Bulletin of Pure and Applied Sciences
Zoology (Animal Science), Vol.41A, No.1,
January-June 2022: P.28-33

Print version ISSN 0970 0765
Online version ISSN 2320 3188
DOI: 10.5958/2320-3188.2022.00004.3

Content Available online at: https://www.bpasjournals.com/zoology

Original Research Article

Evaluation of the Effect of Noise on the Physical and Psychology Health and Enhanced Rate of Errors in Manual Performance and Working of Employees

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Article Info:
Received on 26.08.2021
Revised on 20.12.2021
Accepted on 13.01.2022
Published on 15.06.2022

ABSTRACT:
Noise is an underestimated threat that can cause a number of short-term and long-term health problems. Sound, when becomes noise, is among the significant environmental factors for people's health and it has an important role in both physical and psychological injuries. There was interaction with the people living in residential areas and workings in different areas and suggestions were enlisted to find out the ways to tackle the problem of noise pollution. Monitoring of noise level was done at the 11 sites under study. Levels of noise had exceeded the acceptable limits as laid down by Central Pollution Control Board.

Keywords: Noise, Pollution, health, Physical, Psychological.

How to cite this article: Dewan M. (2022). Evaluation of the Effect of Noise on the Physical and Psychology Health and Enhanced Rate of Errors in Manual Performance and Working of Employees. ***Bulletin of Pure and Applied Sciences-Zoology***, 41A (1), 28-33.

INTRODUCTION

Noise is a very big factor that interferes in the personal and professional works of the people. People encounter noise often in their everyday environments. Sound, when becomes noise, is among the significant environmental factors for people's health and it has an important role in both physical and psychological injuries, and it also affects individuals' performance and productivity. Noise can decrease the accuracy and focus of employee's work. The aim of this study was to determine the effect of exposure to high noise levels on the performance and rate of error in manual activities. Expecting your employees to perform well is reasonable. However, expecting your employees to perform well under unreasonable conditions is where the issue lies. Making a small modification to the office ceiling tiles won't cost much in the grand scheme of things but it will create a healthier work environment and more satisfied employees. Noise is a common hazard and is present in almost all workplaces. It is the most common health hazard in industries such as entertainment, manufacturing, agriculture, educational institutes, food and drink places, woodworking, metal working, construction sites etc. Sources of noise in workplaces are the use of heavy machinery, transport, loud music, various working tools etc. Inappropriate inner environment has also a negative effect on human performance and their comfort during working hours. It has

been estimated that inappropriate working environment causes millions of dollars losses (Lister et al, 1998).

MATERIALS AND METHODS

A total 515 subjects had undergone questionnaire survey to study the various aspects of Noise Pollution affecting work efficiency of the subjects, in their respective areas. Sound level meter was used to measure the noise level.

The noise level was also recorded from roadside offices, organizations and commercial business centers, which were at close distances to building from the center of the road, located at different places. On the basis on following 7-statements in the questionnaire, the results have been drawn.

- I can concentrate despite of high noise
- I don't feel good when there is quiet all around.
- Noise and sound are natural parts of environment and society.
- Traffic noise is not disturbing.
- It is easy for me to ignore high noise levels anywhere.
- Over the period, I have become comfortable with high noise level.
- When I can't get rid of high noise levels, I feel helpless

RESULTS AND DISCUSSION

Monitoring of noise level was done at the 11 sites under study. Levels of noise had exceeded the acceptable limits as laid down by Central Pollution Control Board. The large traffic and noise created by them is also one among the most critical problems faced by the Chandigarh. The impact of noise on human work efficiency was adjudged (Table 1, Table2 & Table 3) and Anova has been applied to test the validity and significance of Regression Models. All models were proved to be significant and valid.

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.181a	0.033	0.031	2.61341
2	0.257b	0.066	0.062	2.57073
3	0.284c	0.081	0.075	2.55256
4	0.300d	0.090	0.083	2.54260
5	0.312e	0.097	0.089	2.53441
6	0.327f	0.107	0.096	2.52366
7	0.339g	0.115	0.103	2.51444

a. Predictors: (Constant), Do people who visit your area make noise
b. Predictors: (Constant), Do people who visit your area make noise, Noise Source - Small Vehicles
c. Predictors: (Constant), Do people who visit your area make noise, Noise Source - Small Vehicles, Noise from Animals
d. Predictors: (Constant), Do people who visit your area make noise, Noise Source - Small Vehicles, Noise from Animals, Problem of noise pollution in your area
e. Predictors: (Constant), Do people who visit your area make noise, Noise Source - Small Vehicles, Noise from Animals, Problem of noise pollution in your area, Construction activity in your area
f. Predictors: (Constant), Do people who visit your area make noise, Noise Source - Small Vehicles, Noise from Animals, Problem of noise pollution in your area, Construction activity in your area, Noise Source - Large Vehicles
g. Predictors: (Constant), Do people who visit your area make noise, Noise Source - Small Vehicles, Noise from Animals, Problem of noise pollution in your area, Construction activity in your area, Noise Source - Large Vehicles, Noise Source - Religious Places

Table 2: ANOVA[a]

S. No.	Model Sum of Squares	df	Mean Square	F	Sig.	Model Sum of Squares
1	Regression Residual Total	117.950 3490.085 3608.035	1 511 512	117.950 6.830	17.270	0.000b
2	Regression Residual Total	237.630 3370.405 3608.035	2 510 512	118.815 6.609	17.979	0.000c
3	Regression Residual Total	323.901 3284.134 3608.035	4 508 512	80.975 6.465	12.526	0.000e
4	Regression Residual Total	351.450 3256.586 3608.035	5 507 512	70.290 6.423	10.943	0.000f
5	Regression Residual Total	385.383 3222.652 3608.035	6 506 512	64.231 6.369	10.085	0.000g
6	Regression Residual Total	415.222 3192.814 3608.035	7 505 512	59.317 6.322	9.382	0.000h

a. Dependent Variable: Level of Work Efficiency Due to Noise
b. Predictors: (Constant),Do people who visit your area make noise
c. Predictors: (Constant),Do people who visit your area make noise, Noise Source - Small Vehicles
d. Predictors: (Constant), Do people who visit your area make noise, Noise Source - Small Vehicles, Noise from Animals
e. Predictors: (Constant), Do people who visit your area make noise, Noise Source - Small Vehicles, Noise from Animals, Problem of noise pollution in your area
f. Predictors: (Constant), Do people who visit your area make noise, Noise Source - Small Vehicles, Noise from Animals, Problem of noise pollution in your area, Construction activity in your area
g. Predictors: (Constant), Do people who visit your area make noise, Noise Source - Small Vehicles, Noise from Animals, Problem of noise pollution in your area, Construction activity in your area, Noise Source - Large Vehicles
h. Predictors: (Constant), Do people who visit your area make noise, Noise Source - Small Vehicles, Noise from Animals, Problem of noise pollution in your area, Construction activity in your area, Noise Source - Large Vehicles, Noise Source - Religious Places

Table 3: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2.542	0.262		-9.696	0.000
	Do people who visit your area make noise	-0.916	0.220	-0.181	-4.156	0.000
2	(Constant)	-1.275	0.394		-3.235	0.001
	Do people who visit your area make noise	-0.924	0.217	-0.182	-4.260	0.000
	Noise Source - Small Vehicles	-0.331	0.078	-0.182	-4.256	0.000
3	(Constant)	0.459	0.718		0.640	0.523
	Do people who visit your area make noise	-.0922	.0215	-0.182	-4.284	0.0000

	Noise Source - Small Vehicles	-0.285	0.079	-0.157	-3.627	0.000
	Noise from Animals	-1.965	0.683	-0.125	-2.878	0.004
4	(Constant)	0.701	0.724		0.969	0.333
	Do people who visit your area make noise	-0.939	0.215	-0.185	-4.376	0.000
	Noise Source - Small Vehicles	-0.276	0.079	-0.152	-3.517	0.000
	Noise from Animals	-1.917	0.680	-0.122	-2.818	0.005
	Problem of noise pollution in your area	-0.203	0.091	-0.095	-2.235	0.026
5	(Constant)	1.590	0.839		1.894	0.059
	Do people who visit your area make noise	-0.956	0.214	-0.189	-4.467	0.000
	Noise Source - Small Vehicles	-0.298	0.079	-0.164	-3.771	0.000
	Noise from Animals	-2.286	0.701	-0.145	-3.261	0.001
	Problem of noise pollution in your area	-0.206	0.091	-0.096	-2.274	0.023
	Construction activity in your area	-0.257	0.124	-0.092	-2.071	0.039
6	(Constant)	2.089	0.863		2.420	0.016
	Do people who visit your area make noise	-1.006	0.214	-0.199	-4.695	0.000
	Noise Source - Small Vehicles	-0.234	0.083	-0.129	-2.804	0.005
	Noise from Animals	-2.306	0.698	-0.146	-3.303	0.001
	Problem of noise pollution in your area	-0.218	0.090	-0.102	-2.406	0.016
	Construction activity in your area	-0.311	0.126	-.111	-2.474	0.014
	Noise Source - Large Vehicles	-0.185	0.080	-0.106	-2.308	0.021
7	(Constant)	1.697	0.879		1.932	0.054
	Do people who visit your area make noise	-0.977	0.214	-0.193	-4.567	0.000
	Noise Source - Small Vehicles	-0.270	0.085	-0.149	-3.185	0.002
	Noise from Animals	-2.172	0.698	-0.138	-3.110	0.002
	Problem of noise pollution in your area	-0.206	0.090	-0.096	-2.278	0.023
	Construction activity in your area	-0.319	0.125	-0.114	-2.549	0.011
	Noise Source - Large Vehicles	-0.227	0.082	-0.130	-2.755	0.006
	Noise Source - Religious Places	0.202	0.093	0.098	2.172	0.030
a. Dependent Variable: Level of Work Efficiency Due to Noise						

This table 3 depicts the relative contribution of constant and predictors respectively in the designed regression models. Negative Beta values indicate a clear negative relationship between the level of work efficiency and noise predictors. It further can be elaborated that any increase in the level of noise predictor is causing a significant decrease in the level of work efficiency.

The World Health Organization has listed critical health effects, with corresponding noise levels and exposure time in specific environmental settings.

Table 4: WHO guideline for community noise

Environment	**Critical Health Effect**	**Sound Level dB (A)**	**Time (Hours)**
Outdoor living areas	Annoyance	50-55	16
Indoor dwellings	Speech intelligibility	35	16
Bedrooms	Sleep disturbance	30	8
School classrooms	Disturbance of communication	35	During class
Industrial, commercial and traffic areas	Hearing impairment	70	24
Music through earphones	Hearing impairment	85	1
Ceremonies and entertainment	Hearing impairment	100	4

Noise is an underestimated threat that can cause a number of short-term and long-term health problems. It is increasingly becoming a potential hazard to health, physically and psychologically and affects the general well-being of an individual (Goswami et al., 2011) Excessive noise interferes with people's daily activities at school, at work, at home, and during leisure time. The findings of a study also showed that, as the noise intensity increased, the rate of errors also increased. According to the results, a significant difference was observed between the error rate measured at the sound level of 110 dB and those measured at the sound levels of 70dB and 90 dB. However, no significant difference was found between the error rates measured at the sound levels of 70dB and 90 dB. Moreover, male and female subjects were significantly different regarding the measured errors (Farahnaz et al., 2016). Moreover, some studies have shown the connection of response dose of noise exposure and outbreak of psychological distress in industrial workers (McDonald 1989). So noise has negative effect on job satisfaction of workers (Leather, et al, 2003) and as a result has negative effect on workers' productivity and performance (Shikdar and Das, 2003). It can disturb sleep, causes cardiovascular and psychophysiological effects reduce performance and provoke annoyance responses and changes in social behavior. (WHO, 2011). Noise is probably the most common occupational danger, and it also is an environmental danger (Clark and Bohn, 1999). Hence regulation of noise will be more challenging in these sensitive areas where more care is required. Excessive noise interferes with people's daily activities at school, at work, at home, and during leisure time. Noise exists in all human activities, and, considering the effect of noise on human health, it can be classified into two categories, i.e., occupational noise and environmental noise, which include traffic noise, music, and other sources (Stansfeld and Matheson, 2003). One reason for the large number of complaints about noise in the work environment is that noise is a physical phenomenon that can easily be felt in the work environment (Persson-Waye et al, 1997). Scientists are in agreement that exposure to excessive noise levels stimulates our nervous system – raising blood pressure and releasing stress hormones. Excessive noise levels over a long period of time will damage your hearing. This may happen so gradually and painlessly that you may not notice the minor deterioration from one day to the next. Excessive noise in the workplace presents a risk of hearing damage and other health problems. It is pollutants that causing the damage silently and always remain undetected. Noise pollution control is overshadowed by other types of pollutions such as air, water pollution, largely due to lack of awareness about its health implications. There are two major settings where noise occurs, viz., community noise and industrial noise. Community noise (also called environmental noise, residential noise, or domestic noise) is defined as noise emitted from all sources, except noise at the industrial workplace. Major sources of community noise are automobiles, construction work, loudspeakers, recreational activities, fireworks, etc. At a noise level of 50 dB, an adult can get moderately annoyed, and around 55 dB, seriously annoyed (Berglund et al., 1999). Constant interruptions can lead to an inability to focus, which subsequently may result in an increased level of stress. The quality of work throughout the area could suffer, and workers may have difficulty talking with clients or customers on the telephone. Employee absenteeism may rise, affecting the company's bottom line. The irritation might have resulted in minor aggravation or may have been dramatic enough to hinder their work.

Majority of the total environmental noise is caused by motor vehicles (Banerjee et al., 2008) Increasing population, transportation demands, vehicular increase, and congestion of roads are factors that have intensified traffic noise pollution significantly in recent years. An unfamiliar, intense noise can lead to agitation and interference in doing tasks, as well (Cohen et al., 1981; Ising and Michalak, 2004)

515 individuals were interviewed using a questionnaire for attitudinal responses in the city. Age distribution of the subjects was: 17% 20-30 years, 60% 31-40 years and 22% 41-50 years. The actual statistical estimation of the noise pollution levels in all areas had brought about the cause and the extent of noise pollution existing presently. The noise

pollution levels, more than the recommended permissible limits have been observed. Noise level in workplace has negative effect on human productivity which leads to decrease in organization productivity and decrease in quality and quantity of services and products. Therefore, it is recommended to control noise level of workplace and decrease it to standard level (less than 85 dB) to increase comfort and human productivity. Nevertheless, lighting and noise level effect on human productivity were noticed and changes in lighting did not have a relationship with changes of human productivity while noise affects the productivity of occupants in Automotive Assembly Industry (Jafar et al., 2013).

CONCLUSION

Strict implementation of rules against noise pollution is required. The resident welfare associations as well as business associations must be incorporated to make people aware about the ill-effects of noise pollution. Reducing exposure to excessive noise in the workplace can be accomplished in many different ways: Sound proofing of the rooms, less sound producing equipment, use hearing protection such as ear plugs or ear muffs at places of excessive noise will prove effective in reducing the effects of noise pollution.

REFERENCES

1. Clark WW, Bohn BA. (1999). Effect of noise in hearing. J Am Med Assoc. 281(17), 1658–1659. doi: 10.1001/jama.281.17.1658. [PubMed] [CrossRef] [Google Scholar]
2. Cohen Sh, Weinstein N. (1981). Nonauditory Effects of Noise on Behavior and Health. J Soc Issues. 37, 36–70.
3. Khajenasiri F, Zamanian A, and Zamanian Z. (2016). The Effect of Exposure to High Noise Levels on the Performance and Rate of Error in Manual ActivitiesElectron Physician. 8(3), 2088–2093. doi: 10.19082/2088
4. IsingH,and Michalak R. (2004). Stress effects of noise in a field experiment in comparison to reactions to short term noise exposure in the laboratory. Noise & Health. 6, 1–7. [PubMed] [Google Scholar]
5. Akbari J, Dehghan H, Azmoon H, and Forouharmajd F. (2013). Relationship between Lighting and Noise Levels and Productivity of the Occupants in Automotive Assembly Industry. Volume 2013 Article ID 527078
6. Leather P, Beale D, and Sullivan L. (2003). Noise, psychosocial stress and their interaction in the workplace. Journal of Environmental Psychology, 23(2), 213–222.
7. Lister D.B., Jenicek E.M., and Preissner P. F. (1998). Productivity and Indoor Environmental Conditions Research. An annotated bibliography for facility engineers. DTIC Document, 1998.
8. McDonald N. (1989). Jobs and their environment: the psychological impact of work in noise. The Irish Journal of Psychology, 33–50, 1989.
9. Persson-Waye K, Rylander R, Benton S, and Leventhall HG. (1997). Effects on performance and work quality due to low frequency ventilation noise. J Sound Vib. 205, 467–474.
10. Shikdar A. A. and Das B., "The relationship between worker satisfaction and productivity in a repetitive industrial task," Applied Ergonomics, vol. 34, no. 6, pp. 603–610, 2003.
11. Stansfeld SA, Matheson MP. (2003). Noise pollution: non-auditory effects on health. Brit Med Bull. 68, 243–257.

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