

An Investigation of Traffic Noise Pollution Effects on Citizens` General and Mental Health (Case Study: Kermanshah City)

Kamran Noori* and Farhad Zand

Department of social science, Payame Noor University, I.R.IRAN

Corresponding author: Kamran Noori

ABSTRACT: Kermanshah people working at different jobs comprise the statistical population of this study and the sample group was selected according to work location, the amount of exposure to traffic noise, and the probable effect of traffic noise at work place; being classified as mild, moderate, severe, and extreme groups. Questionnaires were distributed among them and a simple random sampling method was used. The number of credible samples from each group was 50 people. The questionnaires were presently handed out to 254 people in these groups, from which 200 credible questionnaires from four different groups acknowledged the existence of traffic noise. The amount and the intensity of traffic noise effects were investigated in the four groups. The highest amount of effects in the four groups was respectively seen among traffic officers and shopkeepers working in crowded locations, then among shopkeepers working in non-crowded locations, and finally in the university students and staff group. Without doubt, the amount and the intensity of effect is demonstrative of the existence of noise at people's work place, the amount of which varies from job to job, according to the type of the job and the amount of exposure to noise pollution.

Keywords: Traffic, Citizens, Mental Health, Kermanshah.

INTRODUCTION

Noise pollution psychologically means unpleasant and unwanted sound, and quantitatively is a combination of different sounds with different wave lengths and intensities that not having a clear and certain composition sounds unpleasant to ears (Ahmadzadeh, 1996). Noise is unwanted and bothering sound waves that are produced by frequent changes in the ambient air pressure. Given that exposure to overloud sound can endanger health and generally has negative effects on living creatures, it is considered as one of the environmental pollutions (Makhdoom, 1989). The impacts of sound on human do not usually appear directly and shortly; because, sound has a short-term nature and, therefore, can not remain for a long time in the environment. However, even this short-term durability could have significant impacts on humans and their surrounding environment in the long term. Physiological and mental impacts of sound usually appear gradually on human, and in the long term they will directly affect the nervous system and the consequences of which will show up (Karamkhani, 1996). Mental effects of noise do not have a direct relationship with sound intensity; because, sometimes the lowest sound might cause the most intensive reaction, or the highest sound could have no effect on the human mind; mental effects of noise are different from person to person, situation to situation, and time to time. Nevertheless, on the whole, it could be concluded that noisy environments can mess up communication and understanding abilities, reduce the brain activity, causes incoordination in physical activities, reduce learning abilities, and increase the number of flaws (Ghavam, 1996).

The symptoms of unwanted noise on human can include: nervous frailty, extreme irritability, muscle cramp, mental and physical tiredness, stress and anxiety, dizziness, headache and migraine, anger, loss of body balance, suicide and murder tendencies, petulance, aggression and lack of concentration, adrenaline secretion, poor vision, wideness of eyes, weakness of sexual power, metabolic and digestive system disorders, stomach inflammation

and ulcers, constipation, indigestion, intestinal inflammation, jumping out of sleep, reduction of skin resistance, shortness of breath due to the rupture or reduction of body vessels, hypertension, internal increase of hormones, premature birth, educational failure, work efficiency reduction, temporary and even permanent deafness (Korte et al., 2001).

Given the lack of related studies about noise pollution in counties like Kermanshah and the large number of motorcycles existing in this city, the necessity of the present research doubles. This research studies the probable symptoms of noise pollution and their amount and percentage on people who are exposed to traffic noise in Kermanshah city as well as investigating the general health condition of people in different groups.

The results of two descriptive and empirical studies made on teachers and parents regarding noise pollution in the neighborhood of Mehrabad airport showed that the lungs during sleep, communication, and education current could be affected; sometimes accompanied by panic. Unwanted noise distracts students' attention from the class and provides the situation for more messing around and, in turn, less educational work, which will directly result in their educational fail (Karami, 2001).

In order to survey the amount of noise pollution caused by traffic along Tajrish square_Rah Ahan aquare path in Tehran and its probable effects on the residents of these regions, a study was conducted by Pour Ansari in the fall and winter of 1995; participated people considering honking as the most leading cause of traffic noise.

In the research done by Gonzalez on the relationship between environmental noise and changes of citizens' sleep habits in Valencia, Spain, in 1989, which investigated different groups of citizens in terms of different disorders caused by noise pollution phenomenon, 40 percent of participants suffered from sleep disorders; 59 percent of which specifically suffering from traffic noise.

Results (Omidvari, 1990) showed that in areas suffering from high amounts of noise pollution, when environmental sounds were between 250-4000 Hz, noise and conversation interference rate went so high among those exposed to noise; causing problems for people.

MATERIALS AND METHODS

Statistical population of this study is composed of Kermanshah people with different jobs, and sampling group is selected according to work place, the amount of exposure to traffic noise, and its probable effect on work environment; being classified to mild, moderate, severe, and extreme groups. The sampling method was also a simple random one and the number of credible samples in every group was 50. The questionnaires were presently handed out to 254 people in the groups, from which, on the whole, 200 questionnaires from four different groups were credible. Groups were classified as the following:

Group 1: University students and staff, which university staff made up most of the participants. This group was selected as a group of participants that were mildly exposed to traffic noise.

Group 2: Shopkeepers who were exposed to intensive traffic noise, all of whom were selected from the shopkeepers of the streets the noise pollution of which were measured.

Group 3: Traffic officers and drivers who were exposed to very intensive traffic noise.

Group 4: Shopkeepers who worked at less crowded locations with more moderate traffic noise.

It should be mentioned that on account of existing limitations, the questionnaire survey was carried out only in four different groups, the distinction of which defined by the work place noise factor.

Evaluation Tools

Evaluation tools of this study include: a B and K2237 sound level meter and a questionnaire involving different sections of personal characteristics, the amount and the effect of environmental noise on interviewees, the investigation of significant noise symptoms, and general health status. As one of the most important noise pollution sources in nature and society is different types of transportation vehicles that affect their surrounding environments, one of the prominent sources of noise pollution are also motor vehicles that because of their movement nature, take their noise pollution everywhere with themselves (Nasiri and Abbaspour, 1998). In order to specify the sound level in variable sound sources, e.g. traffic noise that changes over time, equivalent sound level in decibels is the most appropriate scale for the calculation of the average sound pressure level (Abbaspour, 1992). According to the World Health Organization standards, the average noise for industrial, commercial, and shopping centers and urban traffic should be equivalent to 70 decibels in 24 hours (Lindvall et al., 1999). In Iran the noise standard of

outdoors is 55 decibels in day and 45 decibels at night for residential areas, 60 decibels in day and 50 decibels at night for residential-commercial areas, and 65 decibels in day and 55 decibels at night for commercial areas (Monavari, 2001). The threshold of noise distribution in welfare centers and hospitals is 45 decibels for days and 30 decibels for nights (Zobiri, 1996).

In this study, first the noise pollution of different locations was measured by means of a sound level meter. According to the WHO standards, for measuring in the street the best place for the device would be a sidewalk that is 3.5 meters away from the wall and 0.5 meters from the curb. Given that sidewalks do not follow any specific rule, it was tried that stations were selected as close to these standard criteria as possible.

The distance between the receiver (the location of the device in the sidewalk according to the WHO) and the sender (the width of the street) depends on the width of the street that is different in streets, being one of the elements affecting the amount of received sound by the device. Also, all of the 10 areas were selected in the middle areas of streets so that the effect of traffic lights and vehicles pull-up and horn that would temporarily be higher at the beginning and end of the street were excluded. Measurement was made in two steps: firstly, measuring a street as a sample, and secondly, specifying and measuring ten areas taking account of the results produced from the sample area.

First, one street that apart from two elements of development and urban static was also old and famous and well known as one of the credible commercial centers of the city was selected for the investigation of different places and differences between days of week. The under study street (Ghiam Street) was measured according to the standard timing (approved by the Supreme Council of Environment in 2002) for two weeks continuously from 7 in the morning to 10 at night. This measurement was made for two locations of the beginning of the crossroads and the middle area of the street in 2003, and these two locations were compared together in the end. According to the produced data, days of week and prepared locations were specified for the 10 areas, and 10 stations of city streets, as sampling areas, were measured according to Iran's standards; each one for one day. Then, taking the noise pollution amount in to account, the effects of traffic noise on different groups were investigated by means of questionnaires at high standards.

In investigation with questionnaires, questions were tried to be designed so that they kept the highest relation to the research subject, and all were designed as clear multi-choice questions so as to provide more accuracy in scoring and totaling up the scores. First, questions regarding age, sex, work place noise type, work place noise amount, and its probable symptoms were considered, and then general health questions were considered, which the most important means of this study were.

General Health Questionnaire

This questionnaire is based on the self-report method, which is used in clinical centers for chasing those with mental disorders. The transcendence of the 28-point form of the general health questionnaire is that it is designed for the whole society. This questionnaire, as a choice-based tool, can determine the probability of the existence of some type of mental disorder in a person. It is also a multifaceted and self-running test designed for the investigation of non-discrete mental disorders, which are found in different situations in the society; with application for teenagers and adults at different ages for the discovery of disability in normal behaviors and the existence of bothering events in their lives. This test does not have a diagnostic aspect and only could be used for screening patients with acute conditions (Goldberg and Williams, 1988). This questionnaire because of features like easy execution, objectivity, and enjoyment of psychometric aspects is very appropriate. The questionnaire has four subscales: somatic symptoms, stress and insomnia, lack of appropriate social reaction, and intense depression; summing up the scores of which provides an aggregate score.

The first subscale (A) includes things about people's feelings about health status, feeling of tiredness, and somatic symptoms. This subscale identifies physical sensory receptions that are usually accompanied by emotional arousal.

The second subscale (B) includes elements that specify to which extent people are struggling with stress and insomnia.

The third subscale (C) evaluates people's abilities against their professional requests of everyday life and reveals their feelings in coping different life situations.

The fourth subscale (D) includes cases that are associated with acute depression or suicidal tendencies. The overall score of each person is obtained by summing up the corresponding scores of the four subscales. In scoring, every answer was assigned zero, one, two, or three points from right to left. The scores of each test are determined separately for each subscale; afterwards the scores of the four subscales are summed up to make up the aggregate score. Numbers between 14 and 21 in each subscale are indicative of the worseness of situation in that

certain factor, and by summing up the scores of the quadric subscales also the total score of that person in the general health questionnaire is produced (Ostura, 1998).

RESULTS AND DISCUSSION

First of all, for the specification of the amount of noise pollution and its comparison with Iran's standards, measurement was made in the main streets of the city. The amount of noise pollution has been shown in Table 1. All of the regions measured were residential-commercial areas and the measurement was made during day; the allowed threshold of which being 60 Decibels. According to table 1, all of the measured regions were above the 60 decibel standard in terms of their equivalent noise level.

Table 1. The average of the equivalent noise levels of the 10 regions (10 important streets) and its standard in Iran

Ten regions	Saboni	Kashani	Beheshti	Motahari	Imam	Navab	Lbea b	Shahrivar	Daneshjo	Moalaem
Leq (iran)	60	60	60	60	60	60	60	60	60	60
Leq(Equivalent noise level)	74.2	77.9	76.8	75.8	75.3	75.5	76	76.9	76.8	74.9

Having investigated the amount of noise pollution and compared it with the standard (60 decibels), probable effects and symptoms in different groups were investigated from the questionnaires.

Questionnaires Investigation Results

First, the interviewees were determined by sex; Diagram 1 showing the sex and the per cent of participants. Diagram 2 showing the percent of different age groups. In the third part of the questionnaire the types of abnormal environmental noises and the percentage of people exposed to them were asked. Traffic noise received the highest percentage among different types of abnormal environmental noises from the participants.

Motorcycles noise and then honking were respectively specified as the most important sources of traffic noise pollution. Apart from traffic noise pollution, disturbances caused by other sources like factories, drilling operation, urban development, and construction were considered as secondary sources. A survey was also done in different groups about the environmental noise amount and its general effect on people.

Discussion and Conclusion

The analysis results of this research about the investigation of the amount of the effects of noise pollution caused by traffic on citizens, its probable symptoms, and also the findings of the general health questionnaire are as the following:

Table 1 shows the amount of noise pollution in different streets of Kermanshah city. The high number of motor vehicles, specially motorcycles, in all regions and a pollution above the standard warn that the health condition of Kermanshah citizens could be in danger in the long term.

The results of the questionnaire show that most of the participants are comprised of men especially between 15-30 years old. Because, among the surveyed groups, men had main roles in those activities and most of them knew traffic noise as the most prominent environmental noise.

The intensity and the amount of noise pollution effects have been investigated in four groups. The highest intensity and amount are respectively seen among traffic officers, shopkeepers who work in crowded areas, shopkeepers who work in uncrowded areas, and finally university students and staff. Undoubtedly, the intensity and the amount of effects are indicative of the existence of noise at work places; which varies from job to job and according to the amount of exposure to noise pollution in different jobs. Among the groups, traffic officers know the amount of their environment noise so high that its toleration is very annoying, then the two groups of shopkeepers working in crowded and uncrowded areas know the amount of their environment noise moderate and its effects bothering to less bothering. It is because shopkeepers spend a large part of their work time inside the closed area of their shops. However, university staff, working in closed areas with lesser exposure to traffic noise, knows the type of noise down, and unannoying in terms of effects. Nevertheless, the noise inside the environment of university was annoying for a number of students, which seemed to be felt more when larger numbers of students crowded inside the university. Traffic officers in terms of symptoms like sleep disorder, communication disorder, irritability, headache, dizziness, premature fatigue, and muscle weakness are the most vulnerable group, which due to direct exposure to traffic noise such symptoms are more seen among them, compared to other groups. On the whole, the increase of tension in people decreases their general health level and increases somatic symptoms in them, which are actually considered some kind of stress reaction. The results of this study also show consistency with the results of Mazaheri and Pour Emadi's research, (2003).

Statistical results of studying the effects of environmental noise on the health and social life of workers demonstrated those environments with noise above 85 decibels cause hurt and discomfort (65% - 98%), fatigue (22% - 96%), and hearing disorder (60% - 91%) in workers. Noise also has negative effects on work flow, effectiveness, production, and productivity (7% - 91%). Produced results repeat the results of Jazani's research in 1996.

A survey of the amount of workers' stress and job satisfaction in one of Hamadan's manufactories showed that increase in harmful physical factors in the work place led to decrease in function and production amount. And, according to the multifaceted regression test, there was a meaningful relationship between stress and job satisfaction, which was coincident with Hamidi and Gol-Mohammadi's research in 2001.

The groups of shopkeepers in crowded and uncrowded areas are respectively placed at the second and third places in terms of traffic noise symptoms. The effect of environmental noise on these people is at an average level because of lesser exposure to traffic noise, and fewer symptoms are seen among them compared to the traffic officers group.

Kermanshah University staff, which are exposed to lesser traffic noise compared to the other groups, also present a lower percentage of all symptoms except for concentration disorder; which because of their job natural requirement of more silence and calmness for mind activities, such a problem that is caused by the noise inside the environment of the university is of more importance among them. According to Hakimi's research results (2001) it could be concluded that human in a condition free of any interfering environmental stimuli (noise) will present his/her best function in problem solving.

Analysis of General Health Questionnaire among Different Groups

Average and standard deviation in groups that are exposed to more noise show higher numbers, which is indicative of the reduction of general health in them; while groups with lower average and standard deviation represent a better state. There was not seen any meaningful difference among different groups in terms of the three subscales of somatic symptoms, stress and insomnia, and social dysfunction; at a probability level of 0.05. Although the percentage of symptoms varies among different groups and symptoms have a direct relationship with the noise pollution amount, this difference was not that meaningful in the present questionnaire. Main reasons for the lack of a meaningful difference among different groups are as follows:

Habituation to noise, so that, although people exposed to noise may sustain more problems in everyday life, the physiological reaction of their body will provide a balance in the health status of these people and those exposed to lower rates of noise. In public opinion, people who are exposed to noise become habituated to it. However, habituation to pollution means self-protection against a gradual type of pollution, in proportion to the amount of the pollution. The effects of long term symptoms remain for a longer time, which make people unprotected and weak against other unwanted annoying factors (Karamkhani, 1996). According to the results of investigations conducted on people in noisy places, people exposed to noise will suffer hearing problems, which is assumed some kind of physiological inconsistency causing people to show meaningful differences in terms of general health in some subscales, compared to other groups. Besides the mentioned cause, there are several other minimal factors playing role in the general health of people, such as, genetic, cultural, social, family, economic, job, and climate differences, to name a few. Also, compared to factors affecting general health, a pollutant, especially one with a short time endurance, is not that considerable and does not make any meaningful change among the interviewees in different groups, in the three subscales of such a questionnaire. Results are demonstrative that a few minutes after encounter with loud and short term noise, man can accustom himself/herself to it and improve his/her operation (Bron and Byrne, 2001).

Regarding the subscales of depression and total number, there was seen a meaningful difference among different groups, explaining the effect of noise pollution symptoms in the long term, which ultimately ends up in depression. While, in other subscales, symptoms appear in the short term and cause no difference in different groups. A study for the specification of depression and the investigation of its relationship with workplace noise was carried out on 631 workers. Depression was measured by Beck's test and noise by sound meter. Results showed that the depression prevalence was about 61% and its relationship with noise was meaningful at a probability level of 0.05 (Mirsadeghi, 2001). The analysis of the results of the subscales of the questionnaire, This means that traffic officers and shopkeepers in crowded streets enjoy a lower level of general health in comparison to shopkeepers in uncrowded streets and university students and staff.

The successful management of noise involves a spectrum of considerations and choices; on the one hand prevention of noise by means of long term solutions with the goal of preventing or minimizing noise effects before occurrence, and on the other hand solutions for resolving issues caused by noise that are unacceptable for the society and cause different kinds of disorders in the society.

REFERENCES

- Abbaspoor M. 1992. Environmental Engineering. I.A. university Press.
- Ahmadzadeh Z. 1996. Noise pollution. Publications of women to combat environmental pollution.
- Dabiri M. 1996. Environmental Pollution. Tehran University Press.Iran.
- Ghavam MA. 1996. Penal support of the environment. Organization of the Environmental Protection press.
- Hakimi H. 2001. Noise effect on problem solving. Psychology journal,17:31-43.
- Hamidi Y. Golmohammadi, R. 2001. the Survey of Stress and job satisfaction of workers in a factory in Hamedan . Proceedings of the First Conference of sound health and development.
- Jozni R. 1996. Study of Health and social life workers. Proceedings of the First Conference of sound health and development.
- Karami K. 2001. Effects of noise on children's health. Proceedings of the First Conference of sound health and development.
- Karamkhani H. 1996. Noise Pollution and vibrations. Environment journal,4.
- Makhdoom M. 1989. Evaluation of sound pollution in Tehran. Journal of Ecology. Tehran University press, 15:57-68.
- Mazaheer M. Pooreatemad, H. 2003. Compare of Mental health in wedding student with wedding normally. Psychology journal, 25:52-72.
- Mirsadeghi M. 2003. Prevalence of depression and its relation to occupational noise. Proceedings of the First Conference of sound health and development.
- Monavvari M. 2001. Guide environmental impact assessment of the highway. Organization of the Environmental Protection press.
- Omidvari R. 2000. Evaluation of noise pollution in the textile industry, Kermanshah. Proceedings of the First Conference of sound health and development.
- Ostura B. 1998. Stress, translate by Dadsetan, P. Rooshd publication, Tehran, Iran.
- Pollution. Proceedings of the First Conference of sound health and development.
- Pouransari M. 1995. Evaluation of noise pollution caused by traffic on the railway square track-Tajrish and Its impact on the people. Master thesis of Environment department, I.A. University.