Environmental Risk Assessment of Noise Pollution Caused by Construction Activities (Case Study: Metro Line 3, 7th District Tehran)

Elaheh Pahlevan[*1], Bahram Malekmohammadi[2], Hasan Hoveidi[3], Esmaeil Salehi[4]

[*1].Master of Environmental Planning, School of Environment, college of Engineering, University of Tehran, Tehran, Iran

2.Associate Professor of Environmental Planning, School of Environment, college of Engineering, University of Tehran

3. Assistant Professor of Environmental Planning, School of Environment, college of Engineering, University of Tehran

4.Associate Professor of Environmental Planning, School of Environment, college of Engineering, University of Tehran

* Email Address: pahlevan.elahe@ut.ac.ir

Abstract

Having an ideal metropolis needs a large number of huge projects, such as the construction of a subway, which benefits the development of the city. However, the construction of such projects (which typically takes two to three years) has a negative effect on the environment of human and natural surroundings during construction operations. One of the most negative effects is noise pollution and the annoying noise of the construction. This study was carried out in a residential context around the auxiliary tunnel of line 3 metro- Abbas-Abad district- Tehran- Iran. The study population was inhabitants of the residential area around the project that were randomly selected. The risks were evaluated through the William fine method. Also, by checking the most important environmental risks, among the six significant and important identified risks, 3 Risk effects on the fauna, health and disease, human population and migration were in high level and the 3 Risk effects on the flora, Dead Night, cruelty and insecurity were at a moderate level.

Introduction

One of the important factors in urban construction designs is noise prevention (Monazzam et al., 2014). Complexity and expansion of social systems, reduction of resources, the establishment of laws, standards, criteria and occurrence of unwanted events caused more attention to risk assessment and management studies. According to American Standard Project Management risk is an uncertainty situation, if it occurs, has a positive or negative effect on the project's objectives (Jozi, 2008). Risks in the project are events or uncertain future situations that, if occurring, will have a positive or negative impact on the project objectives. Each of these events or situations has certain causes and consequences that can be identified. The consequences of these events directly affect the time, cost and quality of the project. Therefore, identification of risk and determination of its positive and negative consequences on project objectives is important (Yarahmadi and Moridi, 2012). One of the

main challenges of urban planning is creating urban spaces with the ability to provide high quality of life to its inhabitants. In recent years, economic development has led to a significant increase (both public and private) in the construction industry. Need for inner-city access and communication facilities also led to an increase in the number of national underway projects. In general, construction has an active policy toward existing threats (uncertainty) in urban projects (Taherkhani et al., 2017). The implementation of civil activities in urban workshops has damaged the environment. Citizens living near these projects have always been protesting against dust, mud, noise, traffic, reduced public space, deposits of materials or debris in public places. However, at the moment there are no specific guidelines for assessing the environment in developing in-city projects Such as streets, traffic tunnels and metro, water channels and so on in the country (Report on EIA of Urban Infrastructure Projects, 2013). Increasing population

and traffic in metropolises and consequently the pollution of the air and urban traffic, attention to public transportation, especially the subway, is very important (Hamidi et al., 2012). In Iran like other developing countries, traffic is an inevitable fact which was supposed to take all measures to resolve it. Metro is one of the best urban transportation options that has been considerably expanding in our country over the last few decades and the size of the metro rail lines increases every day. Considering that the statistics of construction underground projects are increasing in the country, the number of accidents caused these projects is also increasing. Given that the preservation and protection of human resources, as well as the protection of capital, equipment, credit and the environment, are the essential requirements of safety, health and environmental management systems. To reduce the risks, immediate and effective measures are taken (Salimipour et al., 2017). Such huge projects during the construction phase have caused problems such as noise pollution due to the presence in all urban contexts, especially the residential areas. In the definition of noise pollution, it can be mentioned that any unwanted sound produced at the wrong time and place is likely to cause noise pollution (Mohammadi Dah Chashmeh et al., 2015). Since the term noise pollution or noise is a qualitative assessment, it depends entirely on the value system of the individual and this factor caused that the concept of noise pollution is subjective nature: an optimal sound for an individual may be an unpleasant sound for another one (Mohammadi Dah Cheshmeh and Sanbehpour, 2017). Also, depending on the type of space and the expectations, the type and amount of sound tolerated in space is different. We often expect calm and low noise in the local square. While in the city Square there will be more diverse voices (Bach and Dorostkar., 2017). Construction of buildings, highways and streets require the use of a variety of noisy machinery and the noise caused by the presence of various industries and businesses in the urban environment is also added to this collection (Saeedi and Jaderi, 2013). The building is always associated with demolition, excavation, ironwork and concreting. During the implementation of all tasks, the use of relevant machines is associated with very high noise and environmental pollution. Use of such construction machinery with long-lasting sounds, scratching sounds from pouring iron at midnight and afternoons, Longlasting Digging with loud sounds and so on, all of them disruptive the neighbor's life and violates the rights of citizens. Construction is a topic that many citizens, especially residents of major cities, are facing most. In urban environments, the sounds of developmental activities have two types of risk. One is the risks to the natural environment, including plants and animals, and other risks to the human environment, including health and

disease, not having a nightlife (Dead Night)[a], insecurity, the survey of human populations and immigration.noise is known as one of the biological stressors. Excessive contact with noise is considered a health risk that can contribute to creating high blood pressure, heart disease, colitis, and migraine headaches. Recent studies show that sound causes fetal defects in the embryo and weight loss in babies at birth. There is evidence that the sound can increase the risk of viral infections and illnesses caused by toxic substances (Monazam Esmailpour et al., 2016). In this way, the effects of sound pollution are evaluated in two ways. First, increasing the opportunities for crime in the spaces. Second, by intensifying psychological factors, it can increase neurological behaviors (Salehi, 2008). Any anomalous and abnormal behavior In order to easily come from offenders and not be subject to official or social objections, should not be exposed or the sound of the resulting criminal act should remain hidden. Also, the victim's helplessness will not be heard by others. As a result, some of the criminal acts committed with the use of firearms, or some violent and financial assaults to individuals, cannot be carried out in any place and space. Criminals cleverly examining situations, places and times so they choose the conditions to prevent their trapping and easily commit their criminal acts. For this reason, places, where severe noise pollution exists, are suitable for anomic behaviors (Salehi, 2008). The subject of audiovisual is a complex and multi-dimensional concept and people's perception of the various factors of the audiovisual influenced their overall satisfaction on the surrounding environment. As a result, in the discussion of audiovisual assessment, it is important to pay attention to the emotions of each, as well as their social and cultural backgrounds. If satisfied, comfort is created in a person and in case of dissatisfaction, if the person does not have the ability to control the environment, the phenomenon of vandalism and the abandonment of the environment will occur (Bach et al., 2017). Dead Night due to noise pollution indicates a significant reduction in the population living in the study area during the night than the population in the same range throughout the day. In fact, in this study, the meaning of Dead Night is the evacuation of homes at night due to sounds harassment. It has also been seen that people are not always resident in one place and moved from place to place. One of the reasons for this is to move away from conditions or adverse factors (noise pollution) Because of environmental pressures on residential areas. In this way, displacements, or, in other words, relocations, either permanently or shortly, is called immigration.Risks to the natural environment include plants and animals around the project. The results of Gharibi et al. (2015)

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a. due to noise pollution in a case study (neighbourhood), a considerable difference is observed between the number of residents at nights and present people during the day. in other words, the neighbourhood is almost abandoned at nights.

showed that the passage of the road inside the park caused an increase in noise made by human activities, which is in contrast to the natural status of the national park. This has a strong and irrefutable effect on reducing the diverse species of birds. This reduction in the diversity on the roadside is a cause of population decline and a threat to many of the birds in the area. Also, noise pollution caused by the road has a negative effect on the population of birds in different species. In animals, noise can cause unsafe migration of wildlife and birds, ear hemorrhages, abortions, anorexia, milk shortages in lactating animals and shortening their longevity (Dabiri and Bashiribod, 2014). In drought conditions, the results of research showing that changes due to human activities and increased background sound levels can have direct and indirect effects and lead to changes in the density and variety of animal and plant species (Slabbekoorn et al., 2010; Sabet et al., 2016). The feedback and the various effects of noise pollutants can be significantly influenced by levels of biological communities and ecological assemblies. Sound pollutants caused by human activities can cause interactions between different species among prey and predators or the competition between species in different ways and the chain at various levels of food affects the aquatic environment (Slabbekoorn et al., 2010). Trees and shrubs can also be effective in reducing noise pollution although the sound may endanger plant growth. A decline of about 41 percent was seen in the tobacco field, which was exposed to severe noise (Dabiri and Bashiribod, 2014). Noise significantly reduces plant growth and the growth of greenhouse plants is also influenced by the sound of music. Plants growth exposed to high noise (more than 100 dB) are forty percent reduced. Agricultural products are also affected by noise and noise pollution reduces crop production.The sources of noise pollution are divided into two categories: fixed and moving. Fixed resources including cooling systems, thermal power plants, various industries, building structures, commercial centers, public utilities, etc. moving resources like land, air and sea transportation (Karbasi et al., 2016). Construct a building or working on the ground creates a significant noise. There are various noise generating devices included: Mixer, welding machine, crane, digging machine and so on. Acoustic comfort, the lack of disturbing and abnormal sounds and the comfort of people in the workplace and life from an acoustic point of view (Aliabadi et al., 2016). Since the comfort of people in the living environment known by the residential area; According to scientific definitions housing area is the place where its dominant use is residential and its main function is habitat. There are also support activities to meet the daily and primary needs of neighborhoods. Providing residents with comfort and security is the basis of the selection of authorized land use in this zone. Diversity in residential areas is due to the significant difference in construction density, dimensions of residential units, number of floors, number of units per hectare, and width of passages (Shaeri and Rahmati, 2012). Among factors affecting the intensity of noise pollution in residential areas, we can mention the following: The urban form includes physical and non-physical features such as size, shape, scale, density, utilization, type of building, urban building form and green space distribution (Dempsey et al., 2010). In general, the urban form is the result of a combination of concepts and elements of the city's structure. The elements of these concepts may include street pattern, block size and shape, street design, piece shape, parks and public spaces. City form due to various economic, social and environmental impacts it can reach a city to stability or instability (Seifoddini and Mansourian, 2012). In tight streets with high-rise buildings on both sides, due to sound reflection, the noise level may increase up to10 dB (A). Therefore, in the design of the city, the construction of such streets should be avoided (Mohammadpour, 2010). Residential centers that are sensitive to noise pollution must be at least 50 meters far from the source of noise pollution and the edge of the street. In the design of new cities, attention should be paid to the noise pollution factor in the distribution of urban utilities. In this case, potential sources of noise pollution (such as manufacturing units, factories, terminals, stadiums and the like) should place where they cannot influence the pollution-sensitive uses (residential, hospitals and their component) (Mohammadpour, 2010).

Research background

Since 1981, the construction of a subway in Tehran started and so far, it has been continued for 35 years. Unfortunately, the inconceivable statistics of the incidents in this industry have been recorded which the need for risk assessment of these projects is more and more revealed (Taherkhani et al., 2017). Seifoddini and Mansourian. (2012) in an article titled Pattern Analysis of the Urban Services and its Environmental Impact in Tehran Using ETM satellite and urban data, the public access index and environmental quality indicators including air pollution, vegetation cover, ground temperature and sound pollution were extracted and showed that spatial analysis of urban services distribution pattern indicates a significant concentration of services in the city center and its significant relation with environmental indicators. In other words, service polarization in the city center of Tehran has caused various environmental problems for the central areas of the city. Reminded that inequality in access to urban services and facilities does not always benefit the people living in high-access areas. Therefore, attention to the multidimensional nature of urban issues should always be the focus of urban planners.

Jozi and Jafarinasab. (2014) in an article titled Study of Environmental Effects on the Construction of the Mehr Housig Project in MahmoodAbad, Mazandaran,

concluded that in the sub-group of contaminations, the noise pollution has a higher weight with a 649 index. Sekhavati et al. (2016) in an article titled Management and Risk Assessment of Sound Pollution in Larestan Cement Co. Using the William Fine Method, the cement production process, like other industrial environments, has been characterized by the nature and type of activities with various risks in terms of safety, health and the environment. Zahedi et al. (2014) in a paper titled Assessment and Risk Management of the Environmental Aspects of Profile of Hadid Larestan Co relying on noise pollution using the William Fine and AHP method and according to the results of the Delphi decision model, the initial investment cost criterion with a relative weight of 0.239 was the most appropriate criterion for all economic, technical, engineering and environmental aspects in order to select the best sound control method. The last priority was the criterion for method updating with a relative weight of 0.027. The method of controlling individual exposure to noise with a final weight of 224 is the most appropriate method for controlling and reducing the noise pollution in terms of all aspects of economic, technical, engineering and environmental. And the method of insulation of buildings with a final weight of 0.067 is the last priority of the proposed control methods. Also, the use of personal ear protectors with a final weight of 0.117 was ranked third and it cannot be the best way to control and reduce the noise pollution. The results of studies conducted by (Mbuligwe, 2004) in the small industries in Dar es Salaam, Tanzania, show the major sources of noise pollution caused by their surroundings and even non-occupational groups are exposed to noise above the limit of contact. Abedi et al. (2017) in a paper titled "Identification and Prioritization of External Noise Pollutants in Tehran City in 2017" according to the surveys of the urban management system (phone number:137), showed In terms of the highest number of calls to this system, among the 329 subjects noise pollution is at 4th position. In other words, the major popular requests, 3.79% of requests, related to the elimination of noise pollution and 93.3% of the calls for the elimination of noise pollution related to the elimination of noise pollution related to the construction sector (construction activities). Experts also indicated that the options (road traffic), (construction activities), (air traffic), and (other noise pollution) were 0.353, 0.293, 0.175, and 0.1, respectively.Najafi et al. (2017) in a paper titled "identification and occupational risks assessment in the Mechanized Metro tunnel drilling using the failure mode and effects analyzing method FMEA construction of metro tunnels is considered as the most dangerous industry in terms of work losses, injury rates and compensation. Also, through a sample table of FMEA technique worksheets in the TBM unit, in title unit or activity of subunit, evaluated TBM electrical activities with the potential risk of noise,

effects and injuries; hearing impairment and psychiatric disorders at high-risk levels. Mohammadi Dah Chashmeh and Shanbehrpour. (2017), in a paper titled Measuring the Coefficient of Sonic Comfort in Ahwaz Metropolis, Citizens' dissatisfaction with noise pollution, escape of population, the reduction of urban land prices in high-level parts of the sound has been considered as one of the most important pollution effects in the city of Ahwaz. So far in Iran and various cities, especially in Tehran, there have been many studies on noise pollution from moving sources Such as vehicles and its effects on human health such as blood pressure, headaches, and the natural environment. Less attention has been paid to the category of noise pollution caused by developmental activities, its effects and problems. In the present study, the risk of noise pollution was considered due to the developmental activity of the auxiliary tunnel of subway line 3- Abbas-Abad district on residential communities at night. Therefore, recognizing and identifying these risks requires complete knowledge of the environment, accurate field surveys and exchange of view with an expert. So that, based on the severity of the effect, the probability of occurrence and scope of effect with such corrective actions, the risks of such risks would be minimized as quickly as possible. Therefore, recognizing corrective actions requires understanding the environment and the process of change.
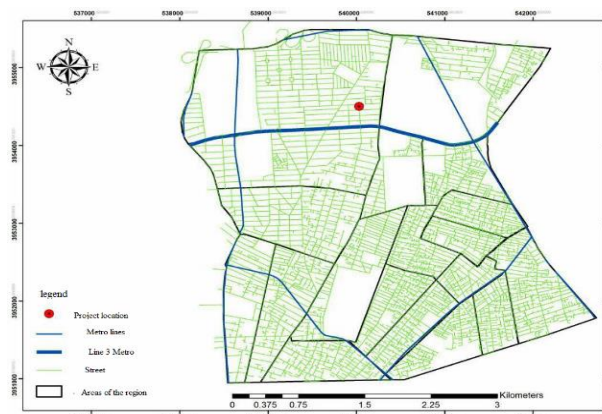
Study area

District 7 is located in the center of Tehran. This area which located in the center of Tehran has 5 zones. The study was conducted in zone 4 located in the northwest of district 7 which named Abbas Abad. Abbas Abad has an area of 4025403.97 m2 and its dominant land use is residential. The Location map is available (map .1)
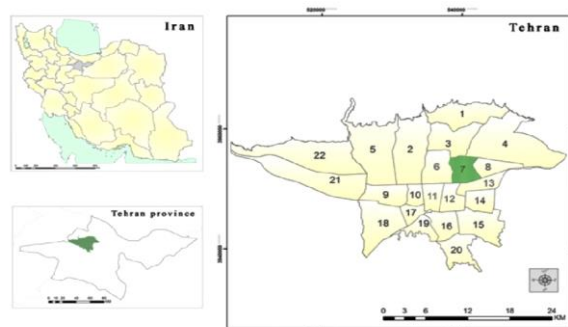
Map 1. The study area of Iran, Tehran, 7th district

Tehran as the most populous city in the country, To overcome the traffic problems, it is necessary to construct and develop metro tunnels. Tehran Metro Line 3 extends about 30 kilometers from the southwest to the northeast. The position of the 3rd line of the subway and the location of the auxiliary project tunnel is shown in 7 districts (map no 2).

Map 2. Location of the project at the district level (Reference: Authors)

Materials & methods

Due to the high overnight sound at night in the residential texture, the residents of the study area were asked to record their experiences and problems from the sound effects of the project during the one month. In this way, a detailed of the problems and risks are presented. After, a list of potential risk factors prepared and they was provided to a group of experts (Ph.D. in Environmental Engineering, Civil and Environmental, and Environmental Planning and Management) to confirm their accuracy. After confirmation of risk, using William Fine's risk assessment method, intensity, extent and probability of these risks were examined. This research is a descriptive cross-sectional study to assess the risks of noise pollution from construction workshops in the vicinity of residential areas in the construction phase during the years 2014 to 2016. In this study, for a lower percentage error, the expert group was onsidered to be 15 people. Alev Taskin Gums presented an article in 2009 in which emphasized that the viewpoints of 10 to 30 experts in the modified Delphi

R = C. E. P   (1)

R: Risk rating

C: Consequence (Table 1).

E: Exposure (Table 2).

P: Probability (Table 3).

After calculating the risk score according to the model presented in the ranking table for risk level in the William Fine method (Table 4), Risk levels ranked.

method are sufficient for a decision-making group (Jozi et al., 2011). One of the most important strengths of the current approach was to emphasize the voting group of experts and increase innovation.

William Fine Method

Among the available methods for risk assessment, William Fine method was chosen. A list of parameters and problems were provided. A questionnaire was prepared through the Delphi methodology for approved selectionparameters by environmental experts. In this method, the risk score calculated based on the table of the intensity of the effect, the probability of occurrence and the score contact rate.

Table 1. Outcome Rate (Risk Outcome) Based on William Fine Method (Jozi, 2008)

Description of the consequence of risk	score
Catastrophic, multiple deaths and very long-term stopping of activities	100
Several deaths	
Death	25
Extremely severe injuries such as amputation, permanent disability	15
Disabling injuries	5
Injuries or minor injuries	1

The risk rating is to decide how to handle the risks and how to handle the risks that should be done.

Table 2. Contact Rate Classification (risk shift) Based on William Fein's Method (Jozi, 2008)

Description of contact and risk frequency	Score
Continuously many times a day - Contact for more than 8 hours - Continuous emission of pollutants	10
Frequently - many times a week - contact between 6 and 8 hours - high polluting emissions	6
Occasionally- many times a mount - Contact between 4 to 6 hours per day - Average pollutant release	3
Unusually - many times a year - contact between 2 and 4 hours per day - abnormal releases	2
Rarely - once in years - Contact between 1 hour and 2 hours per day - Low polluting emissions	1
Partially- very little - contact less than 1 hour per day - non-releasable emission	0.5
No contact-No occurrence-without emission of pollutants	0.2

Table 3. Classification of risk occurrence probability based on William Fein method (Jozi, 2008)

Probability of occurrence	score
It's probably	10
Chance of occurrence 50/50 (possible)	6
It can happen accidentally (the chance of occurrence is less than 50%).	2
It probably will not happen until a few years after contact	0.5
it's impossible to happen (never happens)	0

Table 4. Summary of Risk Ratio and Measures in William Fine Method (Jozi, 2008)

Risk Level	processes	rating
High-risk level	Immediate reform for Risk control is required	>200
Medium Risk Level	Emergency (necessary attention should be made as soon as possible)	199-90
Low-risk level	The risk is monitored and controlled.	89>

Table 5. CF. Cost Factor (cost need to activity reform)

Classification	Value
More than 50000 $	10
25000-50000 $	6
10000-25000$	4
1000-10000$	3
100-1000$	2
25-100$	1
Less than 25 $	0.5

Table 6. Degree of Correction, DC (degree to which hazard will be reduced)

Classification	score
Hazard positively eliminated 100%	1
Hazard reduced at least 75%	2
Hazard reduced by 50%–75%	3
Hazard reduced by W-50%	4
Slight effect on hazard (<25%)	6

Finally, after determining the risk score, the acceptable costs was calculated from the following relationship:

$$J=R/CF.DF \quad (2)$$

J: cost justification, R: risk score, CF: cost factor (Table 5), DC: corrective degree (Table 6).

findings

Noise pollution is a physical risk, and this kind of risk can be a threat to the human environment, including social, cultural and health issues and natural environments, such as Flora and Fauna. The risk of noise pollution is a category of risks that are new to humans. These risks make many concerns in the community because they do not have a strong scientific background. noise pollution can cause a change in the status of the Metro Auxiliary tunnel construction project. Our objective is to assess the risk of noise pollution, to control the reactions that cause noise pollution. Usually, the damage caused by noise pollution on the environment is indirect and cannot be determined precisely such as the destructive effects of noise pollution on workers and personnel or the residential texture around the site, reducing vegetation cover, disease, crime rates, Dead Night and human population discussion. Therefore, the best way to express its effects is through risk assessment.Risk assessment results using William Fine method:

Using the William Fine risk assessment method, the results of the final risk assessment in Tables 7 and 8 can be seen.

Table 7. Calculating the risk of noise pollution on the natural environment around the site by William Fine method

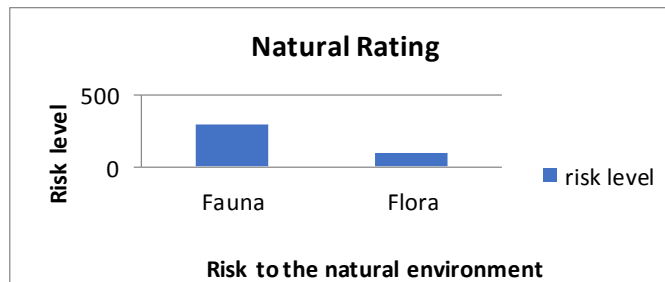| Risk of noise pollution on the natural environment	Effect	C	E	P	Risk rating	Risk Level
Fauna	The adverse situation for life implantation, due to the migration of birds and others due to noise	15	10	2	300	High
Flora	Destruction of vegetation and impaired growth due to noise	5	10	2	300	medium

Fig. 1. The Risk of Sound Pollution on the Natural Environment around the Site by William Fine method (Reference: Authors)

According to the results of sound assessment and field evaluations, noise pollution in terms of quality was ranked highly and by combining this result with the results of the risk rating in the natural environment and comparing the Flora and Fauna trends of bird's area and other living organisms as listed below according to Table 5, it can be said that the noise pollution caused harmful effects on Flora and Fauna, in other words, the ecology of the studied area. As the definition of risk, which means that the risk of injury from a hazard is likely to occur this risk can be analyzed as follows. Since, in urban areas, the best place for habitat is vegetation, as a result, there is a close ecological relationship between plants and animals which can determine the distribution and abundance of species. According to the results, ranking of the flora with a score of 100 and fauna t with a score of 300 and

comparison of the results of Figure 1 with the history of noise pollution effects on plants and animals and field surveys can be justified despite the fact that the impact of noise pollution on plants, especially trees, has not been highlighted, but over a long period of time, their growth and quality have decreased. This moderate degree of risk itself has a high-risk effect on the Fauna in the area. In other words, the range of animals in that region, including insects, birds, mammals, parrots, sparrows, starling, earthworms, snails, beetles, mosquitoes, flies and cats at some stage of their life cycle like feed, regenerate, rest, and other needs that dependent on plants has been influenced. The calculation of the risk of noise pollution on the human environment around the site is presented in Table 8 by William Fine method.

Table 8. Calculating the Risk of Noise Pollution on the Human Environment around the Site by William fine method (Reference: Authors)

| The risk to the human environment	Effect	C	E	P	Risk rating	Risk Level
Human population and migration	Evacuation and displacement of adjacent buildings due to the annoying noise	15	10	2	300	high
Cruelty and insecurity	Increase in the number of robberies, the crime caused by the condition of the sound	5	3	6	90	medium
Dead Night	Due to the evacuation of residential houses around	5	6	6	180	medium
Health and Disease	Neurological problems, hearing impairment, other illnesses such as stroke and ...	15	6	6	540	high
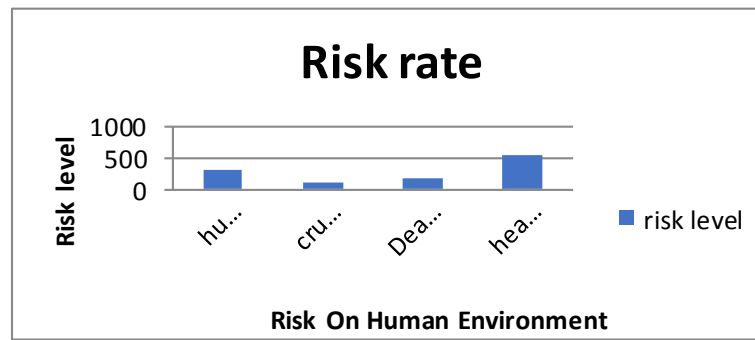
Fig. 2. Influence of noise pollution on the human environment around the site by William fine method

Table 9. cost justification of safety control measures in by William Fine's method

Health	Dead Night	Cruelty	population	Flora	Fauna	parameters
15	30	30	50	11.11	25	J

Analysis of the risks of noise on the human environmentWith proper use of available information, observations and results of risk assessment, the results of noise pollution related to risks on the human environment shown according to fig.2 noise risks on Health and Disease were at the highest risk with a score of 540 and then human migration with a score of 300 was next. After that Dead Night, crime and insecurity with points of 180 and 90 were at medium risk level. In general, it can be argued that the result of the harmful effects of noise and vibration caused by construction is usually in the vicinity of the project areas. noise and vibration created through a variety of activities and equipment used in construction projects. The low and high volume of noise and vibration depends on the type and model of construction activity, the type of equipment used, the location of the equipment, and the manner of operation. These intense noise can create risks such as evacuation and relocation of nearby buildings near the project, Dead Night, the health and illness of people, such as headaches, increased blood pressure, Insomnia, mental disorders, and increased crime such as robbery. Also, according to Table 9, the cost was justified.

Conclusion

Noise pollution is one of the problems of Tehran citizens. This is a growing issue that has potential and actual effects on the health of people and the social environment. Noise pollution is one of the harmful consequences of the industrialization of societies which disturbs the mental health and tranquility of big cities inhabitants and it is the source of many tensions and social problems. The purpose of this study was to investigate the risks of noise pollution due to construction among residents. Due to the lack of similar studies on noise distress in terms of risk in Iran, we used the results of other studies in other countries or similar fields. The noise pollution resulting from massive construction projects such as the Metro Auxiliary Tunnel along with residential texture is one

of the most important environmental pollutants in the urban environment which in various dimensions threatens human health and the environment. Violation of project sound privacy, lack of an environmental impact assessment report on such massive construction projects, in the residential texture and low-lying tissues of many streets and distance between residential buildings especially with the side streets has caused many discomforts problems and complaints in this regard. This kind of pollution has become a major problem for residents of these areas. The result of this study with study by Abedi et al. (2017) which shows that construction policies without taking all the necessary environmental conditions in urban sustainable development and insufficient monitoring in the state of the construction industry caused the noise pollution to become a major problem for citizens of Tehran. In addition, the results of an environmental study on the risks involved in the quality of living in the vicinity of the site and field surveys and observations represented that the majority of residents according to noise pollution crisis will be at risks, such as relocation, in other words, Immigration, insecurity and cruelty, Dead Night, psychological problems and other illnesses. According to the results of the Environmental Experts and the Final Compilation of the Risk Assessment by William Fine method, it was found that among the six identified risks discussed in the context of the risks to the human environment, the topic of health risk and disease was ranked at the highest risk level with 540 points, and then the issue of human migration with a score of 300 was next. After that, the Dead Night and cruelty and insecurity with points of 180 and 90 were at medium risk level. In the discussion of the risk to the natural environment, the habitat of animals with a score of 300 was at a high-risk level and risk to plants with a score of 100 was at medium risk level. From the research problems in present study, the distance between the receiver (the location of Sound meter on the pedestal according to

the WHO) and the sender (Street Width), which depends on the width of the street, can be expressed. It will be the factor of the difference between the numbers obtained in future studies. In other words, the width of the streets is different and one of the factors that influence the difference in sound received by the Persons. In this project due to low street width and low distance project location with residential houses it is impossible to create a privacy policy (at least 50 meters) and an appropriate distance between the construction site and residential areas. Therefore, in order to provide a program for controlling the risk of noise pollution in accordance with the project conditions, a model of buildings, area space and the type of residential texture can be used to control this problem. The proceedings are summarized in Table 10.

Table 10. Corrective measures to reduce the risk of noise pollution

Noise control techniques	The appropriate noise control method in the desired project
Planning and management	Drafting regulations and standards related to urban construction
	Standardization of fixed source noise pollutants
	sound limits for working hours Define a comprehensive system for controlling environmental sound
	Changing hours of massive construction activity from night to day
	The requirement to establish a sound level law for heavy diesel or gasoline vehicles and the requirement for sound testing before the operation of this equipment
Physical	Control in the source- through maintenance of machinery
	Control in the source-plan and location of the sound equipment manufacturer
	Control at the receiver location - double glazing windows, sound insulation doors in residential areas
Biologically	Use of roof and green walls

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