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Analysing the Environmental Risks Among Social Classes in District Faisalabad, Punjab

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Abstract

This study investigates the unequal distribution of environmental risks among different social classes in District Faisalabad, Punjab, using a quantitative research design. A total of 120 respondents were selected through stratified sampling to ensure representation across socio-economic strata. Data were collected using a structured questionnaire, focusing on key environmental hazards such as air pollution, unsafe drinking water, poor sanitation, and inadequate waste management. The study examines how socio-economic inequalities shape exposure to these risks and explores the role of educational, structural, and demographic factors in driving disparities. The findings reveal that individuals from lower socio-economic backgrounds are disproportionately exposed to environmental hazards. Communities living near industrial zones and open sewage channels reported significantly higher risks, including polluted air, unsafe water, and health complications associated with poor living environments. Correlation analysis indicates that income levels, educational attainment, and housing conditions strongly influence the degree of exposure to environmental risks. Moreover, the results highlight systemic neglect and uneven policy enforcement as contributing factors that perpetuate environmental injustice and spatial inequality. This research underscores the pressing need for targeted interventions to address environmental disparities. It recommends inclusive urban planning, equitable environmental governance, and improved public health services to reduce risks for vulnerable groups. By emphasizing equity in environmental protection, the study contributes to the broader discourse on environmental justice and provides evidence-based insights for policy reforms aimed at ensuring safer and healthier living conditions for all social classes in Faisalabad.

Introduction

The distribution of environmental risks is increasingly recognized as not merely an ecological concern but also a social justice issue, where exposure to environmental hazards often aligns with socioeconomic stratification. In the context of District Faisalabad one of Pakistan's most industrialized and densely populated regions understanding how environmental risks affect various social classes has become critical to both sustainable urban planning and public health policymaking. Environmental risks encompass a broad spectrum of hazards, including air and water pollution, poor sanitation, unsafe housing, and inadequate access to clean energy. These hazards tend to disproportionately affect lower income groups who often reside in environmentally degraded and infrastructural neglected areas. Khan et al.,(2023). Faisalabad, known as the "Manchester of Pakistan" due to its textile based industrialization, experiences high levels of environmental stress resulting from unregulated emissions, untreated industrial waste,

and overburdened municipal systems. The city's rapid urban growth has outpaced its infrastructural development, contributing to poor air quality, water contamination, and growing solid waste challenges. These environmental issues do not affect all populations equally. Research shows that lower socioeconomic groups, including laborers, factory workers, and informal settlers, are more likely to live in proximity to industrial zones and poorly serviced areas, where environmental degradation is severe and persistent.Rashid et al,(2022). Social class plays a decisive role in determining both exposure to and the capacity to respond to environmental hazards. While affluent residents of Faisalabad often have access to private healthcare, filtration systems, and safer residential areas, economically marginalized communities lack such buffers. They are less likely to receive early warnings about environmental hazards, less able to afford protective equipment or medical treatment, and less politically empowered to demand improvements in environmental regulation or service delivery. Consequently, environmental risk becomes a driver of social inequality, reinforcing cycles of poverty and vulnerability.Ali(2024). Environmental risks also intersect with gender, education, and occupational structures. For instance, women in low income households often bear the brunt of environmental burdens through greater exposure to indoor air pollution from biomass cooking, or waterborne diseases due to inadequate sanitation infrastructure. Children in poor neighborhoods suffer from lead poisoning, respiratory infections, and stunted growth due to environmental contaminants. These disparities underscore the urgent need for policy frameworks that are inclusive, socially aware, and locally grounded. UNEP,(2024). In recent years, a growing body of research has emphasized the importance of environmental justice a concept that recognizes the unequal environmental burdens borne by disadvantaged groups and calls for fair treatment and meaningful involvement of all people in environmental decision making. In Faisalabad, this requires a deeper understanding of how environmental risks are experienced differently across neighborhoods, economic groups, and social identities. It also necessitates reforms in environmental governance, urban planning, and community participation to ensure that sustainable development is not achieved at the cost of social equity.Naeem et al.,(2023). Thus, analyzing environmental risks in relation to social class is not merely an academic exercise but a necessary step toward achieving equitable urban sustainability in Pakistan. This analysis not only reveals the patterns of environmental injustice but also helps identify vulnerable populations, design targeted interventions, and promote inclusive urban development. By focusing on Faisalabad, this study seeks to contribute to the broader discourse on environmental justice in South Asia and provide policy insights for local governments, development agencies, and civil society stakeholders.

Objectives

These objectives were guide the analysis of how environmental risks are distributed across social classes and the necessary reforms for achieving environmental justice.

- To Investigate how environment, affect megaralized community.
- To evaluate the role of social factors in determining vulnerability to environmental risks.
- To analyze socio economic factors behind unequal exposure hazard.
- To examine the health implications of environmental risks on different social classes.
- To assess spatial patterns of environmental inequality in District Faisalabad.
- To recommend policy measures for promoting environmental justice and reducing disparities.

Literature Review

This chapter presents a comprehensive review of the existing literature relevant to the research problem. The literature review serves as a foundational component in sociological inquiry, enabling the researcher to delineate the scope of the study and identify key variables pertinent to the investigation. Kim, (2025) describe the exposure to air pollution is sharply elevated for populations living near industrial zones, where emissions of volatile organic compounds (e.g.,

benzene) and fine particulates accumulate and persist. A recent population based cohort study in South Korea found that residents in proximity to industrial complexes exhibited a higher chronic respiratory disease burden, with clear epidemiological links between factory emissions and symptoms such as chronic cough, shortness of breath, and other respiratory impairments. The study emphasized that even individuals living more than 10 km from major industrial sources experienced adverse effects, highlighting both local and regional pollution impacts. Su et al., (2024) claimes the frequency of respiratory diseases including asthma, chronic obstructive pulmonary disease (COPD), and bronchitis correlates strongly with ambient air pollution exposure across all age groups. A comprehensive meta analysis conducted in 2024 found significantly higher risks of hospital admissions and symptom aggravation in communities with elevated PM2.5 and PM10 levels. Children and elderly individuals were found to be particularly vulnerable due to weaker immune and respiratory systems. These findings suggest that exposure to air pollutants not only triggers acute respiratory issues but also exacerbates pre existing conditions. Jin et al., (2024) found that the availability of clean air spaces such as urban parks, trees, and green corridors can mitigate the health effects of air pollution. Research has shown that the strategic placement of urban green infrastructure can reduce particulate matter levels by influencing airflow and acting as natural filters. In particular, city parks with dense vegetation were found to create "clean air pockets" that offer protective benefits for vulnerable populations such as children and the elderly. Green spaces, therefore, play a crucial role in promoting respiratory health and reducing exposure in polluted urban environments. According to UNICEF & WHO, (2025) access to clean drinking water remains a major challenge for marginalized communities, particularly in rapidly urbanizing or rural areas. In many parts of South Asia and sub Saharan Africa, the distribution of water infrastructure is skewed in favor of higher income neighborhoods, leaving low income families dependent on unsafe or unreliable water sources. According to a 2025 global review by UNICEF and WHO, over 2 billion people still lack access to safely managed drinking water, and the disparity is most evident in informal settlements and underserved rural regions. Khan et al., (2024) concluded that in the absence of regulated and piped water systems, many households rely on potentially contaminated sources such as open canals, bore wells, and unprotected springs. These sources are often exposed to agricultural runoff, industrial waste, or fecal contamination, posing a serious threat to health. A recent study in Pakistan revealed that nearly 60% of bore wells tested in rural districts exceeded safe limits for nitrates and coliform bacteria, largely due to poor sanitation and inadequate water treatment infrastructure. Patel et al., (2024) confirmed that as a result of consuming unsafe water, the frequency of waterborne diseases such as diarrhea, cholera, typhoid, and hepatitis A remains alarmingly high, especially among children under five. The burden of these diseases is not only a public health issue but also an economic one, affecting school attendance, productivity, and household income. A 2024 study published in *The Lancet Regional Health* emphasized that nearly 485,000 deaths annually are linked to diarrheal diseases caused by unsafe water and sanitation, most of which are preventable through access to improved water services. Iqbal et al., (2025) states that inadequate waste management services are a persistent issue in many urban and semi urban communities, where the frequency of garbage collection often varies based on the socio economic status of the neighborhood. Lower income and informal settlements frequently experience irregular or delayed waste pickup due to under resourced municipal services and poor infrastructure. A 2025 study conducted in South Asian cities highlighted that in high income areas, waste collection occurred 5–7 times a week, while low income zones received collection services only 1–2 times weekly, resulting in unhygienic living conditions and increased health risks. Rashid & Mehmood, (2024) indicates that the presence of open dumping sites near residential areas, especially in marginalized or peri urban zones, further exacerbates environmental and public health concerns. These sites often serve as breeding grounds for disease carrying vectors

such as mosquitoes and rats, and they contribute to air, soil, and water pollution. A 2024 assessment in Pakistan found that nearly 70% of urban waste in low income areas was either dumped in open plots or burned without regulation, largely due to a lack of designated sanitary landfills and weak enforcement of waste disposal laws. United Nations Environment Programme , (2024) mentioned that another key challenge is the lack of proper household waste segregation practices. In most underprivileged areas, residents are either unaware of or unable to implement segregation due to the absence of separate bins, municipal support, or awareness campaigns. Mixed waste disposal not only complicates recycling efforts but also leads to greater environmental hazards. A recent global review emphasized that less than 20% of households in low income areas engage in source level segregation, in contrast to over 60% in better serviced neighborhoods, underlining the role of education, infrastructure, and policy in improving waste management outcomes. Ahmed & Siddiqui, (2025) mentioned that noise levels in residential areas particularly in low income and unregulated urban settlements often exceed the World Health Organization's recommended limits. In many developing regions, poor urban planning, absence of noise barriers, and lack of zoning laws contribute to higher ambient noise exposure in residential communities. A 2025 environmental assessment in Karachi, Pakistan, recorded average daytime noise levels in high density residential areas at over 75 decibels, surpassing the WHO's safe threshold of 55 dB and posing risks to hearing and mental wellbeing. Agency, (2024) states that furthermore, prolonged exposure to noise pollution can result in long term cognitive and behavioral issues, especially among children and the elderly. In areas with constant noise exposure, children tend to show delayed language development and reduced academic performance due to impaired concentration. The elderly, on the other hand, report increased rates of irritability, anxiety, and sleep disorders. A recent report by the European Environment Agency (EEA) highlighted that environmental noise is the second largest environmental cause of health problems after air pollution, reinforcing the need for noise regulation in urban design European Environment.

Methodology

This study employs a **quantitative research design** to systematically examine environmental risks across different social classes in District Faisalabad, as it allows for the collection and statistical analysis of numerical data to identify disparities and relationships (Creswell & Creswell, 2018). The universe of the study is the entire population of Faisalabad, one of Punjab's largest and most industrialized districts, chosen because its socio-economic diversity and environmental challenges make it a meaningful context for such analysis (Kothari, 2004). A **stratified random sampling technique** was applied by dividing the population into low-, middle-, and high-income groups, which is important for ensuring fair representation and minimizing bias, while the final sample size of 120 respondents was considered sufficient for reliability and generalizability (Sekaran & Bougie, 2016). Data were collected using a **structured questionnaire** consisting of 30 items supported by an interview schedule, ensuring accuracy and consistency, while pre-testing with 10 respondents improved clarity and validity (Babbie, 2010). For data analysis, both descriptive and inferential statistics were employed: percentages summarized data distributions, and the Gamma statistic measured associations between ordinal variables, with values close to +1 indicating strong positive relationships and values near –1 showing strong negative ones (Chaudhry & Kamal, 1996).

Theoretical Framework

The present study is grounded in multiple sociological and environmental theories that explain the relationship between environmental risks and social class stratification. The unequal exposure to environmental hazards among different socio economic groups is not incidental but systematically structured through socio political, economic, and environmental dynamics. The following five theories offer conceptual support for understanding these disparities: The Environmental Justice

Theory posits that all individuals, regardless of race, class, or income, have the right to equal protection from environmental harms and equal access to environmental benefits. This theory highlights the disproportionate burden of pollution and environmental degradation faced by marginalized communities. In the context of District Faisalabad, lower income groups may reside closer to industrial zones or contaminated water sources due to limited housing options. Environmental justice embraces the principle that all people and communities are entitled to equal protection of environmental and public health laws and regulations" Bullard, (2000). Human Ecology Theory examines the relationship between human populations and their environments. It considers how population density, land use, industrial development, and socio economic status influence exposure to environmental hazards. This theory helps explain how urban planning and land distribution in Faisalabad may expose poorer communities to greater environmental risks. "Human ecology focuses on the interactions between people and their environment, emphasizing spatial and social organization as determinants of environmental exposure" Park & Burgess, (1925).

Results and Discussion

This chapter presents the empirical findings derived from the data collected from the respondents. It offers a comprehensive quantitative analysis, interprets the statistical results, and contextualizes the findings in relation to the study's objectives and the existing body of literature.

Percentage Distribution of Respondents by their age.

Sr.	Description	Frequency	Percent
1	under 18	24	20.0
2	18 25	29	24.2
3	26 35	50	41.7
4	36 45	17	14.2
	Total	**120**	**100.0**

The majority of respondents (41.7%) were aged 26–35 years. Respondents aged 18–25 made up 24.2% of the sample. Those under 18 accounted for 20.0%, while 14.2% were 36–45 years old. This shows most participants were young adults.

Sr.	Description	Frequency	Percent
1	Male	56	46.7
2	Female	64	53.3
	Total	**120**	**100.0**

The majority of the sample were females, comprising 53.3%, while males made up 46.7% of the participants.

environmental risk in your area?

Sr	Description	Frequency	Percent
1	yes	102	85.0
2	no	18	15.0
	Total	**120**	**100.0**

A significant portion of respondents (85.0%) answered "yes," while only 15.0% responded "no," indicating a strong positive trend in the results.

Percentage Distribution of Respondents by people more affected by environmental issues?

Sr	Description	Frequency	Percent
1	yes	114	95.0
2	no	6	5.0
	Total	**120**	**100.0**

An overwhelming majority of respondents (95.0%) answered "yes," whereas only 5.0% responded "no," clearly showing a highly positive outcome.

Percentage of Respondents by people industrial areas cause more environmental damage?

Sr.	Description	Frequency	Percent
1	yes	115	95.8
2	No	5	4.2
	Total	**120**	**100.0**

The results show that 95.8% of respondents answered "yes," while only 4.2% responded "no," reflecting a strong consensus among participants.

Respondents by people faced water, air, or land pollution?

Sr.	Description	Frequency	Percent
1	yes	114	95.0
2	No	6	5.0
	Total	**120**	**100.0**

A vast majority of respondents (114) responded affirmatively, whereas only a small number (6) expressed a negative response. A total of 85 participants responded with "yes," whereas 35 participants responded with "no," highlighting a notable preference toward the affirmative.

Respondents by government policies for the environment?

Sr.	Description	Frequency	Percent
1	yes	89	74.2
2	No	31	25.8
	Total	**120**	**100.0**

Percentage Distribution of Respondents by these policies help poor communities?

Sr.	Description	Frequency	Percent
1	yes	75	62.5
2	No	45	37.5
	Total	**120**	**100.0**

Out of all participants, 75 responded positively, while 45 gave a negative response, showing a moderate inclination toward the positive side.

Percentage Distribution of Respondents by people benefited from any environmental scheme

Sr.	Description	Frequency	Percent
1	yes	26	21.7
2	No	94	78.3
	Total	**120**	**100.0**

Only 26 respondents gave a positive response, whereas a significant majority of 94 participants responded negatively, indicating a clear opposition.

Percentage Distribution of Respondents by people think these policies are effective?

Sr.	Description	Frequency	Percent
1	yes	38	31.7
2	No	82	68.3
	Total	**120**	**100.0**

Most respondents (68.3%) answered "no," while only 31.7% responded "yes," indicating a strong among respondent.

Bivariate Analysis

It describes the trade between the response and explicatory variables. Statistics used in appraising the strength of link are chai forecourt and gamma statistics. Possibly, it is an important or trivial association. Explained analyses that are bivariate describing the association of two variables were Bivariate analysis.

Research Hypothesis 1

Null Hypothesis (H_0):

There is no significant relationship between age and the perception of environmental risks in the area.

Alternative Hypothesis (H_1):

There is significant relationship between age and & perception of environmental risks in the area

		is there any environmental in your area		Total
		yes	No	
age of respondents	under 18	26	11	37
	19 25	5	1	36
	26 35	42	12	57
Total		96	24	120

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Gamma	.144	.195	.756	.450
N of Valid Cases		120			

The results of the Gamma test, which measures the strength and direction of association between two ordinal variables, indicate a weak positive relationship. The Gamma value is 0.144, suggesting that as one variable increases, the other tends to increase slightly as well. However, this association

is not strong. More importantly, the significance value (p= 0.450) is greater than the commonly accepted threshold of 0.05. This means that the relationship observed in the data is not statistically significant and could have occurred by chance. Based on this result, we fail to reject the null hypothesis, which states that there is no significant association between the two variables. Consequently, the alternative hypothesis that there is a significant relationship is rejected. In summary, while the Gamma value suggests a weak positive association, the lack of statistical significance indicates that no meaningful relationship exists between the variables under study in this dataset of 120 valid cases.

Suggestion

- Design youth focused educational and engagement programs to enhance participation in development initiatives.
- Implement gender sensitive policies that empower women and encourage their involvement in decision making.
- Develop family centered outreach programs to strengthen community support and participation.

Utilize graduates as change agents by involving them in awareness, training, and advocacy roles.

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