

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

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

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## 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.

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## 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.

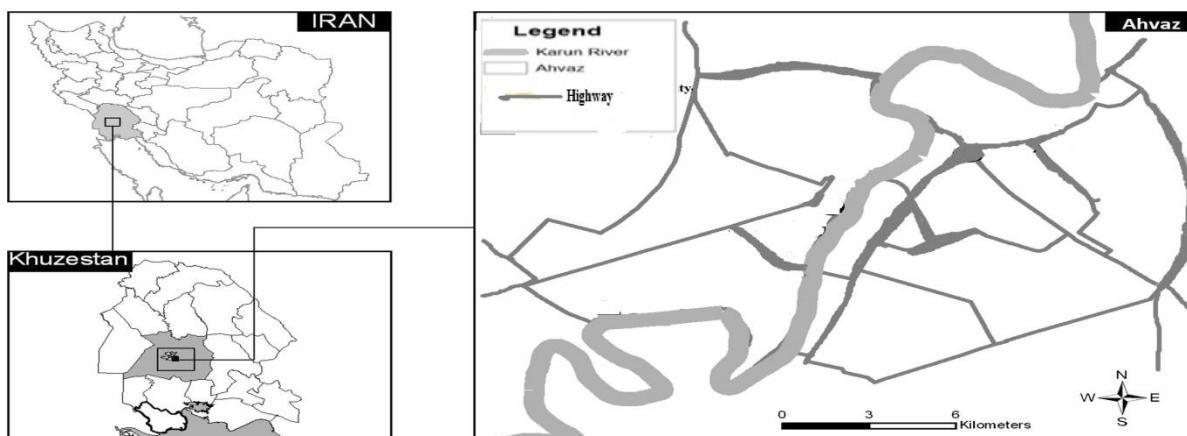


Figure 1) Location of the study area and sampling station in the Khuzestan Province (Ahvaz city), in the South-West of Iran

## 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.

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