

# Comparison of Mental Health Status of People Exposed to Noise Pollution with People in Non-Polluted Areas of Sari

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## Abstract

Noise pollution in psychological terms is defined as an unpleasant, undesirable or unwanted sound and in quantitative terms, it is a sound possessing all different wavelengths and intensities with no certain combination which is unpleasant to ear. The present study was conducted to compare the mental health status of people exposed to noise pollution with people in non-polluted areas of Sari. The sample population in the present descriptive study included 200 people selected by Random sampling method. Then, Sari was divided into four areas in terms of noise pollution, and after implementing GHQ-28 questionnaire (which reliability and validity have been confirmed), general health as well as mental health of samples were compared with each other. Data analysis was conducted based on occupation and residence location using variance analysis tests and t-Test for quantitative data and Square-test for qualitative data. Complaints about physical difficulties in traders' group working in non-polluted environment are lower than traders' group working in an environment exposed to noise pollution. These complaints among residents in non-polluted areas are at the lowest level. In overall review, the prevalence and average of mental health disorders amongst traders in areas exposed to noise pollution are higher than traders in non-polluted areas. Average complaints about physical difficulties, anxiety and sleeping problems, problems with social performance, depression and in general average mental and physical disorders are higher in resident and working groups in areas exposed to noise pollution, however, only complaints about physical difficulties are statistically significant.

## Keywords

Noise Pollution, Mental Health

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## 1. Introduction

Among the occupational pollutants, sound has the highest level of emission and is present in almost every industry [1]. With industrialization of countries, noise pollution has emerged as a serious problem in workplace and has been discussed from health and research aspects. Noise pollution is defined as an unpleasant, undesirable or unwished sound which is created following to energy conversion. The effects of these waves could be discussed and examined from adverse aspects of health and basic researches [2]. On the other hand, it could lead into hearing problems, high blood pressure, stress, mood disorders, cardiovascular diseases and sleep disorders [3]. In general, noise pollution means unwanted sound which brings about physiological and psychological effects in person [4]. Noise pollution in psychological terms is defined as unpleasant, undesirable or unwished sound and in quantitative terms, it is a sound possessing all different wavelengths and intensities with no certain combination which is unpleasant to ear. In other words, if the quantity of energy is much higher than standard, it could be a potential source to create a series of mental and even physical disorders and diseases which could be regarded as noise pollution. Environmental pollutants such as water, soil and air have been increasingly concerned for more than two decades in Iran, however, there is evident and urgent need for more comprehensive studies on noise pollution. In addition, it should be noted that among environmental pollutions, noise pollution bears great importance due to its potential to put physiological and psychological effects on human and this issue intensifies the importance of present study. The importance of this pollution has been increased during the last three decades in a way that noise pollution is not only proposed as a widespread problem but also as a global health problem around the world. In fact, exposure to noise in the last century is regarded as a major problem in public health of populations in most countries of the world [5]. The World Health Organization recommends that for optimal rest and recovery, sound level should be between 30 dB and at most lower than 40 dB on the average [6]. Psychological and physiological effects of continuous and repetitive sounds on human will appear gradually in long-term. It should be noted that psychological effects of noise differ based on people, situations and time. These symptoms include disruption in conversation, understanding the content, lack of brain activity, nerve sensitivity, severe irritability, mental fatigue, muscle cramps, stress and anxiety, dizziness, headaches and migraines, anger, aggression, lack of balance, desire to commit suicide and murder, violence, lack of concentration, poor eyesight, weak sexual drives, sleeping disorders, constipation, swelling and ulcers, indigestion, shortness of breath, high blood pressure, increased pressure inside the vessel, premature birth, academic failure, temporary and permanent deafness. In case of continuing traffic and noise pollution caused by it, each of the above problems could emerge depending on individual sensitivity and the continuity rate of noise pollution. Amongst vehicles and particularly motor vehicles, the highest level of noise pollution resulted from traffic could be created by motorcycles [7] [8]. In studies recently conducted in India,

most physical and psychological effects of noise pollution on the patients at a hospital were respectively contributed to irritability, headache, sleeping disturbance and increased blood pressure due to noise pollution caused by traffic [9]. Unfortunately, the importance and significance of noise pollution, similar to much other pollution, is not obvious in our country. This issue reveals the necessity of comprehensive studies related to this pollution and its risk factors and abundant consequences.

Recent researches have indicated the progress and emission of noise pollution in most large cities of Iran. The issue requires careful and comprehensive planning. Researchers suggested that major studies have been conducted on noise pollution caused by traffic in Tehran and other major cities. However, due to very few studies on noise pollution caused by traffic in small cities and towns, its emission, high prevalence of psychological and physiological consequences of this problem, especially in Sari and high level of traffic in the city, we decided to conduct a study entitled “*Comparison of Mental Health Status of People Exposed to Noise Pollution with Residents of Non-Polluted Areas of Sari*” [10] in order to understand the prevalence of this pollution and examine its relation with variables such as occupation, age and education level and compare the results of present study with studies conducted in other towns and even foreign studies so that we could find appropriate solution to encounter with this global health complication. This study evaluates the people’s mental health status by questionnaire. Therefore, we generally aimed to compare the mental health status of people exposed to noise pollution with people in non-polluted areas of Sari.

## 2. Methods

This was a descriptive study conducted to compare the mental health status of people exposed to noise pollution with people in non-polluted areas of Sari. The sample population in present study, with regard to similar studies, included 200 people selected by Random sampling method. This study was conducted based on the studies by Oveisi *et al.*, Alizade (Eng.) *et al.* on noise pollution in Sari in 2007-2008. In this study, the traders residing in the area exposed to noise pollution were selected from Keshavarz Blvd. where noise pollution level was 18.84 dB and the citizens residing in the area exposed to noise pollution were selected from Helal Ahmar Sq. where noise pollution level was 75.85 dB while this measured amount was higher than open-air standard in Iran (65 dB), so it is regarded as an area with noise pollution. The residents and traders of non-polluted areas were selected from Kooy-e Shafa area based on remoteness from city center and lack of urban traffic.

So the people were divided into 4 groups of 50 persons, including:

- 1) Residents exposed to noise pollution,
- 2) Residents of non-polluted areas,
- 3) Traders whose working places are located in areas exposed to noise pollution,
- 4) Traders whose working places are located in non-polluted areas.

Personal letter of consent was orally taken from all people who were included in this research. Assessment tools in present study included questionnaire containing personal profiles and people's mental health status which was conducted by GHQ-28 scale and used for screening the mental disorders. This questionnaire (which reliability and validity have been confirmed), has been developed by Goldberg in 1972 with the purpose of detecting mental disorders in different centers and environments. The questions examined the mental status of the person during the last month and included symptoms such as abnormal thoughts and feelings and observable aspects of behavior. The questions were selected with regard to four areas:

The first area of Hypochondriac physical disorders includes a wide range of seemingly organic questions. The second area is related to anxiety and psychological turmoil. The third area includes objectively observable behavior which involves the questions related to social dysfunction. The fourth area is related to depression. The questionnaire's validity was measured based on two criteria of sensitivity and specialty. The results of studies showed that the average sensitivity and specialty of GHQ-28 questionnaire were respectively 84% and 82%.

This questionnaire was scored in four ways:

- 1) C-GHQ Scoring
- 2) Modified Likert Scoring
- 3) Likert Scoring
- 4) GHQ Scoring

In present study, scoring was conducted using Likert Scoring or 0- 1- 2- 3 methods. The cut-off point was defined equal to 28 for GHQ-28 questionnaire and 7 for its subgroups. The assessment of these questionnaires was completed directly by people while the illiterates were aided to answer the questions and the questionnaires were collected and examined by the appraiser. Data analysis was conducted based on occupation and residence location using variance analysis tests and t-Test for quantitative data and Square-test for qualitative data.

### 3. Results

**Table 1** indicates that the prevalence of complaints about physical difficulties was 21.3% in non-polluted group and 38.6% in group exposed to noise pollution. The average disorder was 4.76% in non-polluted group and 6.02% in other

**Table 1.** Comparison of average mental health based on GHQ questionnaire and its components in two groups.

	Total				Exposed to Noise Pollution				Non-Polluted			
	%	Frequency	Standard Deviation	Average	%	Frequency	Standard Deviation	Average	%	Frequency	Standard Deviation	Average
Complaints about Physical Difficulties	29.4	52	4.030	5.35	38.6	32	4.102	6.02	21.3	20	3.890	4.76
Anxiety and Sleeping Problems	33.3	59	4.270	6.25	37.3	31	4.031	6.72	29.8	28	4.451	5.84
Social Dysfunction	29.4	52	2.590	6.81	36.1	30	2.776	7.11	23.4	22	2.399	6.55
Depression	12.4	22	3.821	3.16	12	10	3.412	3.48	12.8	12	4.174	2.88
Total	9.24	44	11.716	21.58	32.5	27	10.748	23.34	18.1	17	12.359	20.03

group. The prevalence of anxiety and sleeping problems was 29.8% in non-polluted group and 37.3% in group exposed to noise pollution. The average of this disorder was 5.84% in non-polluted group and 6.72% in group exposed to noise pollution. The prevalence of social dysfunction was 23.4% in non-polluted group and 36.1% in group exposed to noise pollution. The average of this disorder was 6.55% in non-polluted group and 7.11% in group exposed to noise pollution. The prevalence of depression was 12.8% in non-polluted group and 12.0% in group exposed to pollution. The average of this disorder was 2.88% in non-polluted group and 3.48% in group exposed to pollution (**Table 1**).

Examination of **Table 2** shows that at 0.05 error level, with the assumption of equal variances, the null hypothesis which explains that there is no significant difference for any of the above five components in two non-polluted and exposed to noise pollution environments is accepted.

The results of **Table 3** indicate that there was statistically significant difference

**Table 2.** Review on comparative test related to physical and mental disorders, complaints about difficulties, anxiety and sleeping problems, social dysfunction and depression in both groups.

	Level of Test	Probability Level	Degree of Freedom	T
Physical and Mental Disorders	0/05	0/061	175	-1/187
Complaints about Physical Difficulties	0/05	0/036	175	2/111
Anxiety and Sleeping Problems	0/05	0/171	175	-1/375
Social Dysfunction	0/05	0/155	175	-1/427
Depression	0/05	0/299	175	-1/041

**Table 3.** The results of the variance test on the scores of different groups of physical and mental disorders, complaints about physical difficulties, anxiety and sleeping problems, problems with social performance and depression.

		Test Level	Probability Value	F Statistic	Average Sum of Squares	Degree of Freedom	Total Squares
Physical and Mental Disorders	Inter-group				462/108	3	1386/323
	Intra-group	0/05	0/017	3/511	131/634	173	22,772/739
	Total					176	24,159/062
Complaints about Physical Difficulties	Inter-group				48/451	3	145/354
	Intra-group	0/05	0/029	3/090	15/682	173	2712/929
	Total					176	2858/282
Anxiety and Sleeping problems	Inter-group				19/498	3	58/493
	Intra-group	0/05	0/363	1/070	18/214	173	3151/066
	Total					176	3209/559
Social Dysfunction	Inter-group				11/617	3	34/852
	Intra-group	0/05	0/158	1/754	6/624	173	1145/996
	Total					176	1180/847
Depression	Inter-group				64/178	3	192/533
	Intra-group	0/05	0/004	4/669	13/744	173	2377/716
	Total					176	2570/249

between four groups under study using one-way analysis of variance (ANOVA) at 0.05 error level. In other words, there was significant difference between traders and residents in two geographical locations in terms of noise pollution in total scores of mental and physical disorders, complaints about physical difficulties and depression however these investigations showed no significant difference in scores of anxiety, sleeping disorders and problems in social performance.

Examination of the results of **Table 4** indicates that amongst these four properties only gender, time spent on noise pollution, psychotropic medication and duration of total health residence were significant.

#### 4. Discussion

In present study, the average of complaints about physical difficulties, anxiety and sleeping disorder, social dysfunction, depression and in general average physical and mental disorders in residence groups and working groups in areas exposed to noise pollution were at higher level but only complaints about physical difficulties were statistically significant. Complaints about physical difficulties in traders group working in non-polluted area were lower than traders working in area exposed to noise pollution and these complaints amongst residences in non-polluted areas were at the lowest level. Anxiety and sleeping

**Table 4.** Demographic variables which were significant with general and mental health in samples.

Probability Value	Level of Freedom	Chi-Square	Not Healthy		Healthy		Item	Group
			%	F	%	F		
0/042	2	6/336	45/5	20	64/7	86	Woman	<b>Gender</b>
			54/5	24	33/8	45	Man	
			0	0	1/5	2	No Answer	
			100/0	44	100/0	133	Total	
0/013	5	14/413	36/4	16	12/8	17	Less than 5 years	<b>Duration of Residence</b>
			18/2	8	24/1	32	5 to 10 years	
			4/5	2	16/5	22	10 to 15 years	
			9/1	4	12/0	16	15 to 20 years	
			13/6	6	17/3	23	Over 20 years	
			18/2	8	17/3	23	No Answer	
			100/0	44	100/0	133	Total	
0/039	2	6/494	18/2	8	6/0	8	yes	<b>Psychotropic Medication</b>
			81/8	36	92/5	123	No	
			0	0	1/5	2	No Answer	
			100/0	44	100/0	133	Total	
0/024	3	9/441	56/8	25	58/6	78	Half day	<b>Time Spent in Noise pollution</b>
			27/3	12	36/8	49	Whole day	
			4/5	2	0	0	Only Nights	
			11/4	5	4/5	6	Total Day and Night	
			100/0	44	100/0	133	Total	

problems amongst traders and people who are in areas exposed to noise pollution are higher than residents and people working in non-polluted area. Social dysfunction amongst traders and people in areas exposed to noise pollution is higher than residents and people working in non-polluted areas. Prevalence of depression amongst traders in non-polluted areas was higher than traders exposed to noise pollution and prevalence of depression amongst residents in areas exposed to pollution was at higher level. In our study in Sari, average physical and mental disorders including residents and traders in both non-polluted and exposed to pollution areas at 0.1 error level ( $P = 0.061 < 0.1$ ) are different. Average complaints about physical difficulties amongst citizens in different areas are different ( $P = 0.029 < 0.05$ ). In the study by Oveisi *et al.*, there was no significant difference at 0.05 error level in terms of complaints about physical difficulties between different groups.

The survey conducted in Varanasi, India showed that volume has reached alarming level and 85% of people are annoyed by traffic noises. About 90% of people mentioned the voice as the main cause of headache, high blood pressure, dizziness and fatigue. People who have higher level of education and income are more aware of the effects of noise on health [11].

A study conducted in Oslo, Norway based on responses of 1842 people indicated that only sensitivity to sound is associated with high blood pressure and chest pain and there is no relation between exposure to noise and health complaints. It seems that the relation between sound and health in these studies (based on the reports by people exposed to pollution and not diagnosed by doctor) is incorrect [12]. However another study conducted in East India on hospitalized patients indicated that people exposed to noise pollution caused by traffic significantly exhibited signs of irritability, headaches, insomnia and increased blood pressure [9].

In this study, average depression including residents and traders in both non-polluted areas and areas exposed to pollution had no difference ( $P = 0.299 > 0.05$ ). Average depression differs between citizens in different areas ( $P = 0.004 < 0.05$ ). In the study by Oveisi *et al.*, there was significant difference between different groups at 0.05 error level in terms of general health status of depression and total score. In present study, average social dysfunction amongst residences and traders in both non-polluted areas and exposed to pollution areas had no differences ( $P = 0.155 > 0.05$ ). Average social dysfunction amongst citizens in different areas had no difference ( $P = 0.158 > 0.05$ ). In the study by Oveisi *et al.*, there was no significant difference at 0.05 error level in terms of social dysfunction between different groups. In present study, average anxiety and sleeping problems among citizens in different areas had no difference ( $P = 0.363 > 0.05$ ). In the study by Oveisi *et al.*, there was no significant difference at 0.05 error level in terms of anxiety and sleeping problems.

[13] also conducted a study in Valencia, Spain on changes in sleeping patterns of citizens on environmental noise and found that 40% of participants in this study had sleeping problems while 59% of them distinctively suffered from traf-



fic noise which signifies the significant difference at 0.05 error level.

The study conducted by Khodabakhsh Karami on residents near Mehrabad airport showed that not only the plane sound makes disturbance in personal speaking and conversation but also has negative effect on listening to the radio and even receiving TV picture and create problems in people's sleeping and rest.

Another study by Dzhambov *et al.*, in Bulgaria showed that severe sleep disorders caused by noise pollution has imposed large financial burden on related systems [14].

The results of a study carried out in Sweden indicates the significant relation between street traffic noise and sleeping parameters including sleeping quality, waking, habit of closing window at night which affect the quality of sleeping and daytime sleepiness [15]. In our study conducted in Sari, there was significant difference in terms of gender in residents and traders groups in both non-polluted and area exposed to pollution at 0.1 ( $P = 0.061 < 0.1$ ) with general and mental health. The study by Oveisi *et al.* showed that more respondents were male in the age ranges of 15 - 30 years. Since men played key roles in these activities amongst the questioned groups and most people said that the main sound environment is traffic voice, there was significant difference between different groups at 0.05 error level.

In our study conducted in Sari, there was significant difference in terms of duration of residence in residents and traders groups in both non-polluted area and area exposed to pollution at 0.1 error level ( $P = 0.061 < 0.1$ ) with general and mental health. There was significant difference in terms of neurologic drugs in residents and traders groups in both non-polluted area and the area exposed to pollution at 0.1 ( $P = 0.061 < 0.1$ ) with general and mental health however it was not investigated in other studies. In present study, there was significant difference in terms of time spent in noise pollution in both areas at 0.11 error level ( $P = 0.061 < 0.1$ ) with general and mental health however it was not investigated in other studies.

## 5. Conclusions

Although numerically in the group exposed to noise pollution, higher average disorder was observed in most of the disorders compared to non-polluted areas and only few of them were significant, it could be said the people usage to noise means that although people exposed to noise tolerated more difficulties in their daily lives, however, physiological reaction of body led to emergence of equilibrium in the health status of these people compared to those exposed to less noise.

In public opinion, people exposed to noise will be adapted to noise, however, adaption to pollution does not mean protection against the kind of pollution, it is proportional gradual immune depletion to the amount of pollution. The impact of long-term side effects will remain and in such a case the person will be defenseless and powerless against unpleasant and unwanted environmental factors.



## 6. Limitations of Study

Since the present study was a new research and few studies are available with similar subject and even if there was a similar study, it had different variables compared to studies conducted so far, so it was impossible to review and compare the variables in present study with other studies, it was essential to evaluate the traffic voice and traffic load in this project so that we could compare its results with several studies which used the same variables.

## 7. Recommendations

It seems necessary to implement more comprehensive studies on the above field and use variables such as traffic noise index that is used in almost all similar studies so that we could carry out a more comprehensive study.

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