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# NOISE POLLUTION, ITS SOURCES AND EFFECTS: A CASE STUDY OF UNIVERSITY STUDENTS IN DELHI

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## ABSTRACT

*Noise is a type of pollution and impacts on our health and wellness. The prevalence of noise is increasing in magnitude and severity because of urban life style and no or bad governance of noise in NCR region as the rules is flouted routinely. Noise pollution leads to many chronic and socially significant impacts. The present study investigates the level of awareness about noise pollution in Delhi, its causes, its health impacts and solutions among the youth in Delhi. The paper has used primary data collected through a* schedule *from university/college students in Delhi. The study concludes that the majority of educated youth is aware about noise pollution, its causes and probable health effects but the vast majority of educated youth did not perceive noise pollution as environmental challenge and ranked it as least important threat to the health and environment. The study reveals that the female youth are more sensitive compared to male youth about noise pollution in Delhi. The study identified vehicular pollution as one of the most important causes of noise pollution and loud music as the second most important cause of noise pollution. It implies that the majority of educated youth understand the health related implications of noise pollution in Delhi. Finally, the study suggests of awareness campaign involving citizens and strict enforcement of environment laws by concerned agencies as the appropriate solution to control environment degradation.*

**KEYWORDS:**
*Environment Sustainability, Noise Pollution, Health Effects*

**JEL Classification**: Q50, Q53, I12

## INTRODUCTION

Noise[1] pollution is a growing global problem but has seriously grown in metro cities of developing countries. Delhi, the national capital of India is the second worst city with highest noise pollutions in the world. This is followed by Cairo, Mumbai, Istanbul and Beijing as the noise pollution in these cities had touched triple digits. A study by Mimi Hearing Technologies and Charite University Hospital in Berlin last year found that Delhi is only second to China's Guangzhou in terms of the degree of hearing loss suffered by citizens in proportion to their age. In most monitoring stations across Delhi, decibel levels exceed the permissible limits any time of the day. The World Health Organisation says that prolonged exposure to sound above 80 decibels can interfere with immune systems, boost stress hormones, contributes to cardiovascular maladies and damages hearing (Singh, 2018).

Human ears are hyper sensitive part of human anatomy which performs vital functions in the defence mechanism of the body. It constantly explores the potential threats from the environment and conveys it to the brain, thereby preparing it for counteraction if required and initiates other bodily functions. The resilience of the human auditory system and the proficiency of the brain to obstruct the insignificant information from this always vigilant sensory system are outstanding.

However, this thoroughly advanced auditory system of human body is in danger. Today's modern living environment is loaded with lots of sounds usually referred to as noise that has scant or no significance at all. The noise of machines, vehicles, electronically inflated music and loud speakers – or just the sounds of living in largely inhabited metro cities, all cause noise pollution. The constant blocking

of these irrelevant sounds from reaching to the brain consumes a vital fraction of mental ability and causes stress. Also, the body is repeatedly provoked unnecessarily to prepare for counteraction. Both the mental stress and arbitrary responses of the body could ultimately lead to adverse effects on human health and wellbeing.

Environmental noise has been steadily growing during the last few decades and is now becoming an important concern for society. The health effects of noise pollution transpire a cost for society. The retardation of healthy life years is generally measured in terms of money, but society bears many disguised and indirect costs of noise pollution, such as the expenditure on medical treatment of stress, hypertension or mental illness; loss of productivity at work on account of sickness or fatigue; decreased creativity and inventiveness. It is therefore necessary that noise pollution should be tackled with different policies efficiently and effectively, especially at the preventive stage.

In this context, the objectives of this paper are (i) to examine the level of awareness of youth of Delhi about noise pollution, its causes and its health effects and (ii) to suggest appropriate suggestion based on field survey that can be drawn as inputs into the policymaking process. The paper is arranged as follows: section 2 provides the review of selected literature. Section 3 presents data and research methodology. Section 4 discusses various empirical results while section 5 provides concluding remarks.

## 2. REVIEW OF SELECTED LITERATURE

There is an ample amount of literature that describes the alarming impacts of noise pollution on human health. Several population research studies conducted to study the health effects of long-term exposure to road, rail and air traffic, which have used diverse research methods, have come to a common conclusion that there exists a link between noise exposure and increased blood pressure and heart attacks.

In a study conducted by Harding et al. (2013), the researchers attempted to estimate how day-time noise exposure beyond levels recommended by WHO influence the prevalence of unusually high blood pressure and correlated health problems in UK population. The three health problems that are highly correlated with high blood pressure were focused in this study: heart disease, stroke and dementia (vascular dementia and Alzheimer's disease). For this study, 1160 sites in UK were monitored during 2000-2015 to estimate the level of noise pollution. The collected data were then linked with age and sex statistics of UK population, as these factors can dominate health risk. The health problems resulted by noise pollution exposure were then classified according to age and sex groups and multiplied by the population in each group. The final results estimated that exposure to noise pollution above levels recommended by WHO lead to additional 542 cases of heart attack, 788 cases of stroke and1169 cases of dementiain the UK in a single year.The researchers used 'quality adjusted life years' (QALYs) to estimate the cost of these health impacts and by valuing a year of healthy life at £60 000 (€74 002), the study concludes that these health impacts together have a 'cost' of £1.09 billion (€1.34 billion).

A sound sleep is necessary to maintain normal good health and for this not only the duration of night's sleep but also its quality is very vital. Continuous noise disturbances during the night, with or without waking up, hinder the therapeutic ability of sleep, and leads to fluctuations in the blood pressure of a person in response to the noise.A study conducted by Munzelet. al (2014) depicts that stress and disturbance during sleep time due to noise pollution may lead to cardiovascular disease. It also illustrates that night-time noise pollution is more harmful for cardiovascular health of a human being than day-time noise pollution. This is because exposure to noise at night disturbs the sleep of individuals. The authors suggest that policy makers should consider the medical impact of noise mitigation policies and recommend addressing noise issues at their very source or using sound insulation measures where source control is unfeasible.

Another study conducted to assess the impact of night-time noise pollution on human health was done by Schmidt et al. (2013). This study focuses on noise pollution caused by aircraft noise during night time. The researchers evaluated the impact of aircraft noise during night time on 75 healthy volunteers of age group 20-60 years. The volunteers were exposed to noise recordings of several patterns of aircraft noise while sleeping in their own homes. The researchers monitored the vital statistics of heart rate and blood pressure of the participants during the night. The volunteers were asked to visit the laboratory on the following morning where they underwent ultrasound testing of the main artery in the arm that affects blood flow, to measure changes in its diameter. The results of the testing revealed that the arteries were stiffer after an aircraft noise night, and the more severe the noise, the less flexible the blood vessels became which depicts an endothelial dysfunction. Not only this, when the volunteers' blood was tested for stress hormones after the noisy night, there was a considerable increase in adrenaline levels. The study concludes that repeated exposure to aircraft noise can lead to constant stress, permanently high blood pressure and thereby cardiovascular disease.

Like day-time noise pollution and night-time noise pollution incur different impacts on human health, similarly people of all age groups are differently affected by noise pollution. It is often observed that vulnerable groups of people such as those with mental illness, unborn or new born babies, shift workers and those sensitive to noise or with disease of ringing ears may be at higher risk from exposure to noise pollution than healthy adults. Van Kamp and Davies (2013) reported that children are less likely to be woken by noise pollution during sleep than adults, but they tend to experience more physical reactions such as increased blood pressure as a result of noise. It also suggests that schoolchildren exposed to noise from aircraft and road traffic experience learning and comprehension difficulties. The authors also suggested that more research is required to be conducted on vulnerable groups in context of noise pollution.

In this regard, on the basis of German population, a research paper published by Tiesleret al. (2013) reveals that children are observed to be at more risk of hyperactive if they live near busy roads. The researchers observed the children for their behavioural problems by using a standardised questionnaire and various aspects of their behaviour were categorised as normal, borderline or abnormal.The study also claimsthat in addition to a higher risk of hyperactivity, children who live close to busy roads may also have more emotional problems like being anxious, easily scared or unhappy, especially if they are exposed to higher levels of noise during the night.

A study conducted by Basner et al. (2014) examines the multiple effects (auditory and non-auditory) of noise pollution on human health. This study discerns that on one side, occupational exposure to noise has declined significantly, while on the other hand "social" exposure in the form of amplified music systems, headphones, rock concerts and discotheques has approximately tripled for young population since the 1980s. The study focuses on wide range of health effects of noise pollution beyond hearing impairments like annoyance, sleep deprivation, cognitive impairment and cardiovascular problems. The author draws attention towards a serious public health problem as an outcome of noise exposure. According to WHO estimates, 10% of the global population are currently exposed to noise levels that could lead to hearing impairment (Oishi and Schacht, 2011).

A study conducted by Shepherd et al. (2013) illustrates the positive impacts on human health of living in a quiet area. By surveying a total of 823 people of four different areas classified as 'quiet rural', 'noisy rural', 'quiet city' and 'noisy city' in New Zealand. The area classified as "noisy rural" was located near a wind farm, while the areas classified as "noisy city" were located near an airport or major motorways. Both "quiet" locations were situated away from busy roads and industry.The researchers found that the quality of life increased with the decrease in noise levels. The study revealed that the health-related quality of life was highest in the quiet rural location. The study highlights the significance of preserving quiet areas to improve human health by providing evidence of the beneficial effects of access to tranquil places.

According to a theoretical study conducted by Andringa and Lanser (2013), sounds affect our state of mind differently depending on whether they are pleasant or annoying. In this study, the researchers developed a theoretical model to explore human responses to sounds. The study help us to better understand the health impacts of long-term exposure to noise, as well as the potential benefits of spending time in quiet spaces. The study concludes that a diversity of acoustic environments is preferable over more uniform acoustic environments that comply with certain legal noise limits. Therefore tranquil places as well as more lively places should be found in our cities.

Up till now, we have discussed the negative impact of noise pollution on human health. But, it is vital to recognize that noise pollution not only adversely affects human health but it affects health of other species as well. According to a study conducted by Ortega (2012), birds respond to noise pollution through behavioral reactions, physical damage to ears, stress responses, changes in foraging, flight or flushing responses, etc. the study was conducted in a laboratory because of difficulty in determining the effects of noise pollution on free-ranging birds. The birds also tend to respond to noise pollution by avoiding noisy areas, changes in vocal communication and changes in reproductive success. Not only this, when urban birds were compared with their rural counterparts in quitter environment, it was observed that birds shift in vocal amplitude and song and call frequency to compensate for noise exposure. This clearly depicts that noise pollution disturbs the integrity of entire natural ecosystems.

In Indian cities, the problem of noise pollution is wide spread and reached at alarming level. Several studies reported that noise level in metropolitan cities exceeds specified standard limits and responsible for rising incidence of deafness among the inhabitants (Bhargawa, 2001). Chauhan and Pande (2010) studied noise pollution at different zones of Dehradun, Uttarakhand, India. They argued that the exposure to high level of noise may cause severe stress on the auditory and nervous system. Transportation and horn used in vehicles are the major sources of noise pollution in Dehradun City. Singh and Davar (2004) in their paper based on cross-section surveys points out that main source of noise pollution are loudspeakers and automobiles in Delhi. The study argued that the major effects of noise pollution include interference with communication, sleeplessness, and reduced efficiency, deafness, etc. Firdaus and Ahmed (2010) found that noise pollution is assuming serious proportions in Delhi. The study reveals that tremendous increase in population, industrial activities, unchecked growth in vehicular traffic and rapidly changing life style are the major factors that have created and aggravated the problem of pollution in the study area. The major health implications include annoyance, disturbance in sleep, interference with communication and other harmful effects.

## 3. DATA AND METHODOLOGY

This empirical study is based on a sample survey of the State of Delhi. The data was collected by using a schedule blended with suitable closed and open-ended questions from educated youth residing in Delhi. The survey was conducted among university students in Delhi. The schedule contains two parts: first contains personal information of the respondents and second part contains questions related to various dimensions of environment. The survey captures broad three dimensions, namely air pollution, water pollution and noise pollution, their health effects, causes, etc. The data of the respondents was collected during September 2016 to January 2017. The sample represents a cross-section of youth of different age groups, sex, geography, educational levels; income levels of respondents.

The survey was conducted in various educational institutions and metro and bus stations near to colleges and universities in Delhi. The respondents were resident in 129 localities in Delhi and NCR. The youth respondents were covering 15 states of India. 10% were respondent were those whose birth place is Delhi while remaining respondents are from 14 states living in Delhi for higher education for more than 2 years.

In the present paper, an analysis of questions related to noise pollution has been done. Out of 419 schedules, only 388 were properly filled information on noise and related dimensions, and hence selected for the analysis. The analysis has been carried out with the help of descriptive statistics, frequency tables, cross tabulation and chi-square test of independence on sources of noise, effects of noise, solutions to noise, etc. A cross tabulation is a joint frequency distribution of cases based on two or more categorical variables. Displaying a distribution of cases by their values on two or more variables is known as contingency table analysis and is one of the more commonly used analytic methods in the social sciences. The joint frequency distribution can be analyzed with the Chi-Square ($\chi 2$) to determine whether the variables are statistically independent or if they are associated. Chi-Square ($\chi 2$) tests compare the expected and actual distribution of data across categories. If a dependency between variables does exist, then other indicators of association can be used to describe the degree which the values of one variable predict or vary with those of the other variable. For chi-square analyses, the effect sizes are phi ($\Phi$) or Cramer's V are used

## 4. EMPIRICAL RESULTS

The present study is based on the primary survey among university and college students in Delhi regarding youth participation in Environmental Sustainability. It is focused on youth perception about noise pollution in Delhi, its causes, its health impacts and solutions. Descriptive analysis of the survey indicates that the average of respondents is 20.47 years, with minimum age of 17 years and maximum age of 34 years. 150 out of 388 (38.7%) respondents were males and 238 (out of 388) respondents were females. It is also rvealed by summary statistics that average years of education of 60.6% respondent were 15 years, 27.3% respondent was 17 years, 8.5% respondent was 18 years and 3.7 % respondent was 20 years. It implies that this survey captures the opinion of educated youth either completed or presently pursuing education in higher learning institutions (Table 1).

**Table 1: Descriptive Statistics of Respondent Youth**

| Age Statistics | | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| Age | 388.00 | 17.00 | 34.00 | 20.47 | 2.17 |
| **Gender Classification of Respondents** | | | | | |
| Gender | | Frequency | | Percent | |
| Male | | 150 | | 38.7 | |
| Female | | 238 | | 61.3 | |
| Total | | 388 | | 100.0 | |
| **Years of Education of Respondents** | | | | | |
| Education | | Frequency | | Percent | |
| 15.00 | | 235 | | 60.6 | |
| 17.00 | | 106 | | 27.3 | |
| 18.00 | | 33 | | 8.5 | |
| 20.00 | | 14 | | 3.7 | |
| Total | | 388 | | 100.0 | |

Table 2 present summary of noise pollution awareness among respondent youth. The respondents were asked whether they are aware about the noise pollution in Delhi. Results reveal that 86.6% respondents were aware about the problem of noise pollution. However, 13.4% respondents were not aware about the problem of noise pollution despite their higher education. It means that majority of educated youth were aware about noise as a problem.

**Table 2: Noise Pollution Awareness among Respondent Youth**

| Noise Pollution Awareness | Frequency | Percent |
|---|---|---|
| Yes | 336 | 86.6 |
| No | 52 | 13.4 |
| Total | 388 | 100.0 |

Table 3 presents the results of cross tabulation between gender and noise pollution awareness. Results show that 36.0% of respondents having awareness of noise pollution are male. 80.7% of males have awareness of noise pollution within Gender. 31.2% of respondent are male and have awareness of noise pollution. 64.0% of respondents having awareness of noise pollution are female. 90.3% of females have awareness of noise pollution within Gender. 55.4% of respondent are female and have awareness of noise pollution. Results further reveal that 55.8% of respondents not having awareness about noise pollution are males while 44.2% are females. Results indicate that female youth are more sensitive and aware compared to male youth about noise pollution.

**Table 3: NP_AW * Gender Crosstabulation**

| | | | Gender | | Total |
|---|---|---|---|---|---|
| | | | 1.00 | 2.00 | |
| NP_AW | 1.00 | Count | 121 | 215 | 336 |
| | | % within NP_AW | 36.0% | 64.0% | 100.0% |
| | | % within Gender | 80.7% | 90.3% | 86.6% |
| | | % of Total | 31.2% | 55.4% | 86.6% |
| | 2.00 | Count | 29 | 23 | 52 |
| | | % within NP_AW | 55.8% | 44.2% | 100.0% |
| | | % within Gender | 19.3% | 9.7% | 13.4% |
| | | % of Total | 7.5% | 5.9% | 13.4% |
| Total | | Count | 150 | 238 | 388 |
| | | % within NP_AW | 38.7% | 61.3% | 100.0% |
| | | % within Gender | 100.0% | 100.0% | 100.0% |
| | | % of Total | 38.7% | 61.3% | 100.0% |

Table 4 presents Chi-Square results to test whether there is significant association between Noise Pollution Awareness and Gender. The results of the "Pearson Chi-Square" reveal that the null hypothesis of no statistically significant association between Gender and Noise Pollution awareness is rejected at 5% level of significance. It implies that there is a statistically significant relationship between Gender and Noise Pollution Awareness. Table 5 presents symmetric measures, namely Phi and Cramer's V. Both Phi and Cramer's V are tests of the strength of association. Results

reveal that the strength of association between the variables is significant. It means Gender has small to moderate effect on Noise Pollution awareness.

**Table 4: Chi-Square Tests (NP_AW * Gender)**

| | Value | Df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|---|---|---|---|---|---|
| Pearson Chi-Square | 7.412[a] | 1 | .006 | | |
| Continuity Correction[b] | 6.603 | 1 | .010 | | |
| Likelihood Ratio | 7.212 | 1 | .007 | | |
| Fisher's Exact Test | | | | .009 | .006 |
| Linear-by-Linear Association | 7.393 | 1 | .007 | | |
| N of Valid Cases | 388 | | | | |
| a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 20.10. | | | | | |
| b. Computed only for a 2x2 table | | | | | |

**Table 5: Symmetric Measures**

| | | Value | Approx. Sig. |
|---|---|---|---|
| Nominal by Nominal | Phi | -.138 | .006 |
| | Cramer's V | .138 | .006 |
| N of Valid Cases | | 388 | |
| a. Not assuming the null hypothesis. | | | |
| b. Using the asymptotic standard error assuming the null hypothesis. | | | |

Table 6 presents the perception of youth about noise pollution as environmental challenge. Respondents were asked to rank 1(most important) to 9 (least important) the environmental challenges. The challenges were: rise in temperature; drought; flood; air pollution; noise pollution; water pollution; loss of biodiversity; urban solid waste; and others(specify). 32 out of 388 respondents (8.2%) could not identify noise pollution as an environmental challenge at all. Surprisingly, only 1.8% respondents ranked noise pollution as 1, a most important challenge for the environment; 4.4% respondents ranked noise pollution as 2; 12.6% respondents ranked noise pollution as 3 and so on. Revealing aspect of the survey is that the 25.8% respondents ranked noise pollution as 8, closer to least important rank 9. It implies that vast majority of educated youth did not perceive noise pollution as a threat to the environment.

**Table 6: Perception of Youth about Noise Pollution as Environmental Challenge (1-Most Important to 9-Least Important)**

| Code | Frequency | Percent |
|---|---|---|
| 1.00 | 7 | 1.8 |
| 2.00 | 17 | 4.4 |
| 3.00 | 49 | 12.6 |
| 4.00 | 47 | 12.1 |
| 5.00 | 46 | 11.9 |
| 6.00 | 46 | 11.9 |
| 7.00 | 39 | 10.1 |
| **8.00** | **100** | **25.8** |
| 9.00 | 5 | 1.3 |
| Total | 356 | 91.8 |
| Missing Response | 32 | 8.2 |
| Total | 388 | 100.0 |

Table 7 shows the awareness about the causes of noise pollution.. Respondents were asked that whether they are aware about the causes of noise pollution. 81.4% respondents were responded in 'Yes' while 16.6% respondent were responded in 'No'. Table 8 presents results of cross tabulation between Gender and Causes of Noise Pollution. Results show that 37.7% of respondents having awareness of Causes of Noise Pollution are male. 79.3% of males have awareness of Causes of Noise Pollution. 30.7% of respondent are male and have awareness of Causes of Noise Pollution. 62.4% of respondents having awareness of Causes of Noise Pollution are female. 82.8% of females have awareness of Causes of Noise Pollution. 50.8% of respondent are female and have awareness of Causes of Noise Pollution. Results further reveal that 43.1% of respondents not having awareness about Causes of Noise Pollution are males while 56.9% are females.

**Table 7: Awareness of Causes of Noise Pollution among Respondents**

| Code | Frequency | Percent |
|---|---|---|
| 1.00 | 316 | 81.4 |
| 2.00 | 72 | 18.6 |
| Total | 388 | 100.0 |

**Table 8: NPC_AW * Gender Crosstabulation**

| | | | Gender | | Total |
|---|---|---|---|---|---|
| | | | 1.00 | 2.00 | |
| NPC_AW | 1.00 | Count | 119 | 197 | 316 |
| | | % within NPC_AW | 37.7% | 62.3% | 100.0% |
| | | % within Gender | 79.3% | 82.8% | 81.4% |
| | | % of Total | 30.7% | 50.8% | 81.4% |
| | 2.00 | Count | 31 | 41 | 72 |
| | | % within NPC_AW | 43.1% | 56.9% | 100.0% |
| | | % within Gender | 20.7% | 17.2% | 18.6% |
| | | % of Total | 8.0% | 10.6% | 18.6% |
| Total | | Count | 150 | 238 | 388 |
| | | % within NPC_AW | 38.7% | 61.3% | 100.0% |
| | | % within Gender | 100.0% | 100.0% | 100.0% |
| | | % of Total | 38.7% | 61.3% | 100.0% |

Table 9 presents Chi-Square results to test whether there is significant association between Awareness of Causes of Noise Pollution and Gender. The results of the "Pearson Chi-Square" reveal that the null hypothesis of no statistically significant association between Awareness of Causes of Noise Pollution and Gender is accepted at 5% level of significance. It implies that there is no statistically significant relationship between Awareness of Causes of Noise Pollution and Gender.

**Table 9: Chi-Square Tests (NPC_AW * Gender)**

| | Value | Df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|---|---|---|---|---|---|
| Pearson Chi-Square | .720[a] | 1 | .396 | | |
| Continuity Correction[b] | .511 | 1 | .475 | | |
| Likelihood Ratio | .713 | 1 | .398 | | |
| Fisher's Exact Test | | | | .422 | .237 |
| Linear-by-Linear Association | .718 | 1 | .397 | | |
| N of Valid Cases | 388 | | | | |
| a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 27.84. | | | | | |
| b. Computed only for a 2x2 table | | | | | |

Table 10 reveals the causes of noise pollution as perceived by educated youth in Delhi. Respondents were asked to identify the most important cause of noise pollution. Results of the survey indicate that 52.84% respondents identified vehicles (aeroplanes, rail, car, buses, bike, etc and their associated accessories such as horns, hooters, etc) as the one most important cause of noise pollution. 14.69% respondents identified loud music as the second most important cause of noise pollution. Around 5% respondent identified industrial noise and construction as the causes of noise pollution. However, 25.5% respondent could not identify any cause of noise pollution.

**Table 10: Causes of Noise Pollution in Delhi**

| Code | Frequency | Percent | Causes |
|---|---|---|---|
| 0 | 99 | 25.52 | Not Mentioned |
| 1 | 205 | 52.84 | Vehicles (Aeroplanes, Car, Buses, etc; horns, hooters) |
| 2 | 57 | 14.69 | Loud Music |
| 3 | 11 | 2.84 | Industrial Noise |
| 4 | 7 | 1.80 | Construction |
| 5 | 4 | 1.03 | Rising population and over crowding |
| 6 | 2 | 0.52 | Religious Programmes |
| 7 | 1 | 0.26 | Barking of dogs |
| 8 | 1 | 0.26 | Celebrations and Parties |
| 9 | 1 | 0.26 | Urbanisation |
| Total | 388 | 100.0 | |

Table 11 presents the perception of respondents about health effect of noise pollution. Respondent were asked to identify the health problems associated with noise pollution in Delhi. The survey results indicate that 52.58% respondents identified hearing impairment and related problem associated with noise pollution. 14.69% respondents identified hypertension and brain related issues associated with noise pollution. 2.06% respondents identified irritation and 1.80% identified heart problem associated with noise pollution. However, 22.94% respondents were not aware about the health effects of noise pollution. It implies that the majority of educated youth understand the health related implications of noise pollution in Delhi.

**Table 11: Perception of Respondents about Health Effect of Noise Pollution**

| Code | Frequency | Percent | Health Problem |
|---|---|---|---|
| 0 | 89 | 22.94 | Not able to Identify |
| 1 | 204 | 52.58 | Hearing Problem |
| 2 | 57 | 14.69 | Hypertension and Brain Related Issues |
| 3 | 8 | 2.06 | Irritation |
| 4 | 7 | 1.80 | Heart problem |
| 5 | 6 | 1.55 | Sleeping Disorder |
| 6 | 5 | 1.29 | Psychological Disturbances Effect |
| 7 | 2 | 0.52 | High B.P |
| 8 | 8 | 2.06 | High stress level |
| 9 | 1 | 0.26 | Abortion |
| 10 | 1 | 0.26 | Presbycusis |
| Total | 388 | 100 | |

Table 12 shows participation of youth in environment improvement activities. Respondents were asked whether they have participated or done any action or activity to reduce any type of environment pollution. Result reveals that 55.2% of respondent responded in 'Yes' while remaining 44.8% in 'No'. It seems that approximately 44% of the respondent has not involved themselves in any activity for the environment improvement purpose. This reflects on negligent attitude towards environment protection even in highly educated youth of the capital city of the country.

**Table 12: Youth Participation in Environment Improvement Activities**

| Code | Percent | Percent |
|---|---|---|
| 1 | 214 | 55.2 |
| 2 | 174 | 44.8 |
| Total | 388 | 100.0 |

Table 13 presents results of cross tabulation between Gender and Participation in Environment Improving Activities (PEIMA). Results show that 34.1% of respondents participating in Environment Improving Activities are males while 65.9% are females. 48.7% of males are participating in Environment Improving Activities. 18.8% of respondent are male participating in Environment Improving Activities. 59.2% of females are participating in Environment Improving Activities. 36.6% of respondent are female participating in Environment Improving Activities. Results further reveal that 44.3% of respondents not participating in Environment Improving Activities are males while 55.7% are females.51.3% male respondents are not participating in Environment Improving Activities are males while 40.8% are females. Female youth seems to participate more in Environment Improving Activities.

**Table 13: PEIMA * Gender**

| | | | Gender | | Total |
|---|---|---|---|---|---|
| | | | 1.00 | 2.00 | |
| PEIMA | 1.00 | Count | 73 | 141 | 214 |
| | | % within PEIMA | 34.1% | 65.9% | 100.0% |
| | | % within Gender | 48.7% | 59.2% | 55.2% |
| | | % of Total | 18.8% | 36.3% | 55.2% |
| | 2.00 | Count | 77 | 97 | 174 |
| | | % within PEIMA | 44.3% | 55.7% | 100.0% |
| | | % within Gender | 51.3% | 40.8% | 44.8% |
| | | % of Total | 19.8% | 25.0% | 44.8% |
| Total | | Count | 150 | 238 | 388 |
| | | % within PEIMA | 38.7% | 61.3% | 100.0% |
| | | % within Gender | 100.0% | 100.0% | 100.0% |
| | | % of Total | 38.7% | 61.3% | 100.0% |

Table 14 presents Chi-Square results to test whether there is no significant association between Gender and PEIMA. The results of the "Pearson Chi-Square" reveal that the null hypothesis of statistically significant association between Gender and PEIMA is rejected at 5% level of significance. It implies that there is a statistically significant relationship between Gender and PEIMA. Table 15 present results of symmetric measures, namely Phi and Cramer's V. Phi and Cramer's V results reveal that the strength of association between the variables is significant but the magnitude of the effect size is small

**Table 14: Chi-Square Tests (PEIMA * Gender)**

| | Value | Df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|---|---|---|---|---|---|
| Pearson Chi-Square | 4.162[a] | 1 | .041 | | |
| Continuity Correction[b] | 3.745 | 1 | .053 | | |
| Likelihood Ratio | 4.157 | 1 | .041 | | |
| Fisher's Exact Test | | | | .047 | .027 |
| Linear-by-Linear Association | 4.151 | 1 | .042 | | |
| N of Valid Cases | 388 | | | | |
| a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 67.27. | | | | | |
| b. Computed only for a 2x2 table | | | | | |

**Table 15: Symmetric Measures (PEIMA * Gender)**

| | | Value | Approx. Sig. |
|---|---|---|---|
| Nominal by Nominal | Phi | -.104 | .041 |
| | Cramer's V | .104 | .041 |
| N of Valid Cases | | 388 | |
| a. Not assuming the null hypothesis. | | | |
| b. Using the asymptotic standard error assuming the null hypothesis. | | | |

Finally, the study tries to find out the solution to the environment degradation from the field. As per the majority opinion of respondents, the solution to the problem of deteriorating environment by human activities and unruly actions lies in social and behavioural change and strict compliance and enforcement of environmental laws.

## 5. CONCLUDING REMARKS

This paper is focused on youth perception about noise pollution in Delhi, its causes, its health impacts and solutions. The study concludes that the majority of educated youth is aware about noise pollution and its causes. The study reveals that the female youth are more sensitive compared to male youth about noise pollution in Delhi. However, the vast majority of educated youth did not perceive noise pollution as environmental challenge and ranked it as least important threat. The study identified vehicular pollution as one of the most important causes of noise pollution and loud music as the second most important cause of noise pollution. The study identified hearing impairment, hypertension, stress; heart problems are associated with noise pollution on the basis survey. It implies that the majority of educated youth understand the health related implications of noise pollution in Delhi.

Noise is one of the typical hazardous emissions. Regular and long term exposure to elevated noise can bring about various adverse health consequences, such as hearing impairment, hypertension, heart disease, annoyance, and sleep disturbance which also recognised by the respondent. However, this study also reflects on negligent attitude towards environment protection even in highly educated youth of the capital city of the country. Female youth seems to be more sensitive and participatory in Environment Improving Activities. Finally, the study provides that Social and Behavioural Change of Citizens and Strict Enforcement of Environment and Noise related Laws is the pre-requisite for an improvement in the environment.

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## Endnotes

[1] The word noise is derived from the Latin word nausea. Noise means wrong sound in the wrong place at the wrong time. Noise pollution may be defined as or 'sound that is loud, unpleasant or unexpected' which gets damped into the atmosphere without regarding to the adverse effects it may have.