



Research Paper

Public Perception of Air Pollution in an Urban Area: A Geographical Study of Punwarka, Saharanpur

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Abstract

Air pollution is one of the important environmental challenges affecting human well-being, particularly in urban and rapidly developing settlements. Although scientific assessment of air pollution generally focuses on pollutant concentrations and atmospheric measurements, understanding the perception of local residents is equally important because people experience environmental pollution through their everyday surroundings, health concerns and behavioural responses. The present study examines the public perception of air pollution among residents of Punwarka, Saharanpur, with particular emphasis on perceived sources, severity, health effects, environmental consequences and attitudes towards pollution-control measures. The study adopts a descriptive and analytical research design and is based primarily on primary data collected from local residents through a structured questionnaire. A sample of 200 respondents is considered for the statistical analysis, covering different age groups, genders, educational levels, occupations, income groups and durations of residence. Frequency and percentage analysis are used to examine the socio-demographic characteristics and major dimensions of public perception. The findings indicate that respondents commonly perceive vehicular emissions, road dust, construction activities and waste burning as important sources of air pollution. A considerable proportion of respondents also associate polluted conditions with breathing difficulty, eye irritation, cough, throat irritation and restrictions on outdoor activities. The study further indicates strong public support for tree plantation, stricter pollution-control measures and community participation. The proposed hypotheses examine differences in perception according to socio-demographic characteristics, the relationship between awareness and perceived health/environmental effects, and the relationship between perceived severity and support for pollution-control practices. The study concludes that public perception constitutes an important social dimension of environmental assessment and that local awareness and community participation can complement institutional approaches to air-quality management in Punwarka.

Keywords: Air Pollution, Public Perception, Environmental Awareness, Health Effects, Urban Environment, Environmental Behaviour, Punwarka

I. Introduction

Air pollution has emerged as one of the major environmental challenges affecting the quality of life of people living in urban and semi-urban areas. Rapid population growth, increasing vehicular movement, construction activities, industrial development, road dust, waste burning and the excessive use of fossil fuels contribute to the deterioration of air quality. Although air pollution is generally measured through scientific indicators such as particulate matter, nitrogen oxides, sulphur dioxide and carbon monoxide, the **public perception of pollution** is equally important for understanding how people experience and respond to environmental problems in their everyday lives. People living in an affected area may notice pollution through visible dust, smoke, unpleasant odours, reduced visibility, breathing discomfort or irritation of the eyes and throat. However, perceptions of air pollution may differ according to age, gender, occupation, educational level, income, residential location and exposure to pollution sources. Some residents may consider air pollution a serious health and environmental problem, while others may regard it as a normal consequence of urban development. Therefore, understanding public perception provides an important social dimension to the study of urban air pollution.

Understanding Air Pollution in Urban Areas

- **Concept of Air Pollution**-Air pollution refers to the presence of harmful substances in the atmosphere in concentrations that can adversely affect human health, ecosystems and the general environment. Pollutants may originate from transportation, industries, domestic activities, construction, agricultural

practices and open burning of waste. Among the pollutants of particular concern in urban environments are particulate matter, especially PM_{2.5} and PM₁₀, along with nitrogen dioxide, sulphur dioxide, ozone and carbon monoxide.

- **Urban Sources of Air Pollution**-Urban air pollution is generated through multiple interconnected sources. Vehicular emissions are an important source, particularly in areas experiencing increasing traffic. Road dust, construction and demolition activities can increase particulate matter. Burning of solid waste and other materials can release smoke and toxic substances. Small-scale commercial activities, generators and nearby industrial activities may also contribute to local air-quality problems.
- **Air Pollution and Human Health**-Exposure to polluted air can affect the respiratory and cardiovascular systems and may aggravate existing health problems. Short-term exposure may be associated with irritation of the eyes, nose and throat, coughing and breathing discomfort, while prolonged exposure to certain pollutants can contribute to more serious health risks. Consequently, public awareness regarding pollution and its possible health consequences is an important component of environmental management.

Public Perception of Air Pollution

- **Meaning of Public Perception**-Public perception refers to the way individuals understand, interpret and evaluate an environmental problem based on their observations, experiences, knowledge and beliefs. In the context of air pollution, perception may include people's views regarding the severity of pollution, major pollution sources, health effects, changes in air quality and responsibility for controlling pollution.
- **Awareness and Environmental Behaviour**-Perception can influence environmental behaviour. Residents who perceive air pollution as a serious problem may be more willing to avoid pollution sources, adopt environmentally responsible practices, use public transportation, reduce waste burning and support local pollution-control measures. Thus, studying perception can help identify the gap between environmental awareness and actual behaviour.
- **Variation in Public Perception**-Public perception is not necessarily uniform within an urban area. People who spend considerable time outdoors, work near roads, operate vehicles or live close to construction or commercial areas may experience pollution differently from residents living in relatively less-exposed locations. Education and access to environmental information may also influence people's understanding of air pollution and its health implications.

Context of the Study Area: Punwarka, Saharanpur

- **Geographical Setting**-Punwarka is located in **Saharanpur district of Uttar Pradesh**. The area represents an important setting for examining environmental perceptions at the local level because human settlements, transportation, commercial activities and surrounding land uses interact with one another. The study focuses on the perceptions of residents rather than attempting to measure air pollution solely through technical monitoring.
- **Urban and Environmental Context**-The changing settlement pattern and increasing human activities in and around Punwarka provide a suitable context for examining people's experiences of environmental conditions. Road traffic, dust, construction-related activities, waste disposal and other locally occurring activities can influence residents' perception of air quality. A locality-level study can therefore provide information that may not be visible in broader district-level environmental assessments.
- **Population and Socio-Economic Characteristics**-Residents of Punwarka may differ in terms of age, gender, educational attainment, occupation, income and duration of residence. These socio-economic characteristics can influence exposure to environmental pollution as well as people's awareness and interpretation of its effects. The present study therefore considers public perception as a multidimensional phenomenon rather than treating all residents as a homogeneous group.

Need of the Study

The need for the present study arises from the increasing importance of environmental quality in rapidly changing urban and semi-urban settlements. Scientific measurements can identify pollutant concentrations, but they do not fully explain how residents experience pollution in their daily lives. People's observations can provide useful information about commonly perceived pollution sources, visible changes in air quality, health concerns and environmental practices. A localized study of Punwarka is particularly useful because environmental problems are often experienced differently at the neighbourhood level. Understanding residents' perceptions can help identify areas where environmental awareness needs to be strengthened and can provide useful inputs for community-based environmental planning. The study can also contribute to the broader understanding of how local communities perceive air pollution and its consequences.

Significance of the Study

The study is significant from **environmental, social, health and geographical perspectives**. From an environmental perspective, it can identify the major pollution sources perceived by residents. From a social perspective, it can examine differences in awareness and attitudes among different groups of people. From a public-health perspective, understanding residents' perception of pollution-related health risks may help identify concerns requiring greater environmental awareness. From a geographical perspective, the study contributes to understanding the relationship between settlement characteristics, human activities and environmental perception at the local level.

The findings may also be useful for local authorities, environmental organisations, researchers and community groups in designing awareness programmes and encouraging environmentally responsible behaviour.

Research Question- What is the level of public perception and awareness regarding the causes, severity, health effects and control of air pollution among residents of Punwarka, Saharanpur?

Research Objectives

Objective 1-To examine the level of awareness and perception of air pollution among the residents of Punwarka, Saharanpur.

Objective 2-To identify the major sources and perceived effects of air pollution as reported by the residents.

Objective 3-To examine the relationship between selected socio-demographic characteristics of residents and their perception of air pollution.

Hypotheses of the Study

H₁-There is a significant difference in the perception of air pollution among residents of Punwarka on the basis of selected socio-demographic characteristics.

H₂-There is a significant relationship between residents' awareness of air pollution and their perception of its health and environmental effects.

H₃-Residents who perceive air pollution as a serious environmental problem are significantly more likely to support pollution-control and environmentally responsible practices.

Delimitation of the Study

The present study is delimited geographically to **Punwarka, Saharanpur, Uttar Pradesh**. The study concentrates specifically on the **public perception of air pollution** rather than undertaking comprehensive laboratory-based monitoring of atmospheric pollutants. The respondents will be selected from residents of the study area, and information will be collected through a structured questionnaire/interview schedule. The study will focus on awareness regarding pollution sources, perceived severity, health effects, environmental consequences, personal experiences and attitudes towards pollution-control measures. The findings will primarily represent the perceptions of the selected respondents during the period of data collection and should therefore not automatically be generalized to the entire Saharanpur district or other urban areas.

Scope of the Study

The study provides scope for examining air pollution as both an environmental and a social issue. It can assess residents' understanding of major pollution sources, their perception of changes in air quality, perceived health effects and their willingness to participate in pollution-control activities. It may also provide a basis for future studies comparing Punwarka with other settlements of Saharanpur district.

II. Review of Literature

Air pollution has become an important subject of environmental, geographical and public-health research, particularly in urban and rapidly developing settlements. Existing literature demonstrates that air pollution is not only a physical environmental problem but also a social issue influenced by people's awareness, perceptions, experiences and behavioural responses. The World Health Organization has emphasized that ambient air pollution is associated with substantial health risks, particularly through exposure to fine particulate matter and other harmful pollutants. This has increased academic interest in understanding both measured air quality and the way communities perceive environmental risks. Studies on public perception indicate that people's understanding of air pollution is influenced by their direct experiences, educational background, occupation, residential environment and access to environmental information. Individuals who frequently travel on congested roads, work outdoors or live near traffic and construction activities may perceive pollution more strongly than individuals with comparatively lower exposure. Perception is therefore geographically variable even within the same urban settlement. Research has also identified **vehicular emissions, road dust, construction activities, industrial emissions and open waste burning** as commonly perceived sources of urban air pollution. Visible pollution, such as dust and smoke, tends to have a particularly strong influence on public perception because residents can

directly observe these sources. However, invisible pollutants may be underestimated because their presence cannot always be detected through ordinary observation.

A substantial body of literature has examined the relationship between air pollution and health. Respiratory irritation, coughing, breathing difficulty, eye irritation and other symptoms are frequently reported in studies involving populations exposed to polluted environments. Research also indicates that children, older adults and individuals with existing vulnerabilities may be particularly concerned about air-pollution-related health effects. Such findings explain why health perception forms an important dimension of public environmental awareness. Another important area of research concerns **environmental behaviour**. Studies suggest that awareness alone does not always result in environmentally responsible behaviour. People's willingness to use public transportation, avoid unnecessary vehicle use, prevent waste burning, support tree plantation and participate in community-level environmental activities depends on both their perception of environmental seriousness and their confidence in available solutions. Indian studies have increasingly focused on air pollution in metropolitan cities and large urban centres, but comparatively fewer studies examine public perception at the locality or neighbourhood level. District-level environmental statistics can provide information about pollution conditions, but they may not capture how residents interpret pollution in their immediate surroundings. A localized study of Punwarka, Saharanpur, therefore provides an opportunity to connect environmental conditions with residents' experiences and perceptions.

The literature collectively suggests that public perception should be examined through multiple dimensions, including **awareness of pollution sources, perceived severity, health effects, environmental impacts, personal experiences, behavioural responses and support for control measures**. The present study builds on this approach by examining these dimensions among residents of Punwarka. It also attempts to identify whether socio-demographic characteristics are associated with differences in perception and whether stronger perceptions of pollution are associated with greater support for environmental action.

III. Research Methodology

The present study adopts a **descriptive and analytical research design** to examine public perception of air pollution in Punwarka, Saharanpur. The descriptive component identifies respondents' awareness, perceived pollution sources, health concerns, environmental experiences and behavioural responses, while the analytical component examines relationships between selected socio-demographic characteristics and perceptions of air pollution. The study is geographically delimited to **Punwarka, Saharanpur, Uttar Pradesh**. The locality was selected to understand air pollution from the perspective of residents and to examine how everyday human activities and environmental conditions influence public perception. The target population comprises adult residents of Punwarka. For the proposed analysis, a sample of **200 respondents** is considered. Respondents may be selected through purposive or convenient sampling, depending upon accessibility and field conditions. Individuals representing different age groups, genders, educational levels, occupations and income groups are included to obtain diverse perceptions. Primary data are collected through a **structured questionnaire**. The questionnaire covers socio-demographic characteristics, perceived sources of air pollution, severity of pollution, perceived health effects, environmental awareness, personal behavioural practices and support for pollution-control measures. Responses are measured using categorical and Likert-type scales.

Statistical Analysis

The collected data are proposed to be analysed using **frequency, percentage, mean and standard deviation** for descriptive interpretation. Cross-tabulation can be used to compare perception across demographic groups. For hypothesis testing, **chi-square test, correlation and, where appropriate, regression analysis** may be employed. The level of significance may be fixed at **5% ($p < 0.05$)**. The analysis is intended to determine whether observed differences and relationships are statistically meaningful rather than merely descriptive. Below is a **model statistical analysis based on an illustrative sample of 200 respondents** from Punwarka, Saharanpur. Since you have not provided the actual survey dataset, these figures should be treated as **sample/illustrative values** and replaced with your collected data before final submission.

Statistical Analysis

Table 1: Socio-Demographic Profile of Respondents and Their Distribution According to Major Background Characteristics

Parameter	Category	Frequency (N=200)	Percentage (%)
Age	18–25 years	38	19.0
	26–35 years	52	26.0
	36–45 years	48	24.0
	46–55 years	35	17.5
	56 years and above	27	13.5
Gender	Male	112	56.0
	Female	88	44.0

Education	Primary	32	16.0
	Secondary	48	24.0
	Graduate	67	33.5
	Postgraduate and above	31	15.5
	No formal education	22	11.0
Occupation	Student	28	14.0
	Government employee	24	12.0
	Private employee	38	19.0
	Business/Self-employed	42	21.0
	Farmer	31	15.5
	Homemaker	25	12.5
Monthly Household Income	Other	12	6.0
	Below ₹15,000	43	21.5
	₹15,001–30,000	61	30.5
	₹30,001–50,000	52	26.0
	₹50,001–75,000	28	14.0
Duration of Residence	Above ₹75,000	16	8.0
	Below 5 years	31	15.5
	5–10 years	47	23.5
	11–20 years	64	32.0
	21–30 years	35	17.5
	Above 30 years	23	11.5

Table 1 presents the socio-demographic characteristics of the 200 respondents selected for the study of public perception of air pollution in Punwarka, Saharanpur. The age distribution shows that the largest proportion of respondents belongs to the **26–35 years age group (26.0%)**, followed by respondents aged 36–45 years (24.0%). Respondents aged 18–25 years constitute 19.0%, while 17.5% belong to the 46–55 years group and 13.5% are aged 56 years and above. This distribution provides representation from both younger and older residents, allowing the study to examine variations in environmental perception across age groups. In terms of gender, males constitute **56.0%** and females 44.0% of the respondents. Although males form a slightly larger proportion, the representation of females is sufficiently substantial for comparative analysis. Educational characteristics indicate that graduates constitute the largest group at **33.5%**, followed by secondary-educated respondents at 24.0%. Primary-educated respondents represent 16.0%, while 15.5% have postgraduate or higher education. About 11.0% have no formal education. Occupationally, business/self-employed respondents account for 21.0%, followed by private employees at 19.0% and farmers at 15.5%. Students constitute 14.0%, while homemakers represent 12.5%. Regarding household income, the largest group falls in the ₹15,001–30,000 category (30.5%), followed by ₹30,001–50,000 (26.0%). Finally, 32.0% of respondents have lived in the area for 11–20 years, suggesting substantial local experience among participants. Overall, the sample provides adequate socio-demographic diversity for examining differences in perception.

Table 2: Respondents' Perception Regarding Major Sources, Severity and Environmental Effects of Air Pollution

Perception Parameter	Response Category	Frequency	Percentage (%)
Vehicular pollution is a major source	Strongly Agree	74	37.0
	Agree	69	34.5
	Neutral	27	13.5
	Disagree	19	9.5
	Strongly Disagree	11	5.5
Road dust contributes significantly	Strongly Agree	68	34.0
	Agree	76	38.0
	Neutral	24	12.0
	Disagree	20	10.0
	Strongly Disagree	12	6.0
Construction activities increase pollution	Strongly Agree	63	31.5
	Agree	71	35.5
	Neutral	31	15.5
	Disagree	22	11.0
	Strongly Disagree	13	6.5
Waste burning contributes to air pollution	Strongly Agree	79	39.5
	Agree	65	32.5
	Neutral	25	12.5
	Disagree	19	9.5
	Strongly Disagree	12	6.0
Air pollution is a serious local problem	Strongly Agree	71	35.5
	Agree	77	38.5
	Neutral	25	12.5
	Disagree	17	8.5

	Strongly Disagree	10	5.0
Air pollution has increased in recent years	Strongly Agree	83	41.5
	Agree	68	34.0
	Neutral	26	13.0
	Disagree	15	7.5
Air pollution affects visibility and cleanliness	Strongly Disagree	8	4.0
	Strongly Agree	72	36.0
	Agree	75	37.5
	Neutral	29	14.5
	Disagree	16	8.0
	Strongly Disagree	8	4.0

Table 2 examines respondents' perceptions regarding major sources, severity and environmental manifestations of air pollution in Punwarka. The findings demonstrate a **generally high level of concern regarding local air pollution**. Regarding vehicular pollution, 37.0% strongly agree and 34.5% agree that vehicles constitute a major source. Thus, **71.5% of respondents express agreement**, indicating that traffic-related emissions are widely perceived as an important contributor to local air pollution. Road dust receives an even stronger perception, with 34.0% strongly agreeing and 38.0% agreeing that it contributes significantly to pollution. The combined agreement of **72.0%** suggests that visible dust is an important component of residents' environmental experience. Construction activities are also perceived as a significant source, with 67.0% of respondents either agreeing or strongly agreeing. Waste burning demonstrates one of the strongest patterns. Approximately **72.0%** of respondents agree or strongly agree that waste burning contributes to air pollution. This indicates that locally visible human activities may strongly influence environmental perception. The seriousness of the problem is further demonstrated by the finding that 74.0% of respondents either strongly agree or agree that air pollution is a serious local issue. The perception of increasing pollution is particularly notable: **75.5%** of respondents believe that air pollution has increased in recent years. Similarly, 73.5% agree that air pollution affects visibility and environmental cleanliness. Neutral responses remain comparatively moderate, ranging from 12.0% to 15.5%, while disagreement generally remains below 17%. Overall, the table indicates that residents do not perceive air pollution as an abstract environmental issue; rather, they associate it with **vehicles, road dust, construction, waste burning and visible deterioration of the local environment**. These findings support the need for examining the relationship between awareness, perceived severity and environmental behaviour.

Table 3: Perceived Health Effects of Air Pollution and Personal Experiences Reported by Respondents

Health/Experience Parameter	Response	Frequency	Percentage (%)
Breathing difficulty during polluted conditions	Frequently	42	21.0
	Sometimes	73	36.5
	Rarely	47	23.5
	Never	38	19.0
Eye irritation	Frequently	51	25.5
	Sometimes	76	38.0
	Rarely	43	21.5
	Never	30	15.0
Cough/throat irritation	Frequently	46	23.0
	Sometimes	81	40.5
	Rarely	44	22.0
	Never	29	14.5
Headache during high-pollution periods	Frequently	34	17.0
	Sometimes	72	36.0
	Rarely	51	25.5
	Never	43	21.5
Pollution affects outdoor activities	Strongly Agree	58	29.0
	Agree	77	38.5
	Neutral	31	15.5
	Disagree	22	11.0
Children are particularly vulnerable	Strongly Disagree	12	6.0
	Strongly Agree	81	40.5
	Agree	74	37.0
	Neutral	24	12.0
	Disagree	13	6.5
Elderly people are particularly vulnerable	Strongly Disagree	8	4.0
	Strongly Agree	76	38.0
	Agree	79	39.5
	Neutral	25	12.5
	Disagree	13	6.5
Pollution can cause long-term health problems	Strongly Disagree	7	3.5
	Strongly Agree	87	43.5

	Agree	70	35.0
	Neutral	24	12.0
	Disagree	12	6.0
	Strongly Disagree	7	3.5

Table 3 presents the respondents' perception of the health consequences of air pollution and their personal experiences. The results indicate that residents associate air pollution with a range of immediate physical discomforts. Breathing difficulty is reported frequently by 21.0% of respondents and sometimes by 36.5%, meaning that **57.5% experience this problem at least occasionally**. Eye irritation shows an even greater perceived occurrence, with 25.5% reporting it frequently and 38.0% sometimes. Cough and throat irritation represent another commonly reported experience. About **63.5%** of respondents report experiencing these symptoms frequently or sometimes. Headaches are reported less frequently than eye and respiratory irritation, although 53.0% indicate that they experience headaches either frequently or sometimes during polluted conditions. The effect of pollution on outdoor activities is also substantial. Approximately **67.5%** either strongly agree or agree that pollution affects their outdoor activities. This suggests that perceived pollution has consequences beyond health symptoms and can influence everyday lifestyle and mobility. A particularly strong perception concerns vulnerable population groups. Approximately **77.5%** of respondents agree or strongly agree that children are particularly vulnerable to air pollution. Similarly, **77.5%** express agreement regarding the vulnerability of elderly people. The strongest health-related perception concerns the possibility of long-term health problems: 43.5% strongly agree and 35.0% agree, producing a combined agreement of **78.5%**. These findings indicate a relatively high level of perceived health awareness among residents. However, perception of symptoms should not be interpreted as medical evidence of causation; reported symptoms may have multiple causes. Nevertheless, the results demonstrate that residents connect air pollution with respiratory discomfort, eye irritation, headaches, reduced outdoor activity and concerns about vulnerable groups. This makes health perception an important component of the overall assessment of public perception.

Table 4: Environmental Awareness, Behaviour and Support for Air-Pollution Control Measures

Parameter	Response Category	Frequency	Percentage (%)
Aware of air-quality-related information	High awareness	62	31.0
	Moderate awareness	91	45.5
	Low awareness	47	23.5
Checks air-quality information	Regularly	31	15.5
	Occasionally	69	34.5
	Rarely	57	28.5
Avoids unnecessary vehicle use	Never	43	21.5
	Always	34	17.0
	Often	61	30.5
Avoids burning household waste	Sometimes	69	34.5
	Rarely	24	12.0
	Never	12	6.0
Supports more greenery/tree plantation	Always	96	48.0
	Often	57	28.5
	Sometimes	29	14.5
Supports stricter pollution control	Rarely	12	6.0
	Never	6	3.0
	Strongly Support	102	51.0
Willing to participate in awareness programmes	Support	72	36.0
	Neutral	17	8.5
	Oppose	6	3.0
Supports community participation in pollution control	Strongly Oppose	3	1.5
	Strongly Support	94	47.0
	Support	76	38.0
Supports community participation in pollution control	Neutral	18	9.0
	Oppose	8	4.0
	Strongly Oppose	4	2.0
Supports community participation in pollution control	Highly Willing	83	41.5
	Willing	76	38.0
	Neutral	24	12.0
Supports community participation in pollution control	Unwilling	11	5.5
	Highly Unwilling	6	3.0
	Strongly Agree	89	44.5
Supports community participation in pollution control	Agree	78	39.0
	Neutral	20	10.0
	Disagree	8	4.0
	Strongly Disagree	5	2.5

Table 4 examines environmental awareness, individual behaviour and support for pollution-control measures among residents of Punwarka. The results suggest that awareness exists at a moderate to high level, although there remains scope for improvement. About **31.0%** of respondents report high awareness regarding air-quality information, while 45.5% report moderate awareness. Thus, 76.5% fall within the moderate-to-high awareness categories, whereas 23.5% report low awareness. Regular checking of air-quality information is comparatively limited. Only 15.5% check such information regularly and 34.5% do so occasionally. Nearly half either rarely or never check air-quality information. This suggests a possible distinction between **general awareness of pollution and active engagement with air-quality information**. Behavioural responses are somewhat stronger. About 48.0% always avoid burning household waste and another 28.5% do so often, giving a combined 76.5%. Similarly, 47.5% either always or often avoid unnecessary vehicle use, although a considerable proportion reports doing so only sometimes.

Support for environmental interventions is particularly strong. As many as **87.0%** of respondents support or strongly support increasing greenery and tree plantation. Similarly, **85.0%** support or strongly support stricter pollution-control measures. These findings indicate that residents largely favour collective and institutional approaches to reducing air pollution. Participation intentions are also encouraging. Approximately **79.5%** are highly willing or willing to participate in environmental awareness programmes. Further, 83.5% agree or strongly agree that community participation should be encouraged in pollution control. Overall, the results indicate that residents' **support for environmental action is stronger than their routine engagement with air-quality information**. This suggests an opportunity for local awareness programmes to convert existing concern into sustained environmental behaviour. The findings also provide preliminary support for the third hypothesis, which proposes an association between perceived seriousness of air pollution and support for pollution-control practices. For formal hypothesis testing, however, an inferential statistical test such as chi-square, correlation or regression should be applied to the respondent-level dataset.

Discussion and Justification of Hypotheses

The findings presented in the analysis indicate that air pollution is perceived as a significant environmental concern among residents of Punwarka. Respondents identify vehicular emissions, road dust, construction activities and waste burning as important sources. A considerable proportion also associates polluted conditions with breathing difficulty, eye irritation, cough, throat irritation and restrictions on outdoor activities. These findings demonstrate that residents' perceptions are based not only on general environmental awareness but also on their everyday experiences.

H₁: There is a significant difference in the perception of air pollution among residents of Punwarka on the basis of selected socio-demographic characteristics.

The first hypothesis is based on the assumption that environmental perception may differ according to age, gender, education, occupation, income and duration of residence. Different population groups experience the local environment differently. For example, people working outdoors or travelling frequently may have greater exposure to traffic-related pollution than individuals who spend most of their time indoors. Similarly, educational attainment may influence access to information about air pollution and its health consequences. The descriptive results show considerable diversity in the socio-demographic composition of respondents. However, the frequency tables alone cannot establish statistical significance. Therefore, the hypothesis should be tested through **chi-square analysis or an appropriate mean-comparison test**. If the obtained p-value is below 0.05, H₁ will be accepted, indicating that perception differs significantly across the relevant socio-demographic categories. If $p > 0.05$, the hypothesis will not be supported. Thus, the hypothesis provides an appropriate framework for determining whether public perception varies systematically across population groups.

H₂: There is a significant relationship between residents' awareness of air pollution and their perception of its health and environmental effects.

The second hypothesis is supported conceptually by the observed pattern in the results. A large proportion of respondents demonstrate moderate or high awareness of air pollution, while substantial numbers also perceive respiratory discomfort, eye irritation, environmental deterioration and long-term health risks. This suggests that greater awareness may be associated with stronger recognition of pollution-related consequences. The relationship can be statistically examined using **Pearson's correlation coefficient** if awareness and perception are represented through suitable continuous/scale scores, or Spearman's correlation when ordinal data are used. A positive and statistically significant correlation would indicate that higher awareness is associated with stronger perception of health and environmental effects. Therefore, H₂ provides an important analytical link between environmental knowledge and risk perception.

H₃: Residents who perceive air pollution as a serious environmental problem are significantly more likely to support pollution-control and environmentally responsible practices.

The third hypothesis is particularly relevant to the behavioural dimension of the study. The descriptive findings indicate that a large majority of respondents consider air pollution a serious local problem and simultaneously express support for tree plantation, stricter pollution-control measures, avoidance of waste burning and community participation. This pattern suggests that **perceived seriousness may influence willingness to take or support environmental action**. The relationship can be tested using chi-square analysis for categorical responses or correlation/regression analysis if composite perception and behavioural scores are developed. A statistically significant positive relationship would support H₃ and demonstrate that stronger perception of pollution severity is associated with greater environmental engagement. Overall, the three hypotheses collectively address three important dimensions of the study: **socio-demographic variation, awareness and perception, and perception and environmental behaviour**. Together, they provide a logical framework for understanding public perception of air pollution in Punwarka and for moving beyond simple description toward analytical interpretation.

IV. Conclusion

The present study on **public perception of air pollution in Punwarka, Saharanpur** demonstrates that air pollution should be understood not merely as a physical or atmospheric problem but also as a significant social and geographical issue. Residents' perceptions provide valuable information regarding the environmental conditions they experience in their everyday lives. The study indicates that people associate local air pollution with several visible and human-generated sources, particularly vehicular emissions, road dust, construction activities and open burning of waste.

The analysis further indicates that a considerable proportion of respondents perceive air pollution as a serious local environmental problem. Many respondents believe that pollution has increased over time and that it affects the cleanliness and quality of the surrounding environment. Such perceptions are important because visible environmental changes can influence how residents understand the seriousness of pollution and its consequences.

Health-related perceptions form another important dimension of the study. Respondents commonly report concerns regarding breathing difficulty, eye irritation, coughing, throat irritation and headaches during polluted conditions. There is also considerable concern regarding the vulnerability of children and elderly persons. A substantial proportion of respondents believe that prolonged exposure to polluted air may result in long-term health problems. These perceptions demonstrate that residents connect environmental quality directly with human well-being. However, perceived symptoms should be distinguished from clinically established health effects, and future studies could combine perception surveys with medical and air-quality monitoring data.

The study also highlights an important relationship between **awareness and environmental behaviour**. Although many respondents demonstrate moderate or high awareness, regular monitoring of air-quality information remains comparatively limited. At the same time, support for practical interventions such as tree plantation, stricter pollution-control measures, avoidance of waste burning and community participation is relatively strong. This suggests that local residents may be receptive to environmental programmes if appropriate information and opportunities for participation are provided.

The first hypothesis proposes that public perception differs according to selected socio-demographic characteristics. Differences in exposure, occupation, education, age and duration of residence provide a reasonable theoretical basis for this hypothesis, although its final acceptance should depend upon the results of appropriate inferential tests. The second hypothesis proposes a relationship between awareness and perceived health/environmental effects. The observed pattern of responses provides conceptual support for this relationship, while correlation or other appropriate statistical testing should determine its statistical significance. The third hypothesis proposes that stronger perceptions of pollution severity are associated with greater support for pollution-control practices. The descriptive findings provide encouraging evidence for this proposition because high concern about pollution occurs alongside strong support for environmental action.

Overall, the study emphasizes the importance of combining **environmental assessment, public awareness, community participation and local-level planning**. Punwarka provides an appropriate setting for understanding how residents interpret air pollution within their immediate geographical environment. Strengthening environmental education, discouraging open waste burning, improving road and dust management, encouraging greenery, promoting responsible transport practices and increasing public access to air-quality information can contribute to greater environmental awareness. Future research may extend the study by comparing different localities of Saharanpur, incorporating actual air-quality measurements and examining seasonal variations in public perception.

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