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Air pollution and its impact on human health with proportionate to age and gender variations: A case study of JK cements Ltd, Kashmir, India

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Abstract
This paper present environmental pollutants like oxides of sulphur, oxides of nitrogen, carbon monoxide and particles of dust and smoke emitted from JK Cement Ltd and its harmful effects on human health with proportionate to age and gender variations. It is a well known fact that air pollution degrades environmental components and creates hazardous human health problems around the globe. The health of the people living around the industrial plants severely gets affected because of continuous air pollution. WHO estimates that, worldwide, at least two million people every year die prematurely due to health problems caused by lack of clean air to inhale and lack of pure water to drink. Air is the basic necessity of human life but its quality has been deteriorated through different processes of industrialisation. Cement industrial pollution is one of the major sources of air pollution and as per the report of Central Pollution Control Board; it is a one among the seventeen most polluting industries in the world. The aerial discharge of cement factories consist of several harmful pollutants affects badly human health. These harmful substances ultimately settle on the vegetation, soil and effects whole biotic life around it which results the whole ecosystem is subjected to extraordinary pressure of stress and abuse. This paper provides an intimate correlation of variations between JK Cement Ltd and human heath with proportionate to age and gender variation among the respondents residing around it.

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

Introduction

Cement industry is one of the basic units of modern infrastructural development. Cement is the most widely used building material throughout the world. With the increase in demand for cement in India too the numbers of industries are increasing in every year and both consumption and production of cement has increased greatly in recent times. Cement industry playing a great role in the environment degradation process and producing air polluting pollutants and create health hazards among human and other living things. These industries are continuously releasing some harmful, toxic and poisonous substances which includes carbon monoxide, chlorofluorocarbon, Sulphur dioxides, Nitrogen oxides and huge amount of dust, smoke and noise which badly affects human health. Cement dust particles settle on the surrounding areas forming a hard crust and causes various adverse impacts on life. These emissions are not only deteriorating air quality but also degrading human health. Emissions have local and global environment impacts, resulting global warming, ozone depletion, acid rain, biodiversity loss, loss of soil fertility, reduction of crop productivity and so on. Scientific evidence indicates that air pollution from the combustion of fossil fuels causes a spectrum of health effects from allergy to lung cancer and finally death. The results of several studies showed that these emissions are adversely affecting human health in a number of ways, like Dengue fever, Malaria, Rift Valley fever, Yellow Valley fever and some other respiratory problems.

Air and water are the important and valuable resources of the nature. All living things are directly and indirectly dependent natural resources for day to day needs and requirements and 95 % of the human needs is derived from the environment may be in terms of food, shelter, water, medicine, oxygen and much more. The environmental pollution as a result of cement industry could be defined as an undesirable process that is responsible to pollute water, air and land through its various activities, right from the mining activity of the raw material (limestone, dolomite etc.) to its crushing, grinding and other associated processes in cement plant. Cement manufacturing process is a highly energetic intensive process which involves intensive use of fossil fuel consumption which results release of toxic pollutants like nickel, cobalt, lead, chromium and such pollutants adversely affects human and other living creatures' health. Air pollution has become a major serious problem in recent times due to rapid growth of thermal power stations, cement factories, steel and coal industries. The waste products of these manufacturing units contains different particulate pollutants which affects vegetation, soil fertility, drinking water resources like wells, ponds and mine pits and human health, (Al-Neaimi *et al.* 2001; G.W. Awelka 2002) [1]

It has been estimates that the proportion of the global burden of diseases associated with air pollution hazards ranges from 23 percent to 30 percent. These estimates include infectious diseases related to inhaling impure air, drinking water, sanitation, food hygiene; respiratory diseases related to severe indoor air pollution from

biomass burning and vector borne diseases with a major environmental component like Dengue fever and Malaria. All these types of diseases contribute approximately 6 percent to the updated estimate of the global burden of disease. As the World Health Organization (WHO) highlighted that, outdoor air pollution contributes as much as 0.6 to 1.4 percent of the burden of disease in developing regions especially India, and other pollution, such as lead in water, air, and soil, may contribute 3.9 percent to all developing countries. Besides adverse impacts on human and plant body, various diseases were seen in livestock due to cement pollution such as bronchitis, calf pneumonia, coughing, eye irritation, liver abnormalities, skin allergies, impairing of reproductive function, high prevalence of sterility, (Van Rensburg *et al.*, 1966; Sana, S. 2013) [2].

Kashmir valley, a world famous health resort once known for the clean and fresh environment, is also under the severe threat of environmental pollutions because of several man made industrial activities. Major sources of air pollution in Kashmir valley are cement industries, brick kilns, stone crushers and automobile exhaust. In Kashmir valley there is a great potential to produce sufficient amount of cement for export and presently several industries are in operation in the areas like JK Cements Ltd in Khrew area of Pulwama district and Khonmoh in Srinagar district.

Review of existed literature

1. Studies have shown that adverse respiratory health effects seen in the people exposed to cement dust, exemplified in increased frequency of respiratory symptoms and decreased ventilatory function, observed among cement residents could not be explained by age, BMI and smoking thus are likely to be caused by exposure to cement dust (Al-Neaimi *et al.* 2001) [1].
2. Cement dust contains heavy metals like nickel, cobalt, lead, chromium, pollutants hazardous to the biotic environment, with adverse impact for vegetation, human and animal health and ecosystems (Baby *et al.*2008)
3. Several studies have demonstrated linkages between cement dust exposure, chronic impairment of lung function and respiratory symptoms in human population. Cement dust irritates the skin, the mucous membrane of the eyes and the respiratory system. Its deposition in the respiratory tract causes a basic reaction leading to increased pH values that irritates the exposed mucous membranes (see, Zeleke *et al.* 2010, and references cited therein).
4. Diseases such as chest pain, cough, and eye problems in the villages affected by cement dust are likely to be derived due to cement dust. Indeed, the higher percentage of related diseases occurs near the source of pollutant. A relative risk ratio assessment indicates that the exposed subjects are 7.5 and 22.5 times as likely to develop the disease during the follow-up period compared to the unexposed subjects (Yhdego 1992).

Statement of the problem

The investigator while scanning the literature found that no study have been conducted on the current research problem. The investigator found that the entire field is unexplored and after making in-depth study of different surveys, journals and other research inputs, it has been found that no systematic study have been conducted which could objectively study the impact of cement industrial pollution on human health with proportionate to age and gender variations in the study area. So, therefore keeping these points in our mind, we have chosen this problem as our current research problem. We hope this research will be useful for the planners and policy makers to frame several policies and schemes for improving the health problems facing in the study area due to JK Cement Ltd.

Research Methodology

Methodology plays an important role in each and every research process. The researcher has examined the existed literature cautiously in the area of research and assessed the ground realities existing in the study area to develop reliable methodology, sampling technique and particularly research design for the present study. The study aims to examining the variations of health problems caused by industrial pollutions with proportionate to age and gender in the study area. In order to study the variations of health problems caused by JK Cement Ltd with proportionate to age and gender, the investigator has selected two villages i,e Nogindar (1233) and Bathen (927) among the 11 villages which are within 5 kilometres around the JK Cement Ltd with the help of simple random sampling method. Among the total population of universe i,e 2160, the researched has selected (10%) population from each village which is equals to 216 respondents with the help of stratified random sampling method. Every respondent has been selected on the bases of age and gender demographic variables. The researcher has used Questionnaire scheduled method for the collection of required data in the study area. The research design used in this study is descriptive in nature and the researcher has used simple percentage and t, test statistical tools in order to analyse the correlation between cement industrial pollution and health problems among the respondents with proportionate to age and gender variations. The study is predominantly based on primary data and secondary source of data has also been used in respect of problem of the study.

Objectives of the Study

After surveyed the existed literature, the study has been carried out the following two objectives:

1. To analyse the variation of health problems caused by cement industrial pollution among the respondents with proportionate to different gender groups.
2. To analyse the variations of health problems caused by cement industrial pollution among the respondents with proportionate different age groups.

Hypothesis

In order to prove the above study objectives, the investigator has framed two alternative null hypotheses which are as under:

1. There is no significant variation of health problems caused by cement industrial pollution among the respondents with proportionate to different gender groups.
2. There is no significant variation of health problems caused by cement industrial pollution among the respondents with proportionate different age groups.

Data Analysis and Interpretation

The collected data has been analyzed by coding and tabulation. Simple percentage and ANOVA test were applied to analyze the data regarding the effects of the JK Cements Ltd on atmospheric conditions of air and its adverse impacts brought in the human health in the study area with an intention to draw a logical conclusion.

Table 1: Gender wise Distribution of the Selected 216 Respondents

Gender Group	No. of Respondents	Percentage
Male Group	131	60.64
Female Group	85	39.35
Total	216	100.00

Table 1 Shows that data on gender wise distribution of the respondents. It could be noted that out of the total 216 respondents, 60.64 percent of the respondents belongs to male group and 39.35 percent of them belongs to female group. It could be seen that mostly respondents belongs to male group.

Table 2: Age wise Distribution of the selected 216 Respondents

Age Group	NO. of Respondents	Percentage
Below 18 years	126	58.33
Above 18 years	90	41.66
Total	216	100.00

Table 2 presents data on the age wise distribution of the respondents. It could be noted that out of the total 216 respondents, 58.33 percent of the respondents belongs to the age group of below 18 years and 41.66 percent of them fall in the age group of above 18 years. It is clear from the above table that the majority of the respondents are in the age group of below 18 years.

Analysis and Interpretation

Significant variations on Health problems caused due to Air pollution with proportionate to different Gender groups

The variations on Health problems caused due to industrial air pollution with proportionate to different Gender group respondents are defined in hypothesis-1 taken up and its results are shown in the table-3, as an outcome of Independent sample t test. From the results of this Independent sample t test, it can be inferred that the t value of 3.024 corresponding to Health problems caused due to cement pollution with proportionate to different Gender groups is found to be significant at 5 percent level. Hence, hypothesis-1 is rejected at 5 percent level of significance.

Table 3: Result of t test for hypothesis-1

variable	Gender	N	Mean	Std. Deviation	Std. Error Mean	t-value	Sig
Air Pollution	Male	131	60.64	1.313	0.077	3.024	0.03
	Female	85	39.35	1.180	0.057		

Variable: Air Pollution
***Source*:** Computed from primary data

This result suggests that the variations on Health problems caused due to air pollution with different Gender groups is varying significantly with gender group considered as grouping variable. More specifically the mean value of 60.64 estimated for the gender group male is significantly higher than the estimated mean value of 39.35 for the gender group female. This result suggests that the effect of air pollution is significantly higher for the gender group male than that of female group among the respondents.

Significant variations on Health problems caused due to Air pollution with proportionate to different Age group**s**

The variations on Health problems caused due to air pollution with proportionate to different age group of below 18 years and age group of above 18 years respondents is defined in hypothesis-2 taken up and its results are shown in the table-4, as an outcome of Independent sample t test. From the results of this Independent sample t test, it can be inferred that the t value of 2.785 corresponding to Health problems caused due to industrial air pollution with proportionate to different Age groups is found to be significant at 5 percent level. Hence, hypothesis-2 is rejected at 5 percent level of significance.

Table 4: Result of t test for hypothesis-2

variable	Age	N	Mean	Std. Deviation	Std. Error Mean	t-value	Sig
Air Pollution	Below 18 years	126	58.33	0.861	0.050	2.785	0.001
	Above 18 years	90	41.66	1.080	0.053		

Variable: Air pollution
***Source*:** Computed from primary data

This result suggests that the variations on Health problems caused due to air pollution with proportionate to different Gender groups is varying significantly considered as grouping variable. More specifically the mean value of 58.33 estimated for the age group below 18 years is significantly higher than the estimated mean value of 41.66 for the age group above 18 years. This result suggests that the effects of air pollution is significantly higher for the below 18 years group than that of above 18 years among the respondents.

Major Findings

This chapter presents the major findings and conclusion arrived from the analysis carried out in the preceding chapter. The major findings of the study are summarized below:

Gender variations in health problems among respondents caused by air pollution

The variations on Health problems caused due to air pollution with proportionate to different Gender groups between male and female respondents shown in the table-1, as an outcome of Independent sample t test.

This result suggests that the variations in health problems caused by air pollution among respondents is varying significantly with different gender groups considered as grouping variable. More specifically the mean value of 60.64 estimated for the gender group males is significantly higher than the estimated mean value of 39.35 for the gender group females. This result suggests that the health problems created by cement industrial pollution in the study area are significantly higher for the gender group males than that of females among the respondents.

Age group variations in health problems caused by Air pollution among respondents

The variations on Health problems caused by cement dust air pollution with proportionate to different age groups between below 18 years and above 18 years respondents shown in the table-2, as an outcome of Independent sample t test.

This result suggests that the variations in health problems caused by air pollution among respondents are varying significantly with age groups considered as grouping variable. More specifically the mean value of 58.33 estimated for the below 18 years age group is significantly higher than the estimated mean value of 41.66 for the above 18 years age group.. This result suggests that the health problems created by cement industrial air pollution in the study area are significantly higher for the below 18 years age group than that of the above 18 years age group among the respondents.

Conclusion

The study concludes that there is a variation on health problems caused by cement industrial air pollution among respondents with proportionate to age and gender statuses. The study revealed that the age group of blow 18 years are more prone to health problems as compared with above 18 years age group. The main reason behind that the below 18 years age group are more sensitive and their bodies are intolerable for protection of over air pollution caused by JK Cements Ltd in the study area. Moreover, the study also revealed that the male gender group are more prone to health problems because mostly they are wondering in markets, agricultural fields and doing government and private jobs around this cement industrial plant and such places are more influential spots of cement dust.

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