

# Assessment of Noise Pollution and Its Effect on Residents Health in Ahvaz, Iran in 2011

Ahmad Reza Yari<sup>a</sup>, Sahar Geravandi<sup>b,c</sup>, Gholamreza Goudarzi<sup>d</sup>, Esmail Idani<sup>e</sup>, Mehdi Vosoughie<sup>f</sup>, Niloofar Mohamadrezai Esfarjani<sup>c</sup>, Mohammad Sadegh Rezaie<sup>c</sup>, Mohammad Javad Mohammadi<sup>g,h,c\*</sup>, Roghayeh Hayati<sup>f</sup>, Reza Malih<sup>h</sup>, Poya Mohammadian Geravand<sup>c</sup>

<sup>a</sup>Research Center for Environmental Pollutants, Qom University of Medical Sciences, Qom, Iran.

<sup>b</sup>Islamic Azad University, Tehran Medical Sciences Branch, Tehran, Iran.

<sup>c</sup>Razi Teaching Hospital, Clinical Research Development Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

<sup>d</sup>Department of Environmental Health Engineering, School of Public Health AND Environmental Technologies Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

<sup>e</sup>Department of Internal Medicine, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

<sup>f</sup>Student Research Committee, Department of Environmental Health Engineering, School of Public Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

<sup>g</sup>Student Research Committee, Department of Environmental Health Engineering, School of Public Health and Environmental Technologies Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

<sup>h</sup>Abadan School of Medical Sciences, Abadan, Iran.

\*Correspondence should be addressed to Dr. Mohammad Javad Mohammadi, Email: [Mohamadi.m@ajums.ac.ir](mailto:Mohamadi.m@ajums.ac.ir)

## A-R-T-I-C-L-E-I-N-F-O

### Article Notes:

Received: Oct 13, 2015

Received in revised form:

Dec 25, 2015

Accepted: Dec 26, 2015

Available Online: Jun 10, 2016

### Keywords:

Noise pollution, Roadway, Traffic, Health effects, Ahvaz, Iran.

## A-B-S-T-R-A-C-T

**Background & Aims of the Study:** Among the environmental pollutions, noise pollution, due to the potential physiological and psychological effects on humans, is of a particular importance. Exposure to noise can result in hearing loss in citizens. Health risks from noise associated with road traffic. Noise health effects are the health consequences of elevated sound levels. This study was conducted to evaluate the noise pollution and health effects due to near roadway in Ahvaz, Iran.

**Materials & Methods:** In this descriptive-cross sectional study, Equivalent sound pressure level was measured by sound level meters in 75 points in 4 roadways, which have high density of traffic in Ahvaz city during daytime. In them, at measuring stations, on 4 days of week, at three times totally 1038 measurements were recorded that including 6 parameters of traffic noise and each measurement was recorded for 30 minutes. SPSS software's were applied for statistical analysis.

**Results:** According to the research findings, the equivalent sound pressure levels in all stations were equal to  $72.36 \pm 2.87$  dB. There was a Statistically Significant difference between the mean Values of equivalent Sound Pressure level and noise health effects. Based on result of this study the highest noise health effects were the nervousness and sleep quality. After transferring data to computer, SPSS and Excel software's were applied for statistical analysis

**Conclusions:** Based on the results of this study, it should seriously be taken into consideration in order to control noise and prevent the effects.

**Please cite this article as:** Yari AR, Geravandi S, Goudarzi G, Idani E, Vosoughie MS, et al. Assessment of Noise Pollution and Its Effect on Residents Health in Ahvaz, Iran in 2011. Arch Hyg Sci 2016;5(1):56-60.

## Background

Nowadays, because of the development of urbanization in megacities, people are exposed to many threats such as noise pollution. Every day, in citizens are exposed to various harmful agents such as noise, vibration and stress which may have negative effects on their health safety and performance (1-4). Fast growing industry and vehicle population in town in the recent years, has resulted in a considerable increase in traffic on the roads causing alarming noise pollution, air pollution (1-4). Noise pollutions from traffic were discussed as factor of society health level reduction (1-4). Exposure to road traffic noise has been associated with numerous adverse health endpoints (5-7). Health effects such as hypertension, sleep quality, mental health and cardiovascular disease are the important characteristics of exposure to noise pollution (8-15). Noise level increases can increase cases in hypertension and heart rate in the residential (16,17). Developing industrial cities and tendency to live in large cities have caused inhabitants this cities face a number of problems. According to the Union of Europe annually, the social costs of traffic noise are more than €40 billion annually, and urban transportation is responsible for the volume of costs (18). Ahvaz city, with a population of 1 million, approximately, with an area of 140 km<sup>2</sup>. Khuzestan province extends over between 48 degrees to 29' east of Greenwich meridian between 31 degrees to 45' to the north of the equator (19-21). In the last decade, Significant urban, industrial development, growing motor vehicles and development of universities have increased transportation on roads, which caused different kinds of pollution especially noise pollution in various parts of Ahvaz city (19-22). Study about noise pollution and effects on health residential megacities such as Ahvaz is important. Therefore, a descriptive statistics of

noise levels and different health endpoint were also shown in this study (1,23).

### Aims of the study:

The main purpose of this research was to assessment of noise pollution and its effect on resident's health in Ahvaz, Iran in 2011.

## Materials & Methods

### Materials

The present study is a descriptive study. This study was carried out in Ahvaz on 4 highway in 2011. Sampling was already performed in 31 test locations were selected from the streets with the highest level of traffic. Noise levels were measured by a sound level meters TES - 1353 with analyzer. This device calibrated before and after use based on stretcher international standards (24,25). Situating sound level meters were at a height of 150 cm above the ground. Equivalent noise sampling was at 30 minutes intervals. The tests were performed in all 75 sampling locations in the roadway of the Ahvaz city. Measurements in locations study were performed near roadway (24,26). For data analyzed, we used descriptive statistics include frequency, percentage, and mean±SD. The primary standard of sound pressure according to EPA is 65 dB (27). The standard of sound pressure level according to ministry health of Iran's standards is 65 dB (27).

The instrument was a researcher-made questionnaire including demographic data (characteristics such as age, sex and experience) and questions related to the attitude participants in near test locations about Health effects attributed to noise pollution included 7 questions in 1 domain: myocardial infarction, depression, sleep quality, decrease hearing, mental health, hypertension and nervousness. We use at Cranach's alpha (0.88) for determined validity and reliability of the questionnaire.

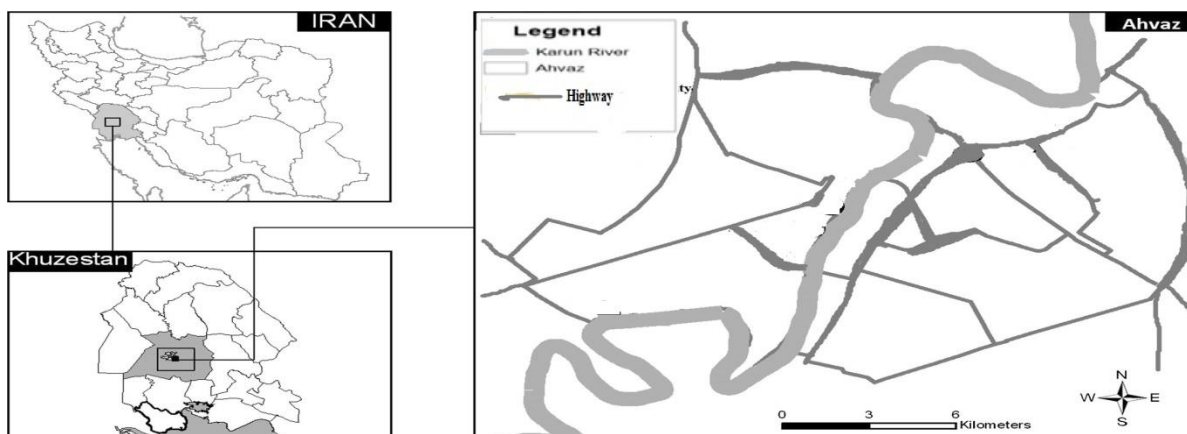


Figure 1) Location of the study area and sampling station in the Khuzestan Province (Ahvaz city), in the South-West of Iran

## Results

Based on results, 67% of the participants were male, and the mean age was  $35.6 \pm 9.57$  years approximately. According to result of our study, 79% of the measurements is higher than the international and Iran standard, 65 dB (27). Table 1 shows that the average sound pressure level in all stations was  $72.36 \pm 2.87$  dB (Table 1). Based on results this study, highest and the lowest equivalent sound pressure levels during 2011 were The Pasdaran and Azadegan highways.

Table 1)  $L_{max}$ ,  $L_{min}$  and  $L_{eq}$  measured near roadway in Ahvaz city during 2011

Estimate	Parameter		
	$L_{eq}$	$L_{min}$	$L_{max}$
Minimum	60.12	56.13	68.28
Maximum	88.74	78.58	92.08
Mean	73.18	65.38	80.28

Main health effects attributed to noise pollution is shown in Table 2. Myocardial infarction, depression, decrease hearing, nervousness, sleep quality, hypertension and mental health were the main health effects caused by noise.

Table 2) main health effects attributed to noise pollution near roadway in Ahvaz city during 2011

Health effects	Attitude	Attitude
	participants (number)	participants (percent)
myocardial infarction	8	2.92
depression	9	3.28
sleep quality	49	17.88
decrease hearing	41	14.96
mental health	32	11.67
hypertension	25	9.12
nervousness	110	40.15

## Discussion

In recent decades, noise pollution is one of the concern for communities. We evaluate the health endpoint of exposure to noise on residential of Ahvaz during 2011. It should be noted that noise pollution based on sound measurements in near roadway was higher than standard level. The results showed, 40.15% of nervousness was related to highway noise in residential. Also, 17.88% of distribute sleep quality was attributed to traffic noise. As mentioned earlier, high percentage of the

observed health endpoint attributed to noise pollution in our study was associated with high level of measured sound pressure level in metropolitan Ahvaz.

Based on Mirzaie et al study in Zahedan, Iran, 62% of subjects reported that street noise was painful approximately. According to their results, nervousness is the main complication of noise (16). In similar A meta-analysis study, evaluated to the association between coronary heart diseases and noise pollution. According to finding study Rahmani et al, noise level was above standard in Iran (28). Result this study showed that nervousness caused by loud noise in Ahvaz is similar compared to Messina, Italy (Leq above 75 dB) (29). According to the results of Mirzaie, high and very high levels of noise have the most negative effect on feelings of tranquility (66.5%) and sleep (66%) (16). High percentage of the observed health effects caused in our study were related to high noise levels of measured in Ahvaz. In another study, Gan et al showed that living within 50 m near a highway in metropolitan Vancouver was associated with a 50% increase in the risk of coronary heart disease (11). Based on the results of our study, loud noise had many effects on myocardial infarction similar to compared with study Gan.

## Conclusion

In megacities such as Ahvaz, the decrease capacity of noise is limited due to emissions from industries and transportation systems. Based on the results of this study and due to increasing trends of traffic load and city population as well as noise pollution studies in other countries, there is an increasing need for proper consideration from traffic police and other related organizations to this form of pollution. Careful monitoring, control of urban traffic, application of technical methods for decreasing noise from sources such as industry,

develop green area will have an important role in controlling and decreasing noise.

## Footnotes

### Conflict of Interest:

The authors declared no conflict of interest.

### Acknowledgement

The authors would take to thank the Azma jonob company for their technical support and providing the facilities.

### Funding/Support

This study was supported by Ahvaz Jundishapur University of medical sciences.

## References

1. Geravandi S, Takdastan A, Zallaghi E, Niri MV, Mohammadi MJ, Saki H, et al. Noise Pollution and Health Effects. *Jundishapur J Health Sci* 2015;7(1):e25357.
2. Kephelopoulos S, Paviotti M, Anfosso-Lédée F, Van Maercke D, Shilton S, Jones N. Advances in the development of common noise assessment methods in Europe: The CNOSSOS-EU framework for strategic environmental noise mapping. *Science of the Total Environment*. 2014;482:400-10.
3. Sogebi O, Amoran O, Iyaniwura C, Oyewole E. Awareness and attitudes to Noise and its hazards in Motor Parks in a sub-urban Nigerian town. *The Nigerian postgraduate medical journal*. 2014;21(1):40.
4. Goudarzi G, Geravandi S, Forouzandeh H, Babaei AA, Alavi N, Niri MV, et al. Cardiovascular and respiratory mortality attributed to ground -level ozone in Ahvaz, Iran. *Environ Monit Assess* 2015;187(8):1-9. *ZUMS Journal*. 2008;16(62):85-96.
5. Naddafi K, Yunesian M, Mesdaghinia A, Mahvi A, Asgari A. Noise Pollution in Zanjan City in 2007. *Sci J Zanjan* 2008;16(62):85-96. (Full Text in Persian)
6. Sarnat JA, Golan R, Greenwald R, Raysoni AU, Kewada P, Winquist A, et al. Exposure to traffic pollution, acute inflammation and autonomic response in a panel of car commuters. *Environmental Research*. 2014;133:66-76.
7. Sørensen M, Lühdorf P, Ketzel M, Andersen ZJ, Tjønneland A, Overvad K, et al. Combined effects of road traffic noise and ambient air pollution in relation to risk for stroke? *Environmental Research*. 2014;133(0):49-55.

8. Banerjee D. Association between transportation noise and cardiovascular disease: A meta-analysis of cross-sectional studies among adult populations from 1980 to 2010. *Indian journal of public health.* 2014;58(2):84.
9. Bluhm GL, Berglind N, Nordling E, Rosenlund M. Road traffic noise and hypertension. *Occupational and environmental medicine.* 2007;64(2):122-6.
10. Chang T-Y, Beelen R, Li S-F, Chen T-I, Lin Y-J, Bao B-Y, et al. Road traffic noise frequency and prevalent hypertension in Taichung, Taiwan: A cross-sectional study. *Environmental Health.* 2014;13(1):37.
11. Gan WQ, Tamburic L, Davies HW, Demers PA, Koehoorn M, Brauer M. Changes in residential proximity to road traffic and the risk of death from coronary heart disease. *Epidemiology.* 2010;21(5):642-9.
12. Istamto T, Houthuijs D, Lebret E. Multi-country willingness to pay study on road-traffic environmental health effects: are people willing and able to provide a number? *Environmental Health.* 2014;13(1):35.
13. Selander J, Bluhm G, Nilsson M, Hallqvist J, Theorell T, Willix P, et al. Joint effects of job strain and road-traffic and occupational noise on myocardial infarction. *Scandinavian journal of work, environment & health.* 2013;39(2):195-203.
14. Sørensen M, Andersen ZJ, Nordsborg RB, Jensen SS, Lilledunnd KG, Beelen R, et al. Road traffic noise and incident myocardial infarction: a prospective cohort study. *PLoS One.* 2012;7(6):e39283.
15. Sygna K, Aasvang GM, Aamodt G, Oftedal B, Krog NH. Road traffic noise, sleep and mental health. *Environmental research.* 2014;131:17-24.
16. Mirzaei R, Ansari-Mogaddam A, Mohammadi M, Rakhshani F, Salmanpor M. Noise pollution in Zahedan and residents' knowledge about noise pollution. *J Health Scope.* 2012;1(1):3-6.
17. Powazka E, Pawlas K, Zahorska-Markiewicz B, Zejda JE. A cross-sectional study of occupational noise exposure and blood pressure in steelworkers. *Noise and Health.* 2002;5(17):15.
18. Europe nri. Noise reduction in Europe. [http://www.transportenvironment.org/sites/te/files/media.2008.\(10/8/2015\).](http://www.transportenvironment.org/sites/te/files/media.2008.(10/8/2015).)
19. Geravandi S, Mohammadi M, Goudarzi Gh AAK, Neisi A, Zalaghi E. Health effects of exposure to particulate matter less than 10 microns (PM10) in Ahvaz. *Journal of JQUMS.* 2014;18(5):45-53.
20. Goudarzi G, Geravandi S, Vosoughi M, javad Mohammadi M, sadat Taghavirad S. Cardiovascular deaths related to Carbon monoxide Exposure in Ahvaz, Iran. *Iranian Journal of Health, Safety and Environment.* 2014;1(3):126-31.
21. Goudarzi G, Mohammadi MJ, Angali KA, Neisi AK, Babaei AA, Mohammadi B, et al. Estimation of Health Effects Attributed to NO2 Exposure Using AirQ Model. *Archives of Hygiene Sciences.* 2011;1(2).
22. Taghavirad SS, Mohammadi MJ. The a study on concentration of betx vapors during winter in the department of ports and shipping located in one of the southern cities of iran. *Int J Current Life Sci.* 2014;4(9):5416-20.
23. Gündoğdu Ö, Gökdağ M, Yüksel F. A traffic noise prediction method based on vehicle composition using genetic algorithms. *Applied acoustics.* 2005;66(7):799-809.
24. Fidell S. Nationwide urban noise survey. *The Journal of the Acoustical Society of America.* 1978;64(1):198-206.
25. Golmohammadi R, Aliabadi M. Noise Pollution and its Irritating Effects in Hospitals of Hamadan, Iran. *Journal of health system research.* 2012;7(6):958-64.
26. Wetzel E, Nicolas J, Andre P, Boreux J-J. Modelling the propagation pathway of street-traffic noise: practical comparison of German guidelines and real-world measurements. *Applied Acoustics.* 1999;57(2):97-107.
27. N K. National Environmental Protection Organization. Environmental criteria an standards. 1st Tehran: Dayereh sabz. 2004:13-4.
28. Rahmani S, Mousavi SM, Kamali M. Modeling of road-traffic noise with the use of genetic algorithm. *Applied Soft Computing.* 2011;11(1):1008-13.
29. Piccolo A, Plutino D, Cannistraro G. Evaluation and analysis of the environmental noise of Messina, Italy. *Applied Acoustics.* 2005;66(4):447-65.