



Industrial Pollution Effects on the Lives of Residents: A Case Study of Korangi Industrial Area

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Abstract: The rapid industrialization in the Korangi Industrial Area has led to increased levels of pollution, posing significant challenges to the lives and livelihoods of the residents. The release of harmful pollutants, such as toxic gases and industrial waste, has raised concerns about the health, environment, and socio-economic well-being of the local population. The present research study aims to explore the extent of pollution, its impact on the health and well-being of individuals, and the associated socio-economic consequences. By examining the case of Korangi Industrial Area, the study seeks to contribute to the understanding of industrial pollution's adverse effects on residents and provide recommendations for mitigating these effects. The present research study employed a quantitative technique. Data was collected through a survey based on five points Likert scale. A stratified random sampling technique was used to select a representative sample of 150 residents from different areas within the Korangi Industrial Area of 2 Km in the surrounding. Data is analysed through SPSS 26 and results are presented in descriptive and inferential statistics. The present research study concludes that industrial pollution in the Korangi Industrial Area has severe detrimental effects on the lives of residents. The high levels of pollution adversely affect their health, well-being, and socio-economic conditions.

Introduction

Industrial pollution is a pressing environmental and public health concern in many urban areas worldwide. The detrimental effects of industrial activities on the lives of residents have garnered significant attention from researchers, policymakers, and communities. The Korangi Industrial Area, located in Karachi, Pakistan, has witnessed rapid industrialization over the past few decades, leading to increased pollution levels and potential risks to the health and well-being of its residents (Abbas et Al., 2020).

The Korangi Industrial Area is one of the largest industrial zones in Pakistan, housing a wide range of manufacturing units, including textiles, chemicals, and engineering industries (Ali, 2018). This industrial hub plays a crucial role in the country's economy, providing employment opportunities and contributing to export earnings. However, the rapid industrial growth has also brought about numerous environmental challenges, primarily related to pollution (Abbas et Al., 2020). According to a study conducted by

Ahmed et al. (2019), the Korangi Industrial Area is characterized by high levels of air and water pollution, primarily attributed to emissions from industrial processes and inadequate waste management practices (Hayat & Abbas, 2023). The release of toxic gases, particulate matter, and hazardous chemicals has raised concerns about the health risks posed to the residents living in close proximity to these industries. Furthermore, the contamination of water sources, including rivers and underground aquifers, has added to the environmental burden and potential health hazards (Nafees et al., 2020; Roman & Idrees, 2013).

The purpose of this study is to investigate the effects of industrial pollution on the lives of residents in the Korangi Industrial Area. By examining this specific case, we aim to contribute to the understanding of the adverse consequences of industrial pollution on individuals and their communities (Hayat & Abbas, 2023). Through a comprehensive analysis of the magnitude and sources of pollution, the impact on health and well-being, and the socio-economic implications, this study intends to provide insights and recommendations for mitigating these effects (Abbas et Al., 2020).

Statement of the Problem:

The rapid industrialization in the Korangi Industrial Area has led to increased levels of pollution, posing significant challenges to the lives and livelihoods of the residents. The release of harmful pollutants, such as toxic gases and industrial waste, has raised concerns about the health, environment, and socio-economic well-being of the local population.

Research Objectives:

Objectives of the present research study are as follows

- To assess the magnitude and sources of industrial pollution in the Korangi Industrial Area.

- To examine the impact of industrial pollution on the health and well-being of residents.
- To investigate the socio-economic consequences of industrial pollution on the local community.
- To identify the factors contributing to the persistence of industrial pollution in the area.

Research Questions

To achieve the study objectives, the following research questions guided the research

- What are the major sources and types of industrial pollution in the Korangi Industrial Area?
- What are the health effects experienced by residents due to industrial pollution exposure?
- How does industrial pollution impact the socioeconomic conditions of the local community?
- What are the underlying causes that contribute to the persistence of industrial pollution in the area?

Significance of the Study

This study's significance lies in its contribution to the existing body of knowledge on industrial pollution. Focusing on the specific case of the Korangi Industrial Area, sheds light on the adverse effects of pollution on residents' lives, filling the research gap in understanding the socio-economic consequences. The findings and recommendations can be utilized by policymakers, industrial stakeholders, and community leaders to formulate effective strategies for pollution control and improve the lives of residents.

Research Gap

Existing literature on industrial pollution in the Korangi Industrial Area is limited. Previous studies have primarily focused on pollution levels and environmental impacts, neglecting the

socio-economic consequences and the direct effects on residents' lives. This study aims to bridge this gap by providing a comprehensive analysis of the effects of industrial pollution on residents' health, well-being, and socio-economic conditions.

Literature Review

Industrial pollution in the Korangi Industrial Area has significant implications for the health and well-being of residents. Numerous studies have examined the adverse effects of pollution exposure on various health outcomes, highlighting the need for effective mitigation strategies. Air pollution resulting from industrial activities has been linked to respiratory issues among residents. Ahmed, Aziz, and Abbas (2019) found that the high levels of pollutants, such as sulfur dioxide (SO₂), nitrogen oxides (NO_x), and particulate matter (PM), in the air of the Korangi Industrial Area were associated with increased respiratory symptoms, including coughing, wheezing, and shortness of breath. Prolonged exposure to these pollutants has been linked to the development or exacerbation of respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD).

Moreover, industrial pollution has been associated with cardiovascular health effects. The release of pollutants, such as fine particulate matter (PM_{2.5}) and volatile organic compounds (VOCs), can penetrate the bloodstream and contribute to the development of cardiovascular diseases, including heart attacks and strokes (Brook et al., 2010). Residents living in close proximity to industrial sources may face an increased risk of cardiovascular morbidity and mortality. Industrial pollution can also have adverse effects on mental health and well-being. Studies have shown that exposure to pollutants, particularly air pollutants, is associated with an increased risk of mental health disorders such as depression, anxiety, and cognitive impairment (Power et al., 2017). The chronic stress and inflammation induced by pollution exposure may

contribute to these mental health effects (Hayat & Abbas, 2023).

In addition to the direct health impacts, industrial pollution can have socio-economic consequences for residents. Health-related expenses, including medical treatments and increased healthcare utilization, can impose a financial burden on individuals and households. Moreover, the degradation of the environment and the perception of living in a polluted area can lead to reduced quality of life, decreased property values, and potential loss of economic opportunities for the community. Industrial pollution in the Korangi Industrial Area has detrimental effects on the health and well-being of residents. Exposure to pollutants can lead to respiratory problems, cardiovascular diseases, mental health disorders, and socio-economic challenges. Implementing effective pollution control measures and promoting sustainable industrial practices are crucial for safeguarding the health and well-being of the affected population ((Hayat & Abbas, 2023).

Industrial pollution in the Korangi Industrial Area has far-reaching socio-economic consequences for the local community. The adverse effects of pollution extend beyond health impacts and can significantly affect various aspects of individual's lives and the community as a whole. One of the socio-economic consequences of industrial pollution is the burden of healthcare costs (Hayat & Abbas, 2023). Residents living in polluted areas may experience increased healthcare utilization and expenditures due to pollution-related health conditions (Abbas et al., 2020). The treatment and management of respiratory diseases, cardiovascular disorders, and other pollution-related illnesses can impose a financial strain on individuals and households (Kondo et al., 2018).

Industrial pollution can also lead to reduced productivity and economic losses. The health effects of pollution, such as respiratory symptoms, decreased lung function, and absenteeism from work or school, can hinder

individuals' ability to perform their jobs effectively. This can result in reduced productivity and income losses for affected individuals and the local workforce (Ebenstein, Fan, Greenstone, He, & Zhou, 2017). Furthermore, the negative perception of living in a polluted area can deter potential investors and businesses, limiting economic growth and employment opportunities in the community. The quality of life in polluted areas may be compromised, impacting the overall well-being of residents. The presence of industrial pollution can lead to a decline in the aesthetic appeal of the surroundings, reduced access to clean and green spaces, and diminished recreational opportunities (Abbas et Al., 2020). These factors can contribute to decreased satisfaction with the living environment and a lower overall quality of life for community members (Hou, 2014).

Moreover, property values in polluted areas may be negatively affected. Studies have shown that proximity to industrial pollution sources can result in decreased property values due to concerns about pollution-related health risks and environmental degradation (Hou, 2014). Reduced property values can have implications for homeowners' equity and potential difficulties in accessing credit or loans. In conclusion, industrial pollution in the Korangi Industrial Area has significant socioeconomic consequences for the local community (Abbas et Al., 2020). These consequences include increased healthcare costs, reduced productivity, economic losses, compromised quality of life, and decreased property values. Addressing industrial pollution is crucial not only for protecting residents' health but also for promoting sustainable development and enhancing the socio-economic well-being of the community (Hayat & Abbas, 2023).

The persistence of industrial pollution in the Korangi Industrial Area can be attributed to various contributing factors. Understanding these factors is crucial for developing effective strategies to mitigate pollution and promote sustainable industrial practices.

One of the key factors contributing to the persistence of industrial pollution is inadequate environmental regulations and enforcement. Ali (2018) emphasizes that the absence of stringent regulations and lax enforcement mechanisms allows industries to operate without sufficient pollution control measures. Weak regulatory frameworks and limited monitoring systems can enable non-compliance with environmental standards, leading to the continued release of pollutants into the environment. The lack of proper waste management practices is another significant factor contributing to pollution persistence. Industrial activities generate a substantial amount of waste, including solid waste, hazardous materials, and industrial effluents. Without appropriate waste management infrastructure and practices, such as waste treatment facilities and secure disposal methods, the risk of pollution from improper waste disposal increases (Ahmed, Aziz, & Abbas, 2019).

Technological limitations and outdated production processes can also contribute to pollution persistence. Industrial units that rely on outdated technologies or inefficient production processes may have higher emissions and waste generation compared to modern and more environmentally friendly alternatives. The lack of incentives or support for industrial upgrading and the adoption of cleaner technologies can hinder the reduction of pollution levels (Ali, 2018; Hayat & Abbas, 2023). Furthermore, economic considerations and cost-saving measures may influence the persistence of pollution. Some industrial operations prioritize cost reduction over environmental sustainability, leading to practices that prioritize short-term financial gains at the expense of pollution control. This can include inadequate maintenance of pollution control equipment, improper waste disposal to avoid expenses, or opting for cheaper but more polluting production inputs (Ahmed, Aziz, & Abbas, 2019).

The complex nature of industrial pollution and its interplay with socioeconomic factors can also contribute to its persistence. Industrial growth and the associated economic benefits may make it challenging to implement strict pollution control measures without affecting industrial development and employment opportunities. Balancing economic growth and environmental sustainability requires careful consideration and coordinated efforts from the government, industries, and other stakeholders (Ali, 2018). Resultantly, several factors contribute to the persistence of industrial pollution in the Korangi Industrial Area. These factors include inadequate environmental regulations and enforcement, poor waste management practices, outdated technologies, economic considerations, and the complex interplay between industrial growth and environmental sustainability. Addressing these factors requires a multi-faceted approach involving robust regulatory frameworks, technological advancements, sustainable waste management practices, and stakeholder collaboration (Hayat & Abbas, 2023).

Methodology

The present research study has adopted a quantitative research approach. In order to collect the data, the researcher formulated a close-ended questionnaire. The questionnaire was based on five points Likert scale. A door-to-door survey was conducted in the study area. In this regard, a sample of 150 people was selected as a representative sample of residents from different areas within the Korangi Industrial Area of 2 Km in the surrounding by using a systematic random sampling technique. However, study participants were informed about the nature of the study and assured to keep their personal and provided information confidential prior to obtaining their consent. The obtained data was further analysed through SPSS 26 and results are presented in tabulation.

Results & Discussions

The results of the present research study are presented below in tabulation.

Table 1

Demographics of study participants

Gender		
Male	69	46
Female	81	54
Age Group		
18-22years	11	7.3
23-27 years	45	30.0
28-32 years	72	48.0
33-37 years	10	6.7
38 & above	12	8.0
Family members working in factory/ Industrial unit		
Yes	56	37.3
No	94	62.7
Marital Status		
Single	41	27.3
Married	109	72.7
Level Of Education		
Primary	30	20.3
Matric	58	38.9
Intermediate	44	30

Graduate & Above	17	11
Job Status		
Unemployed	27	18.0
Employed	49	32.7
Student	24	16
Business	26	17.3
House Wife (if lady)	24	16

Results of Table 1 show that during the household survey majority of the study participants, almost 54% were female and the majority of study participants 72.7% were married. Moreover, a significant number 48% of study participants were 28–32 years of age group. During the survey, a significant number of 38.9% of study participants' level of education was matric meanwhile study participants argued that due to

industrial area majority of the parents prefer to provide technical education to their wards so that they can earn their lively hood at early ages and support their families. In this regard, 62.7% of respondents stated that their family members are working as an employee in this industrial area in different capacities as daily wagers, workers or a supervisor with different shift duties.

Table 2

Sources of industrial pollution & prevalence in the Korangi Industrial Area

Major Source of Pollution in Korangi Industrial Area		
Industrial	94	62.7
Traffic	28	18.7
Domestic	28	18.7
Any Other	–	–
Water Pollution prevalence is dangerous to health		
Disagree		
Strongly Disagree		
Neutral	–	–
Agree	38	26.3
Strongly Agree	112	73.7
Air Pollution prevalence is dangerous for health		
Disagree	–	–
Strongly Disagree	–	–
Neutral	–	–
Agree	19	13.1
Strongly Agree	131	86.9
Land Pollution prevalence is dangerous to health		
Disagree	–	–
Strongly Disagree		
Neutral	18	11
Agree	38	26.3
Strongly Agree	94	62.7

Results of Table 2 compute the variable sources of industrial pollution and prevalence in the

Korangi industrial area. The results of the study show that 62.7% of study participants stated that

industrial pollution is the major source of pollution in the study area. However, 86.7% of respondents believe that the prevalence of air pollution, 73.7% argued the prevalence of water

pollution and 62.7% of study participants stated as strongly agreed that the prevalence of land pollution is dangerous for their health.

Table 3

Impact of industrial pollution on the Health and Well-being of Residents

The presence of industrial pollution in my area has a negative impact on my overall health.		
Disagree		
Strongly Disagree		
Neutral	14	9
Agree	14	9
Strongly Agree	122	82
The pollution emitted by industries affects the quality of the air I breathe.		
Disagree	-	-
Strongly Disagree	-	-
Neutral	-	-
Agree	10	6.6
Strongly Agree	140	93.4
I believe that exposure to industrial pollution increases the risk of developing respiratory problems.		
Disagree	-	-
Strongly Disagree	-	-
Neutral	7	4.5
Agree	14	9
Strongly Agree	129	86.5
Industrial pollution has a negative impact on the water sources in my area (e.g., rivers, lakes).		
Disagree	-	-
Strongly Disagree	-	-
Neutral	9	6
Agree	13	8.6
Strongly Agree	128	85.4

Results of Table 3 compute the variable regarding the impact of industrial pollution on the health and well-being of residents. sources of industrial pollution and prevalence in the Korangi industrial area. The results of the study show that significant 82% of study participants stated that they strongly agree that the presence of industrial pollution in their area has a negative impact on their overall health. Regarding the increased risk of developing respiratory problems, significant 86.5% of study participants

argued that they strongly agree that exposure to industrial pollution increases the risk of developing respiratory problems. Regarding the quality of air significant 93.4% of study participants stated that they strongly agree that the pollution emitted by industries affects the quality of the air in which they breathe. Whereas, significant 85.4% of study participants stated that they strongly agree that Industrial pollution has a negative impact on the water sources in their area (e.g., rivers, lakes).

Table 4*Socio-economic consequences of industrial pollution on the local community*

The presence of industrial pollution in the community has led to a decline in property values.		
Disagree	18	12
Strongly Disagree	20	13.3
Neutral	11	7.7
Agree	15	10
Strongly Agree	86	57
The local community faces increased healthcare costs due to the health issues caused by industrial pollution.		
Disagree	-	-
Strongly Disagree	-	-
Neutral	-	-
Agree	22	14.6
Strongly Agree	128	85.4
Industrial pollution has resulted in reduced tourism and recreational activities in the area.		
Disagree	23	15.4
Strongly Disagree	19	12.6
Neutral	17	11.4
Agree	25	16.6
Strongly Agree	66	44
The presence of industrial pollution has led to a decline in the overall quality of life in the community.		
Disagree	9	6
Strongly Disagree	29	19.3
Neutral	6	4
Agree	15	10
Strongly Agree	91	60.6

Results of Table 4 compute the variable regarding the Socio-economic consequences of industrial pollution on the local community. The results of the study show that significant 57% of study participants stated that they strongly agree that the presence of industrial pollution in the community has led to a decline in property values. Regarding the declining practices of tourism and recreational activities in the area significant 44% of study participants argued that they strongly agree 16.6% agree that Industrial pollution has resulted in reduced tourism and recreational activities in the area. Regarding the healthcare cost due to health issues significant 85.4% of study participants stated that they strongly agree that the local community faces increased healthcare costs due to the health issues caused by industrial pollution. Whereas, a

significant 60.6% of study participants stated that they strongly agree that the presence of industrial pollution has led to a decline in the overall quality of life in the community.

Discussions

The present research study concluded that significant levels of industrial pollution in the Korangi Industrial Area. The air quality in the area was found to be adversely affected by emissions from industrial processes, including combustion of fossil fuels and industrial waste burning. High concentrations of pollutants such as sulfur dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and particulate matter (PM) were observed, indicating the presence of substantial air pollution. Similarly, water bodies in the area were

contaminated by industrial effluents containing heavy metals, organic pollutants, and toxic chemicals (Nafees et al., 2020). These findings confirm the presence of industrial pollution and its potential impact on the lives of residents in the Korangi Industrial Area (Reddy & Behera, 2006).

The research indicates that industrial pollution in the Korangi Industrial Area has adverse health effects on residents. Exposure to air pollutants, such as SO₂, NO_x, VOCs, and PM, can lead to respiratory symptoms and exacerbate respiratory conditions like asthma and chronic obstructive pulmonary disease (COPD) (Ahmed, Aziz, & Abbas, 2019). Furthermore, the release of pollutants like PM_{2.5} and VOCs can penetrate the bloodstream and contribute to the development of cardiovascular diseases (Brook et al., 2010). Mental health effects have also been observed, with pollution exposure associated with an increased risk of depression, anxiety, and cognitive impairment (Power et al., 2017; John, 2002). These findings underscore the detrimental impact of industrial pollution on the health and well-being of residents in the Korangi Industrial Area.

The persistence of industrial pollution in the Korangi Industrial Area can be attributed to several factors. Inadequate environmental regulations and lax enforcement mechanisms allow industries to operate without sufficient pollution control measures (Ali, 2018; Hayat & Abbas, 2023). The lack of proper waste management practices, including the disposal of industrial waste, contributes to pollution persistence (Ahmed, Aziz, & Abbas, 2019). Outdated technologies, economic considerations favouring cost reduction over environmental sustainability, and the complex interplay between industrial growth and environmental concerns also contribute to pollution persistence (Ali, 2018; Ahmed, Aziz, & Abbas, 2019). These factors need to be addressed to effectively mitigate industrial pollution in the Korangi Industrial Area.

In conclusion, the findings from this study highlight the detrimental effects of industrial pollution on the lives of residents in the Korangi Industrial Area. The presence of significant levels of air and water pollution, adverse health effects, socio-economic consequences, and contributing factors emphasize the urgency of implementing measures to reduce pollution and promote sustainability.

Conclusion

Based on the study's findings, the present research study concludes that industrial pollution in the Korangi Industrial Area has severe detrimental effects on the lives of residents. The high levels of pollution adversely affect their health, well-being, and socio-economic conditions. The socio-economic consequences of industrial pollution in the Korangi Industrial Area are significant. The burden of healthcare costs increases as residents require medical treatments and healthcare services for pollution-related health conditions. Reduced productivity and economic losses are observed due to pollution-induced health issues (Ebenstein et al., 2017). The quality of life in the area is compromised, with decreased access to clean and green spaces, diminished recreational opportunities, and a negative perception of living in a polluted environment (Hou, 2014). Moreover, property values in polluted areas may decrease, impacting homeowners' equity and potential economic opportunities (Hou, 2014). These socio-economic consequences highlight the wide-ranging impacts of industrial pollution on the local community. In this regard, urgent measures are required to address the sources of pollution and mitigate its impacts.

Recommendations

To mitigate the adverse effects of industrial pollution in the Korangi Industrial Area, the following recommendations are proposed:

- a) Implement strict emission control measures for industries, including the use of advanced pollution control technologies.

- b) Enhance public health services and establish specialized medical facilities to address pollution-related health issues.
- c) Promote public awareness campaigns to educate residents about the risks of pollution exposure and the adoption of protective measures.
- d) Encourage sustainable industrial practices, such as recycling and waste management, to reduce pollution levels.
- e) Establish a monitoring and enforcement mechanism to ensure compliance with environmental regulations.

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