



Impact of industrial noise pollution on human health: A case study in the Pulwama district of J&K state

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Abstract

Study was carried out to assess the impact of noise pollution on human health created by many cement industrial plants in the Pulwama district of Jammu and Kashmir state. Manufacturing of cement requires number of processes and each process is considered as a source of noise. In this study, the sampling was done with the help of stratified random sampling method by selecting 213 respondents from all the three cement manufacturing plants located at three different industrial sites in the study area. In this study, the respondents were purposively selected on the basis of nearness i.e. those respondents were selected who are residing around the 1km from their respective cement plants. The study concludes that all the respondents health status have been affected in either Disturbance in mental peace or even Disturbance in social life due to the continuous exposure of noise created by all the three cement industrial plants in the study area.

Keywords: cement industry, environmental degradation, noise pollution, human health problems

Introduction

It is a well-known fact that we are living in the industrial period of modernisation. Man has made different kinds of industries for the fulfilment of their own needs and desires. It is a true fact that these industrial activities have increased the economic status of several industrialists on the one hand, but on the other hand, such activities have damaged the natural charming of our environment. However, these factories/industries are continuously releasing some harmful toxic substances like carbon monoxide, chlorofluorocarbons, sulphur oxides, nitrogen oxides, large quantity of dust, smoke and high intensity of noise and such poisonous pollutants have polluted the natural beauties and bounties of our God's gifted natural environment and its adverse harmful affects went to all human and other creatures health status and it is estimated that more than 50% of green house gasses are generated by human activities originated in these industrial plants which results global warming, ozone depletion, acid rains, loss of soil fertility, reduction of agricultural crops and finally scarcity of food and water, and therefore it has increased human troubles and worries (Barron, 2012) [4].

Since the advent of industrial revolution and technological advancement, economic indicators have been considered as the important criteria for measuring the goals of life standards. The industrial revolution has been accompanied by a number of growing negative impacts on the natural environment in terms of adding certain kinds of pollutants that causes several types of pollutions like air, water, soil and noise. Thus, industrialisation carried the seeds of environmental contamination, degradation, damage, assisted and abetted by both needs and greed's of man (Eleftheriou, 2002) [1].

Noise is meant as the unwanted, unpleasant and disagreeable sound that causes discomfort and it is measured by decibels (dB). Activities involved in the manufacturing of cement such

as grinding, mixing, processing, transportation and consumption are not only deplete the stock of natural resources but also adds stress and strain to the human health in the form of communication problems, unable to concentrate on work, high blood pressure, sleeping disorders and hearing impairments caused due to the high intensity of noise around the cement industrial plants (Canfeng *et al.*, 2012) [2].

Sound becomes noise at the time when it produced more than to need and such extra unwanted noise becomes noise pollution and is mainly responsible of aggression, annoyance and anxiety of the people around the industrial sites. It creates a serious threat to the safety and health of the people and has been proved from various research studies that noise more than 80 decibels can cause deafness and other hearing problems. High volume of noise leads to high adrenaline level which in turn causes the constriction of blood vessels which results mental stress, body fatigue and cardiac arrest (Sharma *et al.*, 1998) [3].

Review of existed literature

Ahmadi *et al.* (2014) [5] analysed an experimental study at Tehran cement factory to recognize and to find out the major noise pollution source machineries and its harmful impacts on the people's health living around it. In this survey, first, the mean A-weighted sound pressure level and the number of workers in each unit have been measured and the obtained data has been analyzed in Microsoft Excel. Afterwards, based on the mentioned ISO, some experiments have been done to calculate the A-weighted acoustic power level of the crusher which emits the highest intensity level of noise. The study concludes that the acoustic measurement results show that the crusher, cement mill and row mill units are the three major noise emission sources in the cement plant and have brought number of hazardous impacts on human health status.

Statement of the problem

The present study aims to analyze the impact of noise pollution created by cement industries on health by making a descriptive study in the Pulwama district of the Jammu and Kashmir State. There are three cement industrial plants located at different three industrial sites in the study area. Hence, it is very important to the researcher to investigate the harmful impacts of these industries on the health status of the people living around such cement industrial plants. Therefore, in order to reach the focussed objectives of the study, it is essential to the investigator to investigate the factors relating to the exposure of cement industrial noise pollution which causes Headache, Hypertension, Disturbance in mental peace, Loss of sleep, Communication problems, Disturbance in social life, Reading difficulties, Results in deafness, Unable to concentrate on work and Affecting physical growth.

Research Methodology

The present research study is undertaken in the Pulwama District of Jammu and Kashmir state with the following

Objectives

1. To analyse the variation of health risks caused by cement industrial noise pollution with respect to the different industrial sites in the study area.
2. To study the variations of health problems caused by cement industrial noise pollution with proportionate to different gender groups.

Hypothesis

To prove the study objectives, the investigator has framed two alternative null hypotheses:

1. There is no significant variation of health risks caused by cement industrial noise pollution with respect to the different industrial sites in the study area.
2. There is no significant variation of health problems caused by cement industrial noise pollution with proportionate to different gender groups.

Sampling

The study aims to investigate the impact of noise pollution on human health caused by the cement industrial plants in the Pulwama district of the Jammu and Kashmir State. In order to achieve the targeted objectives, the investigator has purposively selected all the three cement industrial plants located in the three different industrial sites in the study area. The three cement industrial plants include JK Cements Ltd in the area of Khrew, Mehboob Cement Ltd in the area of Wuyan and Cemtac Cement Ltd in the area of Pampore. In this study, the investigator has selected 213 respondents from the three different cement industrial sites with the help of stratified random sampling method. The researcher have selected the respondents on the basis of distance i.e those respondents have been selected who are residing within the 1kilometres around their respective cement plants.

In the Khrew industrial site, the total population within the

1km were 425 and among them the researcher has selected 85 respondents which equals to 20% population with the help of stratified random sampling method. Similarly, same procedures were also applied for both Mehboob and Cemtac Cement industrial plants. Therefore, In the Wuyan industrial site, the total population were 335 and among them the researcher has selected 67 respondents and in the Pampore industrial site, the total population were 305 and among them the researcher has selected 61 respondents. Therefore, the total population of universe is 1065, and among them, the researcher has selected 20% population of each industrial site which equals to 213 respondents with the help of stratified random sampling technique.

Tools of Data Collection

The primary data were collected with the help of structured interview schedule. To avoid the prejudice and to know the exact ground realities, the researcher has also employed the observation technique in the study area. Apart from the primary data, the secondary data were collected through the internet, books, pollution control office, newspapers, and State/district census reports.

Data Analysis and Interpretation

The collected data were classified and analysed by using the Statistical tools like simple percentage, t, Test and Two-way ANOVA model.

Table 1: Industrial site wise Distribution of the Selected 213 Respondents

Industrial Site Name	No. of Respondents	Percentage
JK Cements Ltd	85	39.90
Mahboob Cement Ltd	67	31.45
Cemtac Cement Ltd	61	28.63
Total	213	100.00

Table 1 presents the data on industrial site wise distribution of the respondents. It could be noted that out of the total 213 respondents, 39.90 percent of the respondents belongs to the JK Cements Ltd, 31.45 percent of them belongs to the Mahboob Cement Ltd and 28.63 belongs to Cemtac Cement Ltd. It could be seen that mostly respondents belongs to the JK Cements Ltd.

Table 2: Gender wise Distribution of the selected 213 Respondents

Gender Group	NO. of Respondents	Percentage
Male	126	59.15
Female	87	40.84
Total	213	100.00

Table 2 presents data on gender wise distribution of the respondents. It could be noted that out of the total 213 respondents, 59.15 percent of the respondents belongs to the male group and 40.84 percent belongs to female gender group. It is clear from the above table that the majority of the respondents belong to the male gender group.

Table 3: Industrial Site Wise Respondents' Rating to the Impact of Noise pollution on Health

Variables	JK Cements Ltd	Mehboob Cements Ltd	Cemtac Cement Ltd	Mean
Headache	2.05	2.24	2.41	2.24
Hypertension	2.38	2.90	3.01	2.79
Disturbance in mental peace	4.00	4.04	4.16	4.06
Loss of sleep	3.12	3.59	3.74	3.49
Communication Problems	2.31	2.61	2.47	2.46
Disturbance in social life	3.55	3.81	3.92	3.75
Reading difficulties	2.41	2.78	2.91	2.67
Results in deafness	2.83	3.29	3.44	3.19
Unable to concentrate on work	2.98	3.45	3.60	3.35
Affecting physical growth	2.19	2.38	2.60	2.38
Average	2.90	3.37	3.52	3.27

Source: Computed from primary data

Applying ANOVA

Source of Variation	SS	df	MS	F	F crit
Variation due to indicators of noise pollution on health	16.9832	15	1.132213	124.5236	2.014804
Variation due to cement industrial sites	1.731429	2	0.865715	95.2134	3.31583
Error	0.272771	30	0.009092		
Total	18.9874	47			

Data presented in the table 3 indicates the industrial site wise respondents' rating to the impact of noise pollution on their health status created by the cement industrial plants. It could be noted that out of the 10 impacts of noise pollution on health status, the respondents' rated the Disturbance in mental peace as their first level observed health impact caused by cement industrial noise pollution and it is evident from their secured mean score of 4.06 on a 5 point rating scale. Disturbance in social life is rated at second level health impact caused by noise pollution and it is estimated from the respondents' secured mean score of 3.75 on a 5 point rating scale. The respondents observe the Loss of sleep as their third level observed health impact caused by noise pollution and it is evident from their secured mean score of 3.49 on a 5 point rating scale. Unable to concentrate on work is the fourth level health impact caused by noise pollution and it is observed from the respondents' secured mean score of 3.35 on a 5 point rating scale. Results in deafness is rated at fifth level health impact caused by noise pollution and it could be known from the respondents' secured mean score of 3.19 on a 5 point rating scale.

The respondents rated the Hypertension as their realized sixth level impact of noise pollution on their health status and it is revealed from their secured mean score of 2.79 on a 5 point rating scale. Reading difficulties is rated at seventh level health impact caused by noise pollution and it observed from the respondents' secured mean score of 2.67 on a 5 point rating scale. Communication Problems is rated as their observed eighth level health impact caused by noise pollution and it is evident from their secured mean score of 2.46 on a 5 point rating scale. Affecting physical growth is rated at ninth level health impact caused by noise pollution and it is evident

from the respondents' secured mean score of 2.38 on a 5 point rating scale. Headache is rated at tenth level health impact caused by noise pollution and it is evident from the respondents' secured mean score of 2.24 on a 5 point rating scale.

The respondents of the Cemtac Cement Ltd in the Pompopore Industrial site ranked the first position in their overall rated impact of noise pollution caused by cement industries on health status and it is reflected from their secured overall mean score of 3.52 on a 5 point rating scale. The respondents of Mehboob Cement Ltd in the Wuyan industrial site records the second position in their overall rated impacts of noise pollution on health status and it is reflected from their secured mean score of 3.37 on a 5 point rating scale. The respondents of JK Cement Ltd in the Khrew industrial site ranks the last position in their overall rated cement industrial noise pollution impacts on health status and it is reflected from their secured overall mean score 2.90 on a 5 point rating scale.

The ANOVA two ways model is applied for further discussion. The computed ANOVA value 124.52 is greater than its tabulated value at 5 percent level significance. Hence, the variation among the overall observed impacts of cement industrial noise pollution on health status is statistically identified as significant. In another point, the computed ANOVA value 95.21 is greater than its tabulated value at 5 percent level significance. Hence, the variation among the cement industrial sites is statistically identified as significant as per the respondents rating on impacts of cement industrial noise pollution on their health status. Therefore, the established null hypothesis number 1 is rejected and the alternative hypothesis is accepted.

Table 4: Gender Wise Respondents' Rating to the Impact of Noise pollution on Health

Variables	Male	Female	Mean
Headache	2.02	2.46	2.24
Hypertension	2.51	3.06	2.79
Disturbance in mental peace	3.98	4.14	4.06
Loss of sleep	3.26	3.74	3.49
Communication Problems	2.25	2.68	2.46
Disturbance in social life	3.53	3.97	3.75
Reading difficulties	2.38	2.94	2.67
Results in deafness	2.90	3.47	3.19
Unable to concentrate on work	3.10	3.61	3.35
Affecting physical growth	2.14	2.62	2.38
Average	3.00	3.53	3.27

Source: Computed from primary data

Applying t, Test

T Statistical Value 16.38 df 15, T Critical Value 1.75

Table 4 presents the data on the gender wise respondents' rating to the impact of cement industrial noise pollution on their health status. The female respondents' rank the first position in their overall observed impact of noise pollution caused by cement industrial activities and it is evident from their secured mean score of 3.53 on a 5 point rating scale. The male respondents' take the second position in their overall observed impact of noise pollution and it is evident from their secured mean score of 3.00 on a 5 point rating scale.

The T, test is applied for further discussion. The computed t value 16.38 is greater than its tabulated value at 5 per cent level significance. Hence there is a significant difference between female respondents' and male respondents' in their overall rated impact of noise pollution caused by cement industrial activities. Therefore, the established null hypothesis number 1 is rejected and the alternative hypothesis is accepted.

Findings and Conclusion

The study reveals that there exists a significant variation between three cement industrial site wise respondents' realization to the impact of cement industrial noise pollution on their health status. However, the majority of the Cemtac Cement Ltd industrial site respondents realize the high impact of cement industrial noise pollution on their health status in terms of Disturbance in mental peace and Disturbance in social life. In addition, the study has also shown that the majority of overall respondents views to the impact of cement industrial noise pollution on their health status in the form of Disturbance in mental peace. (Table 3)

The result has found that there exists a significant variation between the gender wise respondents' views to the impact of cement industrial noise pollution on their health status. Moreover, majority of the female respondents realize the high impacts of cement industrial noise pollution on their health status in terms of Disturbance in mental peace and Disturbance in social life. In addition, it has also been found that the majority of overall respondents views to the impacts of cement industrial noise pollution on their health status in terms of Disturbance in mental peace. (Table 4)

Conclusion

The study concludes that the cement industrial noise pollution have brought several harmful impacts on the health status of the people residing around the three cement industrial sites in the study area. On the one hand, these industries has increased the economic and business standard of the people, but on the other hand, it has created number of harmful consequences on their social life of the people by giving the birth of several types of environmental pollutions like air, water, land, noise, thus created a worldwide serious threat for the protection of human health and environmental components. However, such types of pollutions not only affected human health, but it has also created unbalancing alterations in the atmospheric conditions throughout the whole region.

Suggestions

1. Relocation of cement industries from residential to non-residential areas.
2. Use of eco-technological system.
3. Compensation and free medical treatment of the victims.

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