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COMMERCIAL AREAS OFALLAHABAD CITY AND ITS IMPACT ON CONTOUR TRAFFIC NOISE POLLUTION OF THE THE ENVIRONMENT

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ABSTRACT

In Indian cities noise is a common nuisance with very sparse information on actual noise levels. The possibility that noise has negative effects on human health has been a strong impetus for research and a major argument for noise control.Prolonged exposure to noise poses severe health hazards. The main objective of this study is to evaluate the noise levels and its impacts on some commercial areas of Allahabad city. The values for continuous sound equivalent Leq for Civil Lines ranges from 80dB to 83dB, for Chowk the noise level ranges from 78dB to 82dB, for Rambagh ranges from 75dB to 82dB, for Katra75dB to 83dB and for AlopiBaghthe noise level ranges from 79dB to 82dB. The results of the impacts of noise revealed that 69-79% of the people are exposed to noise daily, 62-78% experienced tinnitus, 63-85%have problem with sleep disturbance, 61-79% have experienced decrease in working efficiency, 86-93% were annoyed with the present condition of noise level, 24 -67% of the respondents have problems with blood pressure and cardiac and about 39-64% were aware of the impacts of noise. From the present study it can be concluded that noise levels at all the examined sites show higher values than the prescribed standards of 65dB affecting the people working and residing in these areas.

Keywords: Commercial, Human health, Impacts, Noise Level, Respondents

I. INTRODUCTION

Noise is no less a pollutant than the toxic chemicals in the environment but remains unattendedand ignored since its impact to the community is not felt immediately.Substantial research works have been carried out onrailand road traffic noise, aircraft noise [1, 2]and their impactto the dwelling communities. Exposure to noise may cause some psychological and some physical stress. [3]

Noise is a very complex phenomenon in its physical aspect, as well as in its psychological and medical dimensions which affects both the ability to communicate and concentrate [4]Effects of noise are frequently transitory and infrequently catastrophic but adverse effects can be amassed with prolonged or repeated exposure.In India, the transportation sector is growing rapidly at more than 7.50% per annum increasing the number of vehicles on Indian roads at a very rapid rate causing various types of pollutions and overcrowded

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roads [5]Generally, motor vehicles, which form a significant part of urban environment, are an important source of noise emission, contributing about 55% of the total urban noise [6]The rapid growth of vehicular population gives rise to unrestrained noise pollution and other associated health problems causing both short term as well as long term psychological and physiological disorders. Traffic can be considered as the major source of noise pollution in large cities [7,8]Depending on its duration and volume of exposure noise pollution effects can be categorized into physical effects (temporary and permanent loss of hearing), physiological effects (high blood pressure, cardiac problem) and psychological effects (sleeplessness, decrease in working efficiency, stress, annoyance etc) [9] Chronic exposure to noise can cause temporary as well as permanent loss of hearing. Besides the auditory effect noise can also cause other significant non auditory health effects, such as cardiovascular problems, hypertension, changes in social behavior and induces depressive tendencies [10] Long-lasting, high-level sounds are the most damaging to hearing and generally the most annoying. Therefore, a study was planned on noise generated from the different commercial areas of Allahabad city and its impact on the people so as to bring down the pollution level through public participation and to suggest mitigation measures.

II. MATERIALS AND METHODS

Allahabad city covers a total area of 63.07 sq km with a population of 9, 90,298 at an altitude of 98m above sea level. The Allahabad District is located at 25°26´N/ 81°50´ E. The population of Allahabad presents all types of living standards ranging from business class to labour, official to student and illiterate to highly educated. The city also houses many educational institutions and it has become a hub of administration too. Its rapid growth in trade and commerce as well as developing activities related to modernization and high standard of living make it a perfect place to study the noise impact. A sudden spurt of vehicles has occurred due to influx of large population resulting in increased traffic volume whereas the road infrastructure remains the same. The noise levels were measured with the help of a sound level meter (TES-1350A).The wind influence on the microphone was lowered by placing a special sponge on the top of the microphone. The noise levels was recorded every 5 minutes and was measured in Decibel on an A weighted scale (dBA) since this scale measures sound level in approximately the same as the human ear [11]was used for monitoringnoiselevels.the data measured were evaluated for Leq (combined noise level). The following equations were used to evaluate Leq

$$\mathbf{Leq = ½ (L_{10} + L_{90}) + 0.175 (L_{10} – L_{90})} \qquad \mathbf{(1)}$$

It correlates with dissatisfaction towards traffic noise expressed by people. Measurement of TNI is difficult due to the uncertainty arising from the background noise other than traffic. Prediction is also difficult because of problem in predicting the background noise at a large distance. TNI was also calculated manually by using the formula.

$$\mathbf{TNI = 4(L_{10} - L_{90}) + (L_{90} - 30)\ (dB)} \qquad \mathbf{(2)}$$

The impact of noise on the surrounding area are analysed with the help of questionnaire. The respondents were selected randomlyfrom those working or staying in that area for more than 5 years.

III. RESULTS AND DISCUSSION

The average L_{10} for Civil Lines ranges from 97.7 dB-100.76 dB, L_{90} ranges from 74.66 dB-82.1dB, Leq ranges from 90.35 dB-96.36dB and TNI ranges from 123.26-175.16. The average L_{10} for Chowk ranges from 96.6 dB-

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99.04 dB, L_{90} ranges from 75.3 dB-79.96 dB, Leq ranges from 89.93 dB-90.78 dB and TNI ranges from 116.52-133.48, The average L_{10} for Rambagh ranges from 97.2 dB-100.5 dB, L_{90} ranges from 74.5 dB-97.2 dB, Leq ranges from 91.65 dB-93.68 dB and TNI ranges from 114.96- 143.22. The average L_{10} for Katra ranges from 91.92 dB-101.74 dB, L_{90} ranges from 74.7 dB-79.72 dB, Leq ranges from 89.97 dB-94.11 dB and TNI ranges from 98.28-143.22. The average L_{10} for Chowk ranges from 98.34 dB-102.84 dB, L_{90} ranges from 78.18 dB-82.28 dB, Leq ranges from 92.29 dB- 95.15 dB and TNI ranges from 118.52-138.26. The data recorded from all the different commercial sites were then compared with the standards prescribed by CPCB and BIS and was found to exceed the limits. There is no such city road where vehicles can run smoothly with optimum speed i.e. 45-50 km since there is always an obstruction either due to digging of road, construction of road, violation of traffic rules by pedestrian, cross the road as and when required without zebra line, disobeying the traffic lights, creation of traffic jam to both the sides at railway crossings, stray animals specially cows, oxen, dogs, pigs, poor condition ofthe road; and old vehicles, opening of shops along the roads, road encroachment, congested road. Competitive driving of the maxi cabs, the main transport system of Allahabad carrying only 10 persons/ vehicle. Since vehicular population of Allahabad is increasing enormously every year.

Table 1: Noise Level against time at all the selected commercial sites of Allahabad city

Sites	Timing	L10	L90	Leq	Leq Standard	TNI
Civil Lines	10-11 am	98.42	80.14	92.41	65	123.26**
	11-12am	96.94	77.84	90.73	65	143.34
	12-01pm	98.18	81.74	92.83	65	133.94
	01-02pm	99.36	82.1*	91.74	65	138.4
	02-03pm	97.7**	75.12	90.35**	65	158.02
	03-04pm	100.08	83.84	96.36*	65	135.04
	04-05pm	100.76*	74.66**	92.27	65	175.16*
Chowk	10-11 am	97.2	79.18	91.21	65	121.26
	11-12am	97.2	75.3**	89.93**	65	132.9
	12-01pm	97.34	77.16	90.78*	65	127.88
	01-02pm	99.04*	77.56	91.95	65	133.48*
	02-03pm	96.6**	79.96*	90.16	65	116.52**
	03-04pm	98.28	78.16	91.72	65	128.64
	04-05pm	97.38	77.18	90.81	65	127.98
Rambagh	10-11 am	100.5*	79.56	93.68*	65	133.32
	11-12am	98.7	78.18	92.02	65	130.26
	12-01pm	97.2**	81.28*	92.03	65	114.96**
	01-02am	98.76	79.32	92.36	65	127.08
	02-03pm	99.92	80.12	93.45	65	129.32
	03-04pm	99.28	77.4	93.33	65	134.92
	04-05pm	99.18	74.5**	91.65**	65	143.22*
Katra	10-11 am	101.74*	78.28	94.11*	65	142.12*

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	11-12am	**98.94**	**77.24**	**91.88**	**65**	**134.04**
	12-01pm	**97.78**	**78.76**	**91.45**	**65**	**124.84**
	01-02pm	**91.92****	**79.8**	**89.97****	**65**	**98.28****
	02-03pm	**98.1**	**79.72***	**92.12**	**65**	**123.24**
	03-04pm	**98.24**	**74.7****	**90.57**	**65**	**138.86**
	04-05pm	**98.46**	**79.16**	**92.18**	**65**	**126.36**
AlopiBagh	**10-11 am**	**102.84***	**81.54**	**94.96**	**65**	**136.74**
	11-12am	**100.68**	**78.18****	**93.36**	**65**	**138.18**
	12-01pm	**101.74**	**81.5**	**95.15***	**65**	**132.46**
	01-02pm	**98.84**	**82.28***	**93.45**	**65**	**118.52****
	02-03pm	**100.88**	**79.1**	**92.76**	**65**	**136.22**
	03-04pm	**98.34****	**79.72**	**92.29****	**65**	**124.2**
	04-05pm	**100.76**	**78.26**	**93.44**	**65**	**138.26***

Fig 1 represents the impact of noise on human health on the people residing and working on some of the selected commercial areas of Allahabad city. The results obtained from the questionnaire revealed that the people living close to the vicinity were the most affected since they are in direct contact with noise. About 67-79% of the population were exposed daily to noise in their working place The study conducted shows that the noise levels in these areas were very high which make the people annoyed at present but continuous daily exposure in the long run may also produce other types of problems. Besides annoyance, long-term exposure to environmental noise can also cause other effects to people's health[12]. Tinnitus is a common symptom which was observed in 62-78% of the subjects living in these areas. This usually occurs after exposure to a loud sound in which normal hearing comes back after few hours. Similar results were also obtained by [13]

About 63-81% were having problems with sleep disturbance. The decreased in working efficiency was observed in 61-79% of the exposed population. About 86-93% were annoyed with the noise that they are exposed. Due to the high noise levels the people have problem of sleeping, or waking up frequently, reduction in sleep affects the working efficiency of the people or the working efficiency also decreases due to the noise present in that environment which affect the ability to concentrate making the people annoyed and irritated. Noise annoyance can result from noise interfering with daily activities, feelings, thoughts, sleep, or rest, and might be accompanied by negative responses, such as anger, displeasure, exhaustion, and by stress-related symptoms [14]

About 52-67% were having blood pressure problems. It was also observed that 24-40% were having cardiac problems. [15]reported that long-term exposure to environmental noise can cause Cardiac problems like high blood pressure, heart disease and stroke.

About 27-45% were satisfied with their present environment. The results show that very few people were satisfied with the area where they work or live and the traffic system. Poor traffic system causes congestion due to insufficient capacity and bottlenecks resulting in increased pollution of noise and air which are responsible for various health hazards.

About 39-64% of the respondents were aware with the impacts of noise. It was recorded that the percentage of people who are aware of the impacts of noise are lesser since they include mostly the shopkeepers daily wagers,

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rickshaw drivers etc which are uneducated or not so much educated.Improper stoppage of public transportation facilities also increases the congestion level although some of them were aware of the impacts of noise but shows less attention by considering it as a daily disturbance.It is important to conduct awareness programme to educate them about the harmful effects of noise since noise like air and water pollution can produce adverse effects on human health.

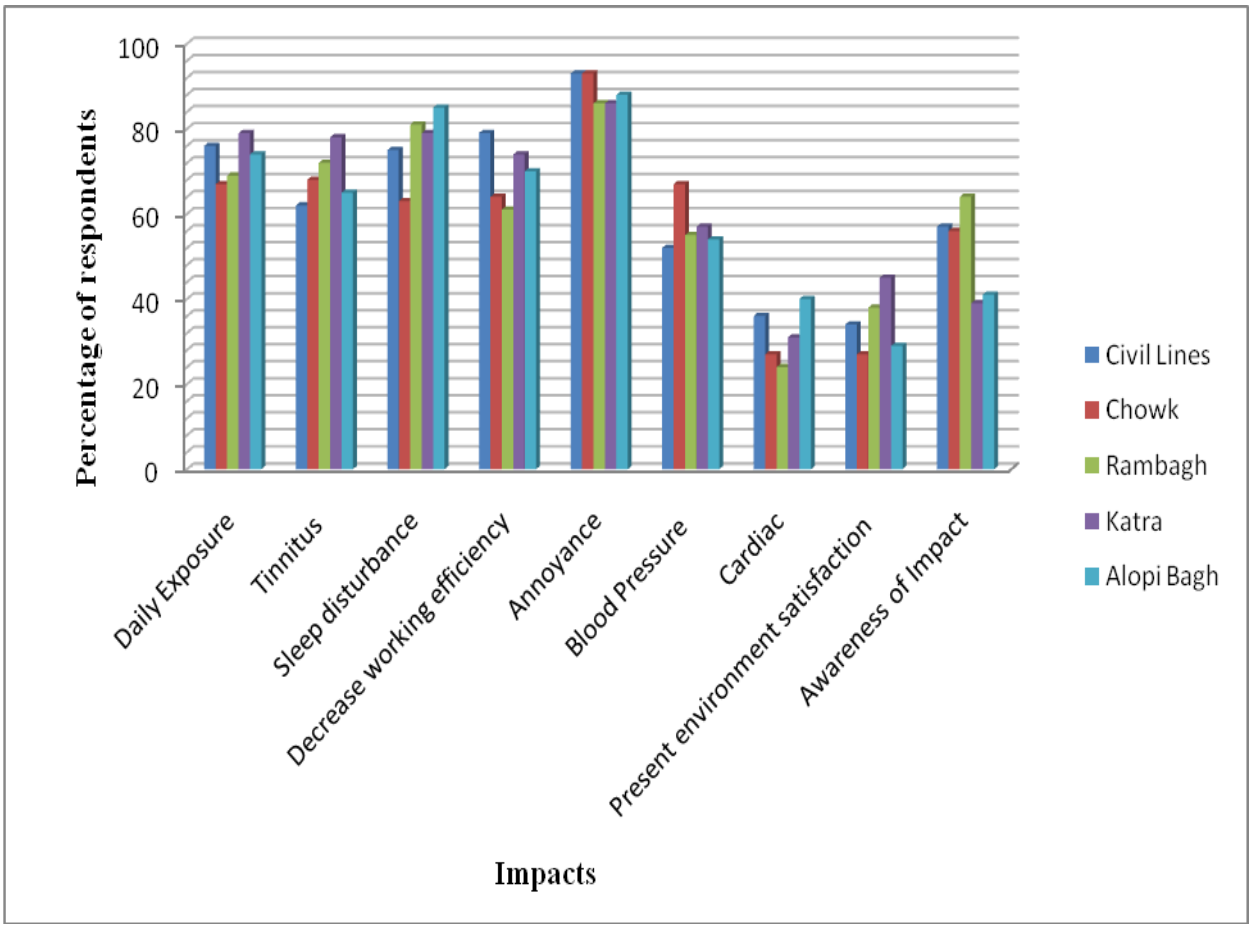

Fig: Impact of noise on the commercial population of Allahabad city

IV. CONCLUSION

The present study helps us to conclude that the noise level at all the different commercial areas (Civil Lines, Chowk, Rambagh, Katra and Alopibagh) have reached an alarming rate due to rapid increase in urbanisation, industrialisation as well as transportation sector leading to overcrowded roads which increases the noise levels. Noise can be controlled by setting a noise limit of at least 5-10 dB(A) below the prescribed standard, organizing regular training, lectures, workshops and exhibition at various school/ colleges, institutes, offices of Government and non Government Organisation, educate the citizens about the raising noise pollution, health effects and traffic rules and regulations. Disseminate a key message that control of noise at individual's level will control noise pollution. Constructing of a green belt of thick vegetation can be produced along the roadways. This will absorb to a large extent and dissipate sound energy and thus act as buffer zone. A tree belt 5 m width and of different height can reduce the noise level up to 10 dB (A). It will reduce the noise intensity by creating obstruction in its transmission path and decrease substantial amount of noise pollution load.

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