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Original Article

# Examining the Effects of Pollution on Human Health in Developing Regions: A Descriptive Analyses

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## ABSTRACT:

Pollution causes environmental damage i.e., air, water, and land inter alia noise through human activities. The change in the atmospherically patterns affect human health. This study aimed to examine the effect of pollution on human health from different perspectives. The population was comprised of all the teachers at public secondary schools of Dera Ismail Khan. A convenient sampling technique was used to take schools and simple random sampling was used to take respondents. Fifty teachers and fifty parents from secondary schools were the samples of the study. The study employed Likert scale to collect data. The data collection instruments comprised of two section i.e., demographic and items related to measurement of the impact of pollution on the human health. The instrument reliability and validity was examined through content validity and pilot study (Cronbach alpha). Descriptive statistics were used for data analyses. The study concluded that not proper cleanliness of the road affects human health, industrial wastage materials effect on human health, transportation noises from vehicles affect human health, Transportation noises from vehicles affect human listening ability, sleeping disorder developed through noise pollution, climate change due to pollution effect on human health, due to pollution human respiratory system affected.

**Key words:** Environmental Pollution, Environmental Damages, Air, Water, Land, Noise Pollution, Effects on Human Health.

## Introduction

Pollution is a major problem of recent decades, which has a serious toxicological impact on human health and the environment. Air pollution or anthropogenic contamination has been part of human life for 500 years. With the advent of the Industrial Revolution, the world got familiarized with the unlimited development in technology, society as well as services. Yet, on the other hand, it also resulted in the emission of huge amounts of pollutants into our atmosphere with no belief in how it could affect human health. Similarly, smoke because of coal burning is one of the prime pollutants. Dockery & Arden Pope (1996) are of the view that this resulted in the emergence of countless air pollutants that proved fatal for human health. Since the beginning, several episodes have been documented that show that the elevated levels of pollutants pose serious health threats among varying populations. For example, in London; according to a study, environmental disorders resulted in a 5-day accumulation of air pollution in the form of Sulphur dioxide and smoke that reached 1500 mg/m3, which caused 4000 in a year. Likewise, in New York City, similar circumstances were recorded. Furthermore, the highest levels of air pollution were also recorded in Rio de Janeiro, Mexico City, Melbourne, Milan, Tokyo, Ankara, and Moscow (Dockery & Arden Pope, 1996). This huge level of suffering from suffering etc. demands special surveillance to safeguard the large populations concentrated in these cities to carry out their significant economic activities. It is exactly because of the flourishing economic activity in these cities that badly damaged the environment. Furthermore, numerous diseases i.e., respiratory with varying degrees of severity cause minor to major irritation also leading individuals to death, have been attributed of the individuals to their exposure to air contamination (Dockery & Arden Pope, 1996). The problem was understudying the study regarding the effect of pollution on human health. The objectives of the study were to investigate the opinion of teachers regarding the effect of pollution on human health; to investigate the causes of pollution effect on human health, and to explore the factors of pollution effect on human health. This study was significant to know about the role of exercise in controlling obesity because obesity is a very negative aspect of any individual. Through this study, the researchers rate the value and the role of exercise in controlling obesity. The study was limited to eight male secondary schools in DIKhan.

### Research Questions

1. What is the opinion of teachers concerning the influence of pollution on human health?
2. What are the causes of pollution that affect human health?
3. What are the factors of pollution that affect human health?

## Literature Review

The majority of substances considered environmental pollutants are produced through human activities such as the use of internal combustion engines (automobiles), power plants, and industrial machinery. Because these activities are performed on such a large scale, they are by far the major contributors to air pollution, with cars estimated to be responsible for approximately 80% of today's pollution. Minor sources of pollution such as lawnmowers, cooking stoves, stationary diesel fuel tanks, heaters, gasoline stations, laundries, other cleaning services, etc. are currently being evaluated as well (Moller, *et al*., 1997). Almost all sources of the exposure given above could be grouped as anthropogenic, whereas natural sources include soil erosion and evaporation of seawater inter alia the volcanic eruptions, deforestation, forest fire, etc. that produce toxic substances damaging the atmosphere and ozone layer (Pooley *et al*., 1999).

### Toxicology of Air Pollution and Environmental Damages

The impact of environmental pollutants not only affects humans but also squarely affects the health of animals too inter alia damaging the whole environment and putting in danger the geographical conditions, resulting in global warming and climate changes besides environmental variations. Air pollution is responsible for serious climatic

damage to the groundwater, soil, and air besides a threat to life diversity. Studies on the association between air pollution and reducing species diversity brought to the fore alarming and fatal effects of environmental contaminants on the extinction of animals and plant species. The air-suspended toxicants bring acid rain, temperature, and reversal due to the emission of greenhouse gases.

**Health Effects of Acute and Chronic Exposure to Air Pollutants**

The toxic effects attributed to acute exposure to air pollutants may vary widely. These are reported by several studies since the Industrial Revolution. The increasing pollutants are attributed to the increases in different cardiac and respiratory diseases and even death. These effects are not limited to one region but rather witnessed in various parts of the globe. Particularly in densely populated highly industrialized regions (Holland *et al*., 1979). The most toxic effect of acute exposure to environmental pollutants is death as reported by several research findings that associated it with exposure to ozone, sulfates, and particulate matter (PM) (Dockery & Pope, 1994). One can dispute this association; however, this association can be disputed; however, a major cause of death is associated with the route of exposure (Schwartz, 1994a).

Most of the research findings report increased mortality because of respiratory diseases. In such an instance, it could be attributed to human exposure to air pollution. Further deaths are reported due to cardiovascular ailments, which is considered as an indirect effect of environmental pollutants. Therefore, deaths attributable to air pollution exposure happen among individuals who are already suffering from respiratory or cardiac diseases, and this death among these vulnerable are occurring within 1 to 5 days after their exposure to the hazardous (Cropper, 1999, 2000). The people at the extremes of the life cycle especially infants and the elderly demonstrate increased deaths linked to exposure to sulphates and PM. In all cases, the mechanisms leading to death the almost identical i.e., toxic effects on the less efficient biological defense mechanisms inter alia the smoking habits since smokers have a 30% reduced lung capacity in comparison to non-smokers in the same age group(Wilson *et al*., 1996). Likewise, a large number of cases of acute conditions have also been documented that are linked with air pollutants exposure including diseases like respiratory tract, pneumonia, chronic obstructive pulmonary disease, bronchitis, and cough together with phlegm.

Most recently, studies have been conducted to determine the impacts of chronic exposure over prolonged periods. A blend of data related to chronic exposure is an exceptionally intricate job because of the multiple factors associated with identical kinds of symptoms, for example, according to Schlesinger *et al*. (1995), active and passive smoking behavior low-level nutrition, etc. It is hard to determine a single agent that could account for cancer. Although the health effects of chronic exposure are identical to those of acute exposure. However, it is reported that increased mortality among elderly individuals due to respiratory and cardiovascular issues is the major cause of death (Borja, 1997). Diseases such as bronchitis have been found related to chronic exposure. Cancer is the most chronic effect of individual exposure to air pollutants; around 70 to 80% of all kinds of cancer are the effects of exposure to ecological pollutants. Likewise, the mutagenic properties of numerous materials have been found to be the principal cause of the disease because it is the mutation that transforms a normal cell into a cancerous one. However, over-activation of regulatory enzymes might result in cellular change, where chronic inflammatory conditions result in the development of cancer.

Our exposure to pollutants in the atmosphere i.e., transition metals is one of the causes of chronic inflammatory conditions because of the changed secretion of reactive intermediaries of oxygen i.e., O2.-, OH and H2O, and nitrogen "NO. & ONOO-"influenced by amplified secretion of a cytokine which affects the production of reactive intermediaries. It results in the activation of long-term macrophages; thus, constant inflammation results in the lesions of a tissue or cancer (Martin *et al*. 1997). In both instances i.e., chronic as well as acute exposure, contaminations are visible to a multifaceted blend of compounds whose collective toxic impacts may vary from one another as a separate compound. Thurston and Ito (1999) in their research used volunteers to expose them to the ozone with and without

prior exposure to H2SO4. They reported that those from the pre-exposed group suffered a more severe toxic impact as compared to the second group with no history of pre-exposing. There are other more toxic substances that an individual compound might cause cancer including, for example, SO2 - Ozone, SO2 - black smoke, and PM10 - ozone (Katsouyanni, 1995). These facts led us to develop some models and protocols to investigate the diverse interactions in the air (Samet, *et al.*, 1998).

**Ozone**

Ozone is the lowest soluble but at the same time, it is a highly reactive gas that is produced in the troposphere through reactions led by sunlight containing volatile organic compounds and nitric oxides. It is somewhat exhausted in the upper airways if it is inhaled. Yet its major portion also reaches the lower airways. During the due course, it might react with uric acid produced by the human airway's sub-mucosal glands. It exists around mmol/l foci in the human nasal surface liquid. Studies have projected a few of the toxic products are the result of the reaction of the latter one (hydroxy hydroperoxides, hydroxy aldehydes). Accordingly, it is one of the significant mediators of ozone effects on epithelium. According to Bromberg (1999), the ozone per se could not even touch the epithelial cell apical membrane in shepherding the airways. The quantity of ozone increases interaction with the surface liquid sharply decreases the surface liquid to thin. Accordingly, the highest epithelial tissue dose is projected by the lethal bronchiole-respiratory bronchiole area. The sampling of the Bronchoscope together with airways specifies a considerable portion (35%) of orally inspired ozone goes into the upper airway and trachea thus ozone in exhaled air is narrow. Thus, initially, the expired volume signified airways' dead space (Bromberg, 1999). That breath yields toxicity in great airways is reinforced by proof of ciliated cell loss along with an augmented epithelial mitotic index neutrophilic inflammation particularly, it increases the bronchial artery blood flow in sheep. This appears as a symptom of cough and substernal pain intensified by deep inspiration among humans (Bromberg, 1999).

**Population Vulnerability**

Each person has a unique vulnerability to environmental pollutants and risk level among every person is determined by their biology, age, and genetics. Particularly, those who are at high risk and are at the extremes of their life cycles with the existence of severe cardiac and respiratory diseases as well as low nutritional conditions besides medication (Wilson, *et al*., 1996). An example could be that of changing individual risks is explained in a study that evaluated the maximum expiratory flow among healthy kids, kids with insignificant respiratory sickness, kids with asthma, and kids that have or don't have pharmacological treatment but are all equally exposed to numerous ecological contaminants. The study reported a significant relationship between exposure and disease among the kids with asthma only who were going under pharmacological treatment Roemer, *et al*., 1999). Likewise, Speizer (1999) also reported similar findings, according to him, the adults who were suffering from asthma were found to be highly subtle to the exposure of SO2. Inter alia, different elements of vulnerability associated with respiratory diseases were found among the certain genetic vulnerability, enzymatic isotypes concerning the metabolism of environmental xenotoxins for example, cytochrome P-450 family, glutathione s-transferase, besides the enzymes in repairer of DNA (Moller *et al*. 1994). Ghio, *et al*. (1999), however also considered age as the most significant factor among the pre-adolescents (< 14 years) and the aged (> 66) at highest risk.

**Effects of Particulate Matter and Ozone on Human Health: A Meta-Analysis**

To assess the health dangers and associated costs because of environmental pollution i.e., Ozone and PM10 in Pakistan, the air poor quality due to contamination is considered as the principal cause and changes in the variations in the rate of contrary health effects. This part of the article gives an overview of the method used in the study to infer the concentration-response functions. While reviewing the existing studies, we have found that the amount of published research concerning the impacts of air pollution on health is increasing with each spell of a new day. Therefore, researchers have decided to recapitulate some national and international publications employing meta-analysis, which focuses on the combination of the results of the existing studies to find reliable and consistent patterns.

The studies point that because of the rapid changes and developments in the epidemiology since 1960s, we see an enormous increase in the volume of publications, yet the classical narrative review is now considered inappropriate in the field.

Although several limitations are attributed to Meta-analysis including Heterogeneity as well as publication bias. Blettner (1999) however suggested the use of pooled estimates with care if heterogeneity between studies is high. He is of the view that only conventional statistical analysis with fixed effects yields sampling error, and it does not consider the heterogeneity because of the differences in the samples. Thus, in case of the existence of any heterogeneity then the random models resultantly integrate changes between studies by assumption i.e., each study has its true exposure effects as well there is a casual dissemination among the true exposure effects on the main effect. However, one other, if heterogeneity is presumed then random effects could be very rare and limited which is insufficient to adequately explain the heterogeneity between different studies, because it simply tells us the arcane statistical difference. Therefore, heterogeneity between studies must result in the watchful analysis of differences in the sources for example, differences among the demographics features i.e., household conditions, particle composition, employed statistical models, and confounders control, etc.

## Methods

This research aimed to understand the perceptions of various stakeholders regarding the role of exercise in controlling obesity. This study has adopted the descriptive design and survey method suggested by Burns and Grove (2003). Ngwome (2012) stated that a survey helps collect data from the sample as it is a valid and reasonable tool, Reiter and Chenail (2017). Shared similar views.

The population of this was all the teachers in the public secondary schools in Dera Ismail Khan. For sampling, we followed the guidelines of Taherdoost (2016) and Ahmad (2007) according to the nature and purpose of the study, so we employed a convenient sampling technique using random methods and the sample size was 50 teachers and 50 parents.

### Instrument of Study

According to Vithal and Jansen (2012), it is vital to use a reliable and valid instrument to collect first-hand primary. We use a 5-point self-administered Likert-type instrument, as it is best to collect onion through survey research with sections one related to the demographic profile and second related to the main research questions.

### Reliability

Gass and Mackey (2007) recommended the use of a reliable and valid instrument. The instrument used in this study initially comprised 30 items that passed through a validation process. At first instance, 15 experts' views were taken. In light of their views, items were reorganized and arranged logically, whereas a few of the irrelevant and repeated items were found and deleted. Then a pilot study suggested by (Burino, *et al*., 2017) was undertaken and administered the questionnaire to 20 accessible representative samples. Some ambiguity was found and hence corrected. Cronbach's Alpha value was above .83 which showed that the instrument is consistent and reliable.

### Data Collection Procedure

Keeping in view the research ethics (Leduc, 2008) we have collected the data through a self-administering questionnaire. Existing studies were reviewed for secondary data. In the survey, a few questionnaires were also administered through school leaders and teaching staff. The researcher systematically channeled each respondent how to fill out the questionnaire.

## Data Analysis and Interpretation

**Table 1**

*Air pollution affects human health.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 13 | 49 | 7 | 11 | 0 | 80 |
| Percentage | 15% | 62.5% | 10% | 12.5% | 0% | 100% |

The majority of respondents i.e., teachers 77.5% agreed that Air pollution affects human health. However, few of the respondents i.e., teachers 12.5% have disagreed. Some of them few of the respondents i.e., teachers 10% could not decide in favor or against.

**Table 2**

*Harmful gases affect human health.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 12 | 58 | 6 | 4 | 0 | 80 |
| Percentage | 15% | 72.5% | 7.5% | 5% | 0% | 100% |

The majority of respondents i.e., teachers 87.5% agreed that harmful gases affect human health. However, few of the respondents i.e., teachers 5% have disagreed. Some of the respondents i.e., teachers 7.5% could not decide in favor or against.

**Table 3**

*Through air pollution skin diseases increased*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 8 | 50 | 12 | 10 | 0 | 80 |
| Percentage | 10% | 62.5% | 15% | 12.5% | 0% | 100% |

The majority of respondents i.e., teachers 72.5% agreed that through air pollution skin diseases increased. However, few of the respondents i.e., teachers 12.5% have disagreed. As some of them few of the respondents i.e., teachers 15% could not decide in favor or against.

**Table 4**

*Dust effects on human health.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 10 | 50 | 12 | 8 | 0 | 80 |
| Percentage | 12.5% | 62.5% | 15% | 10% | 0% | 100% |

The majority of respondents i.e., teachers 75% agree that Dust affects human health. However, some respondents i.e., teachers 10% disagreed. As few of the respondents i.e., teachers 15% could not decide favor or against.

**Table 5**
*Not proper cleanliness of the road affects human health.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 9 | 60 | 6 | 5 | 0 | 80 |
| Percentage | 11.25% | 75% | 7.5% | 6.25% | 0% | 100% |

The majority of respondents i.e., teachers 86.25% agreed that not having proper cleanliness of the road affects human health. However, a few of the respondents i.e., teachers 6.25% disagreed. Few of the respondents i.e., teachers 7.5% could not decide in favor or against.

**Table 6**
*Industrial waste materials affect human health.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 10 | 50 | 10 | 10 | 0 | 80 |
| Percentage | 12.5% | 62.5% | 12.5% | 12.5% | 0% | 100% |

The majority of respondents i.e., teachers 75% agreed that Industrial waste materials affect human health. However, a few of the respondents i.e., teachers 12.5% disagreed. Some of the respondents i.e., teachers 12.5% could not decide in favor or against.

**Table 7**
*Mining activities affect human health.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 8 | 54 | 8 | 10 | 0 | 80 |
| Percentage | 10% | 67.5% | 10% | 12.5% | 0% | 100% |

The majority of respondents i.e., teachers 77.5% agreed that Mining activities affect human health. However, few of the respondents i.e., teachers 12.5% have disagreed. Some of the respondents i.e., teachers 10% could not decide in favor or against.

**Table 8**
*Transportation noises from vehicles affect human health.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 8 | 56 | 10 | 6 | 0 | 80 |
| Percentage | 10% | 70% | 12.5% | 7.5% | 0% | 100% |

The majority of respondents i.e., teachers 80% agreed that Transportation noises from vehicles affect human health. However, a few of the respondents i.e., teachers 7.5% disagreed. A few of the respondents i.e., teachers 12.5% could not decide in favor or against.

**Table 9**

*Transportation noises from vehicles affect human listening ability.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 12 | 50 | 8 | 10 | 0 | 80 |
| Percentage | 15% | 62.5% | 10% | 12.5% | 0% | 100% |

The majority of respondents i.e., teachers 77.5% agreed that Transportation noises from vehicles affect human listening ability. However, a few of the respondents i.e., teachers 12.5% disagreed. As some of the respondents i.e., teachers 10% could not decide in favor or against.

**Table 10**

*Sleeping disorders develop through noise pollution.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 10 | 52 | 8 | 10 | 0 | 80 |
| Percentage | 12.5% | 65% | 10% | 12.5% | 0% | 100% |

The majority of respondents i.e., teachers 77.5% agreed that Sleeping disorders developed through noise pollution. However, few of the respondents i.e., teachers12.5 percentage disagreed. As a few of the respondents i.e., teachers 10% could not decide in favor or against.

**Table 11**

*Noise pollution creates a communication problem.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 9 | 50 | 12 | 9 | 0 | 80 |
| Percentage | 11.25% | 62.5% | 15% | 11.25% | 0% | 100% |

The majority of respondents i.e., teachers 73.75% agreed that Noise pollution creates communication problems. However, of the respondents, i.e., teachers 11.25% disagreed. A few of the respondents i.e., teachers 15% could not decide in favor or against it.

**Table 12**

*Land pollution affects humanity's level.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 10 | 54 | 6 | 10 | 0 | 80 |
| Percentage | 12.5% | 67.5% | 7.5% | 12.5% | 0% | 100% |

The majority of respondents i.e., teachers 80% agreed that Land pollution affects humanity level. However, few of the respondents i.e., teachers 12.5% disagreed. Some of the respondents i.e., teachers 7.5% could not decide in favor or against.

**Table 13**

*Light waves affect human health.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 12 | 50 | 10 | 8 | 0 | 80 |
| Percentage | 15% | 62.5% | 12.5% | 10% | 0% | 100% |

The majority of respondents i.e., teachers 77.5% agreed that Light waves affect human health. However, some of the respondents i.e., teachers 10% disagreed. A few of the respondents i.e., teachers 12.5% could not decide in favor or against.

**Table 14**

*Climate change due to pollution effects on human health*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 12 | 50 | 8 | 10 | 0 | 80 |
| Percentage | 15% | 62.5% | 10% | 12.5% | 0% | 100% |

The majority of respondents i.e., teachers 77.5% agreed that Climate change due to pollution affects human health. However, few of the respondents i.e., teachers 12.5% disagreed. A few respondents i.e., teachers 10% could not decide in favor or against.

**Table 15**

*Due to pollution, the human respiratory system is affected.*

| Options | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Teachers | 8 | 56 | 10 | 6 | 0 | 80 |
| Percentage | 10% | 70% | 12.5% | 7.5% | 0% | 100% |

The majority of respondents i.e., teachers 80% agreed that Due to pollution human respiratory system was affected. However, a few of the respondents i.e., teachers 7.5% have disagreed. Some of them i.e., teachers 12.5% could not decide in favor or against.

## Discussion and Conclusion

The purpose of this research was to understand the effect of pollution on human health. The principal aim of the study was to investigate the perception and the opinion of teachers regarding the causes as well as the effect of pollution on human health. To achieve these objectives, research questions formulated include what the opinion of teachers regarding the effect of pollution on human health is. What are the causes of pollution that affect human health? What are the factors of pollution that affect human health? The population was comprised of all the teachers at secondary schools in Dera Ismail Khan. A total of eight male secondary schools in Dera Ismail Khan were selected through a convenient sampling technique. Based on the main results, the study concluded that the majority of respondents i.e., teachers agree that Air pollution and harmful gases affect human health. It also causes ever-increasing skin diseases. The contamination of air and unhygienic living environment besides industrial waste also affects air as well as human health. Noise pollution and gas emissions from vehicles affect human listening ability, and it results in sleeping disorders too. With this context, climate change due to pollution affects human health mainly bringing respiratory, skin, and cancerous diseases.

## Declaration of Interest

The authors declare that there is no clash of interest.

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