behaviour and increase aggressive behaviour. High continuous noise exposure may increase the susceptibility of schoolchildren to feelings of helplessness (Berglund et al., 1999).

Stronger reactions have been observed when noise is accompanied by vibrations, contains low-frequency components or when noise contains impulses such as shooting noise.

Effect of Sudden Severe Noise: Exposure to sudden intense noise levels can cause acute and subsequent damage to the middle and inner ear. Acoustic trauma may occur in any setting where loud impulsive noise is present, though military operations are the most common source. Unusual explosions also occur due to terrorist activities where sound pressure level can reach 140 – 160 dB(A). One such event occurred in Belfast, Northern Ireland, where nearly one year after an explosive blast in a restaurant, 30% of those present at the time of the explosion suffered from

high frequency sensorineural hearing loss. Victims may suffer from acute effects. Following a blast injury the most common symptoms are tinnitus; pain in the ear; and decreased hearing acuity.

Vulnerable subgroups: Vulnerable subgroups should be considered when recommending noise protection or regulations. These subgroups include people with particular medical problems (e.g. high blood pressure, depression, etc..); people in hospitals or rehabilitating at home; people dealing with complex cognitive tasks; the blind ; the elderly; and foetuses, babies and young children. Chronic exposure to noise of children at school and during the period of learning affects the ability to learn the language and to hear normal speech. Therefore, schools and day care centres sound not be built close to sources of noise like air ports, railway lines, highways and industrial areas.

Noise Control in the Egyptian Legislation:

The Egyptian Environmental Law 4/1994 deals with the subject of noise in Article 42 of the Law and Article 44 of the Executive Regulations. Article 44 of the Executive Regulations states that : " All individuals and workplaces when performing production activities, rendering services or other activities, especially when operating machinery , tools or using loud-speakers or alarms, have to observe the permissible levels of sound pressure inside workplaces or closed public spaces as indicated in Table (2) in Annex 7 of the Executive Regulations"." Licensing authorities should observe that the total sound pressure level of all stationary sources in one area, does not exceed the permissible levels; and make sure that enterprises should select machinery and equipment in such a way as to observe these levels, in accordance with the values stated in Table (2) in Annex (7) of the Executive Regulations".

Permissible levels in different environments at different times of the day according to the Egyptian Environmental regulations are shown in table (1).

Table 1: Permissible values of Sound Pressure Level in Different Areas in dB(A) at Different Times of the Day as Stated in Table (2) in Annex (7) of the Executive Regulations of Law 4/1994

Area	Permissible level dB(A) Day	Evening	Night
Commercial, administrative, downtown	55-65	50-60	45-55
Residential with few workshops, commercial business or along a public road	50-60	45-55	40-50
Residential areas downtown	45-55	40-50	35-45
Suburbs with low traffic	40-50	35-45	30-40
Residential areas in the country-side, hospitals, parks	35-45	30-40	25-35
Industrial areas (heavy industry)	60-70	55-65	50-60

Day = 7 a.m. – 6 p.m. Evening = 6 p.m. – 10 p.m. Night= 10 p.m. – 7 a.m.

Table (2) shows the results of sound pressure levels in different areas in the three Governorate of Greater Cairo, where different activities were being carried out at different times of the day as measured by the " National Network for Measuring Sound Pressure Levels "(Egypt State of the Environment Report, 2010).

Table (2): Yearly Average of Sound Pressure Levels in Different Areas in Greater Cairo Governorates dBA and Permissible Levels[1]

Cairo Governorate:		**Day**	**Evening**	**Night**
Squares:	Permissible levels[2]	----------	80	----------
Roxi		83	84	79
Ramsis		80	80	87
Tahrir		77	77	74
Opera		78	79	74
Industrial areas:	Permissible levels	70	65	60
El Sharabia		77	76	73
El Amiriya		74	74	72
El Maasara		84	84	83
Commercial administrative zones	Permissible levels	65	60	55
Bab el Shaaria		79	80	76
Dair el Malak		77	76	72
Workers' University		84	84	82
Residential areas along public road	Permissible levels	60	65	55
Road el Farag		72	74	69
Al Hegaz street		73	73	69
Autostrade – el Basateen		81	79	78
El Maadi Library		80	80	77
Residential areas	Permissible levels	55	50	45
Girl's University		74	71	68

Al Rodah		74	72	69
Al Mokattam		73	73	70
Al Tagamo' Al Khames		66	64	60
Giza Governorate :				
Commercial Administrative zones:				
National Research Centre		75	75	73
Faculty of Engineering		84	84	81
Areas along Public Road :	Permissible levels	60	55	50
School in Agouza		66	63	60
Al Haram Water Works		71	73	69
Al Bahr Al Aazam Library		68	67	65
National Institute for Titration		75	75	72
Residential Administrative Zones:	Permissible level	60	55	50
6th October Post Office		71	70	67
Industrial area :				
Industrial area in 6th October		69	65	63
Qaliubia Governorate:				
Residential area along Public Road :		77	76	72
Industrial Area :		85	85	83
Qaliub Square :	Permissible level(2)	----------80----------		
		80	81	77

(1) Environmental Law 4/1994 and Executive Regulations.

(2) Egypt State of the Environment report, 2010, Egyptian Environmental Affairs agency, 2010.

Table (2) shows that the yearly average of the sound pressure levels in the great majority of the different areas in the three Governorates of Greater Cairo, as measured by " The National Network for Monitoring Sound Pressure Levels" (of the Egyptian Environmental Affairs Agency), exceed the permissible levels in the Egyptian environmental regulations. It is to be observed that the average sound pressure level in the industrial area of the city of 6th of October, during the day time and evening, fall within the permissible sound pressure level; this is due to the good city planning. On the other hand, the average sound pressure levels in some of the residential areas of Shaik Zayed, one of the New Cities, exceeded the permissible levels; this is due to the fact that there were some commercial shops in the lower floors of some of the residential buildings (Egypt State of the Environment report, 2010).

A study has been conducted to evaluate the sound pressure levels outside a number of schools in Cairo Governorate (9 schools) and inside class rooms (45 classrooms) during the school time (March, 2009). Schools represented educational institutions in residential and commercial areas and schools on a main road, where noise was caused mainly by traffic. Average monthly sound pressure levels outside the schools varied between 73 and 78 dB(A), during the day. The higher sound pressure levels were recorded in the heavy traffic areas. Sound pressure levels inside the class rooms ranged from 54 to 62 dB(A), LAeq,1h (Kamel et al., 2010).

Traffic is an important source of noise. A study was carried out to measure traffic noise in 21 sites in greater Cairo in a number of streets of different width, different number of lanes and different traffic density. The study included sites in Cairo city centre, Nasr City, Pyramids road, Garden City, Helwan and Old Cairo. Daily average sound pressure levels, varied among different sites, according to the width of the street, number of lanes and traffic density from 64 – 87 dB(A). The authors made modifications in the traffic flow and behaviour of the drivers and pedestrians which were intended to reduce traffic noise. Restriction of horns caused a decrease in the equivalent

noise levels of 9.4 dB(A) and 10.8 dB(A) in two down town areas. With wider sidewalks, pedestrians will not walk in the streets and motorists will not have to use their horns. A greater decrease was achieved when ban on horns together with limiting the number of commercial vehicles to 10% of the original. Banning busses from residential areas gave a reduction in the equivalent noise level which varied between 2.6 and 3.7 dB(A) (Ali and Tamura,2003). Also, in the same study, there was a direct relationship between annoyance and the average sound pressures in all locations; an average of 7.3% of citizens complained of moderate annoyance; 9.1% were slightly annoyed and 13.6% were not annoyed at all by noise.

Statistics of the Traffic Police Administration of the Ministry of Interior of Egypt showed that the total number of traffic violations in the year 2010 in relation to noise amounted to 160000 of which10500 were due to blowing horns, 27000 due to noise of wedding celebrations using motor vehicles and 2800 due to disturbing noise from cassettes in the car amplifier systems (Egypt State of the Environment report, 2010).

It is to be noted that in the Egyptian Environmental regulations, permissible sound pressure levels for different environments (table 1) are average values (LAeq). Concerning human health, it is not enough to characterize noise in terms of energy summation because different health effects require different noise descriptions. It is important to describe the maximum values of noise fluctuations (Lmax) , preferably combined with the number of discrete noise events, in addition to LAeq. A separate characterization of night-time noise exposure is also necessary. If the noise contains a high proportion of low-frequency noise components, lower guideline values should be applied. Vulnerable groups should also be taken in consideration. The Expert Group of the World Health Organization, convened in London in 1999, recommended a number of guidelines for permissible sound pressure levels in specific environments, duration of exposure and the health effects; (Table 3) shows these guidelines (Berglund et al., 1999).

Table (3)

Guideline Values for Community Noise in Specific Environments

Specific Environment	Critical Health Effects	LAeq dBA	Time base (hours)	LA_{max} fast dB
Outdoor living area	Serious annoyance, daytime and evening	55	16	--
	Moderate annoyance, daytime and evening	50	16	--
Dwelling indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60
School class rooms & pre-schools, indoors	Speech intelligibility, disturbance of information extraction, and message communication	35	during class	--
Pre-school bedrooms, indoors	Sleep disturbance	30	sleeping time	45
School, playground outdoor	Annoyance (external source)	55	during play	--
Hospital, ward rooms indoors	Sleep disturbance, night time	30	8	40
	Sleep disturbance, daytime & evenings	30	16	--
Hospital treatment rooms indoors	Interference with rest and recovery	*1		
Industrial, commercial	Hearing impairment	70	24	110

shopping and traffic areas indoors & outdoors				
Ceremonies, festivals and entertainment events	Hearing impairment (patrons: < 5 times/year)	100	4	11
Public addresses, indoors and outdoors	Hearing impairment	85	1	110
Music and other sounds through headphones/ earphones	Hearing impairment (free-field values)	85 *4	1	11(
Impulse sounds from toys, fireworks and firearms	Hearing impairment (adults)	--	--	140 *2
	Hearing impairment (children)	--	--	12 *2
Outdoors in parklands and conservation areas	Disruption of tranquillity	*3		

*1 : as low as possible.

*2 : Peak sound pressure measured 100 meters from the ear.

*3 : Existing quiet outdoor areas should be preserved and the ratio of intruding noise to natural background sound should be kept low.

*4 : Under phones, adapted to free-field values.

Sources of Noise in the Egyptian Environment :

The leading source of environmental noise is traffic: brakes, horns, amplifier systems and worn mufflers. Other sources include motor cycles, rail road and aircraft. Community noise can also be generated by industries of different sizes, construction, renovation , public works and street vendors. Poor city planning is another cause of community noise. Cafeterias, discotheques, restaurants, wedding halls etc..., sporting clubs, sports events, media and schools are major sources of annoyance. Community noise can also be emitted from air conditioners, lawn mowers, home and office equipment, barking dogs and domestic animals. Other sources are firearms, fireworks, public speeches, demonstrations and terrorist activities. Popular habits that cause community noise include speaking loudly; calling each other from a distance; and blowing car horns to celebrate foot ball victories and weddings. Naturally, population explosion adds to the problem.

Control of Community Noise:

Since community noise has multiple sources, noise control necessitates cooperation of several parties: individuals, non-governmental organizations and Government agencies.

Control measures include:

I. Means of transportation (Kropp et al., 2007; and den Boer and Schroten, 2007):

a. Traffic noise :

Reduction of the noise of the engine by encouraging research for development of cars

- with quieter engines, like the electric and the hybrid cars. Research includes quieter mufflers and tail pipes. Car maintenance is extremely important.
- The use of low-noise tyres and low-noise road pavement.
- Limiting traffic speed to reduce noise, especially between speeds of 50 – 80 km/hour, also inducing more fluent traffic through smart timing of traffic lights, to avoid stop-and-go traffic as much as possible.
- If the desired degree of noise reduction can not be achieved by at-source measures,

- use noise barriers and acoustic screens on streets for reducing propagation of noise. Roadside noise barriers are only acceptable for motorways where there is no need for pedestrians to cross (Sasho and O'Callaghan, 2005).
- If the above mentioned methods are inadequate, use sound proofing of dwellings: double glass windows, insulated walls and roofs for protection of inhabitants against environmental noise.
- Traffic police should strictly implement regulations banning the unnecessary use of car horns and the loud sounds generated by car amplifier systems; during the regular inspection of cars before licensing, they should observe that car mufflers and tail pipes are in good condition and discourage the use of noise-increasing mufflers.

b. Rail transport : Reduce noise by regular polishing of rails and replacing cast iron brake blocks by composite material blocks (den Boer and Schroten, 2007).

c. Two-wheel vehicle noise : Reduce motor cycle noise by preventing noise-increasing mufflers and aggressive driving behaviour.

d. Air craft noise: Use residential sound proofing near the air ports. Schools, hospitals, day care centres, hotels, meeting rooms, auditoria, restaurants and concert halls should not be established near airports, railroad lines, heavy traffic roads or industrial centres.

II. Urban planning: Observe zoning codes, proper roadway design ; use road-side noise barriers and acoustic screen; and proper design for existing or planned surface transportation projects. Environmental impact assessment is a prerequisite for zoning especially for potentially noisy establishment.

II. Architectural solutions: Stringent building codes have to be followed in case of construction of new buildings (or remodelling) especially schools, hospitals, hotels, concert halls, meeting rooms and restaurants in order to protect building occupants. These deal with interior sound reverberation reduction, inter-room noise transfer mitigation and exterior

building skin augmentation. Special building materials are required such as double glass, perforated metal sheets, special roof material etc.....and special techniques are used to reduce sound transmission within the buildings.

IV. Social activities : Special codes should be applied for entertainment venues and outdoor events that feature amplified sounds and music which present significant sources of community noise, like concert halls, cinemas, and wedding halls. Zoning and sound proofing principles should be applied and in some cases time-restricted activities (Bath and North East Somerset Council, 2012).

V. Government action : A lot of noise sources are due to other human activities that can be handled by various government actions, through : Developing "The National Network for Monitoring Sound Pressure Levels " so that it will cover all major cities in all the Governorates and make the results accessible to all parties concerned with enforcement of environmental regulations.

Periodic health education of the public about health, mental and social hazards of community noise, and asking everybody not to be a source of noise himself. Health education should start at schools, universities and at home; and through media.

The public should be requested to report violations to the environmental law 4/1944 concerning noisy activities to the local police which should be given the authority and the means of dealing with violations.

Environmental police should be provided with the necessary instruments in order to be able to do regular evaluation of environmental noise, identify violating sources and to enforce the standard regulations in the environmental law 4/1994 .

Amendments of environmental regulations can make use of the WHO Guidelines for special environments .

Strict implementation of the law 453/ 1954 concerning the industrial and commercial shops which are hazardous to public health and convenience.

Relocate street markets and noisy shops outside the residential areas and ban the use of loudspeakers by street vendors to advertise their merchandise.

Prohibit raising domestic animals within residential quarters.

Mosques should limit the use of their loudspeakers only to purposes and at times stated by the authorities.

References

1. Ali SA and Tamura A (2003): Road traffic noise levels, restrictions and annoyance in Greater Cairo, Egypt. Applied acoustics; 64: 815-23.
2. Berglund B, Lindvall T and Scwela DH (1999): Guidelines for community noise. WHO-expert task-force meeting. London U.K.
3. Codes of practice and guidance notes on noise control for concerts and outdoor events (2012): Bath and North East Somerset Council. Environmental Protection. Bath, U.K.
4. den Boer LC and Schroten A (2007): Traffic noise reduction in Europe. Solutions for environment, economy and technology. Delft, The Netherlands.
5. Egypt State of the Environment report, 2006. P 50.
6. Egypt State of the Environment report, 2010. Pp. 117-31.
7. Environmental Law 4/1994 and Executive Regulations, Egypt.
8. Kamel M, Abdel Rahman R and Tawfiq S (2010): Evaluation of noise levels affecting schools in Cairo, Egypt. Proceedings of the ISMA 2010 including USD; 1811-20.
9. Kropp W, Kihlman T, Forssen J and Ivarsson L (2007): Reduction potential of road traffic noise. A pilot study. Applied Acoustics, 7-10.
10. Sasho T and O'Callaghan E (2005): Traffic noise control using acoustic screens. Proceedings of ACOUSTICS. Busselton, Western Australia; 241-45.