

**Investigating the Knowledge of Smog and Quality of Life among the Students of Rashid Latif Khan University, Lahore**

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**ABSTRACT**

*Smog is a harmful air pollutant composed of particulate matter, ozone, sulfur and nitrogen oxides, and volatile hydrocarbons. It appears as a thick haze that reduces visibility and poses serious health risks such as respiratory problems (e.g. Asthma, bronchitis) eye irritation, throat irritation, reduced lung function etc. To investigate the awareness, perception and attitude towards smog among students of RLKU. A cross-sectional study, involving 189 undergraduate students was conducted in Rashid Latif Khan University. Data was collected by using a structured questionnaire administered via Google forms, which was analyzed through Statistical package of Social Sciences version 23. This study focused that majorities of medical students (87.4%) were well aware of smog, however 44.2% understood its causes. Despite widespread concern—74.2% viewed smog as a serious issue and 88.9% acknowledged its health impacts—11.1% remained unconvinced, highlighting the need for targeted awareness campaigns, however 28.4% believed individual actions could make a difference, there was greater confidence in policy measures, with 23.7% strongly supporting government regulations. These findings suggest that addressing knowledge gaps and promoting policy-based interventions are essential for effective smog*

*mitigation, particularly among younger, educated populations. This study shows well awareness of smog and willingness to adopt pollution-reducing behaviors among students. However, its findings are limited by a male-dominated, single-university sample. Future research should ensure diversity and support stronger education and policy efforts for smog mitigation.*

**Keywords:** Awareness, Health risks, Perception, Smog

## INTRODUCTION

Smog is a complex mixture of particular matter, ozone, Sulphur and nitrogen oxide, volatile hydrocarbons and other pollutants. A type of air pollution that is characterized by a thick haze and impairs vision and poses serious health risks to people (World Health Organization, 2021). WHO currently consider air pollution as a largest environmental risk to health. Smoke fog, often known as smog, is a severe kind of air pollution. The term “smog” was created in the early 1900s and is a combination of the terms fog and smoke. Because of its opacity and smell, it described as smoky fog. This term was used to describe something referred to as pea soup fog, a prevalent and dangerous issue in London from 19<sup>th</sup> century until the middle of 20<sup>th</sup> century, when it was referred to as London specific or London fog. Smog is a type of air pollution that is a mixture of various pollutants including specially matter, ozone, sulfur dioxide, nitrogen dioxide, and other reactive organic compounds. It is usually seen as haze or fog in urban areas and produce significant health issues (Arif & Hassan, 2023).

In 2024, Bangladesh, Pakistan and India remain the most polluted countries in Asia, with PM2.5 levels significantly exceeding World Health Organization (WHO) guidelines. Bangladesh leads with an alarming average of 79.9  $\mu\text{g}/\text{m}^3$ , primarily due to emission and vehicle pollution in cities like Dhaka. Bangladesh consistently ranks as first most polluted countries in the world, with an average PM (Particulate Matter) 2.5 concentration of 161  $\mu\text{g}/\text{m}^3$  in 2023. The situation has worsened in 2024, with Dhaka recording PM2.5 levels at 80.2  $\mu\text{g}/\text{m}^3$  significantly above the World Health Organization’s (WHO) recommended limit of 5  $\mu\text{g}/\text{m}^3$ . Pakistan ranks as second in Asia with an average PM2.5 concentrations of 147  $\mu\text{g}/\text{m}^3$  in 2023. Lahore is famous for its poor air quality, recording PM2.5 levels of 99.5  $\mu\text{g}/\text{m}^3$  in 2024, due to industrial emissions, vehicular exhaust, and agricultural burning practices. India ranks third globally for air pollution, with an average PM2.5 levels of 84  $\mu\text{g}/\text{m}^3$  in 2023. Cities like New Delhi and Begusarai are among most polluted, with New Delhi recording levels of 92.7  $\mu\text{g}/\text{m}^3$  in 2024. China has made progress in combating air pollution but still ranking fourth globally with average PM2.5 concentrations of 64  $\mu\text{g}/\text{m}^3$  in 2023. In 2024, Beijing’s air quality remains a concern as it averages around 60  $\mu\text{g}/\text{m}^3$  during peak pollution periods (Sharma, 2024).

Smog is a combination of variety of chemicals such as sulfur dioxide (SO<sub>x</sub>), nitrogen oxide (NO<sub>x</sub>), carbon monoxide (CO), volatile organic compounds (VOCs), ozone (O<sub>3</sub>), peroxyacetyl nitrates (PAN) and aldehydes, these components cause serious health issues. Individual cars only produce small amount of air pollution but large buildings that power house plants and smokestacks are also significant source of smog. Industrial emission, vehicular exhaust and agriculture burning practices are the main cause of smog production. Interestingly, burning woods in homes is a significant source of direct emissions of fine particles, which are mostly noticeable in the winter, along with numerous human - caused activities that contribute to air pollution. Deforestation and excessive industrialization are the main cause of smog. Forest makes the environment clean but we use woods for many purposes and did not plant the new one. On the other hands exhaust from urban vehicles, mostly as a result of gasoline, low quality lubricating oils and poorly managed public transportation is the main cause of air pollution. The uncontrolled combustion of waste releases pollutants in the atmosphere (Kousar et al., 2024).

Smog can cause serious health issues, specifically respiratory and cardiac problems. There are many effects of smog but generally some are like irritation of eyes, throat and nose, reduction in lung function, exacerbation of respiratory and cardiac conditions and in some cases fatality. Comprising solid and liquid particles with various sizes and compositions, the majority of particulate matter (PM) is interrupted in the nose and throat, preventing it from reaching the lungs. But finer particles have the ability of deep penetration reach the lungs and cause serious harms on the cardiorespiratory systems, leading to infection, bronchitis, asthma, emphysema, black lung and many other adverse effects. Ozone the other particle of smog can irritate and inflame the respiratory tract and produce symptoms such as coughing, throat irritation and discomfort. Individuals with asthma, as ozone exposure have wheezing and shortness of breath. Nitrogen oxide irritates the respiratory tract leading to inflammation in airways such as patients have difficulty in breathing. Sulfur dioxide is a potent respiratory irritant can cause irritation in nose, throat and lungs (Arif & Hassan, 2023).

#### **Null Hypothesis (H0)**

“There is no significant difference in the level of knowledge about smog among students of RLKU.”

#### **Alternative Hypothesis (H1)**

“There is a significant difference in the level of knowledge about smog among students of RLKU.”

#### **Objective**

To investigate the awareness, perception and attitude towards smog among students of RLKU.

#### **MATERIAL AND METHOD**

This study was carried out at Rashid Latif Khan University, which is well known university in Lahore, Pakistan that provides both medical and non-medical degrees with practical implementation. RLKU is currently a fully Chartered Institute formed by a Legislative Act of the Punjab Assembly (Punjab Act No. XXXVII of 2021) and is approved and recognized as a degree-issuing institution by the Higher Education Commission (HEC) of Pakistan. RLKU provides undergraduate and graduate degrees in a variety of subjects, as well as career orientation courses. Rashid Latif Khan University's (RLKU) mission is to attain academic and professional excellence by means of innovation and constructive societal impact. The university's goal is to create a community of responsible, compassionate, and worldly citizens who are lifelong learners. The descriptive cross-sectional study was employed. “A cross-sectional study design is described as a type of observational research that examines the relationship between health-related variables in a population at a single point in time. It is often used to assess the prevalence of diseases, health behaviors, or other outcomes” (Susan et.al, 2018). Participants of this study were the undergraduate students of Rashid Latif Khan University. Anticipated duration of study for research was 6 to 8 months, including the time taken for preparation of synopsis, its approval, analysis, and conduct of research survey to compilation of results and discussion. 189 students of Rashid Latif Khan University were selected. Simple random technique has been used to recruit participants. The undergraduate students of Rashid Latif Khan University were selected for the research survey.

The postgraduate students and students who were at the process of admission in university were excluded. In addition, with those who was not consent to participate. A structured questionnaire, adapted from a study on public awareness of air pollution in Punjab, Pakistan (King Edward Medical University, Lahore), was used after modifying questions to align with the research objectives. Permission was obtained via email. The questionnaire is based on “perception and attitude of people towards smog”. This cross-sectional study was started after taking permission for data from university ethics committee (RLKU). 189 students were involved in the research. With their signed informed consent, the respondents were subjected to a structured questionnaire via google forms.

The rights of the research participants were protected, and the guidelines established by the Rashid Latif Nursing College ethical committee were adhered to during the research process. The data was analyzed by using the Statistical Package for Social Sciences (SPSS version 23.0). Data analysis helps us organize, interpret, and test our research findings to see if they support our initial hypotheses. Every questionnaire was carefully reviewed in order to look at the response pattern and find any irregularities in the way the questionnaires were filled out. To characterize the demographics and other factors, the mean, standard deviation, frequency and percentage are used in descriptive statistics.

## RESULTS

The majority of respondents (53.7%) were aged 23–27, followed by 38.9% in the 18–22 age groups. A smaller portion, 6.3%, fell within the 28–32 age range, while no respondents were aged 33–37. Additionally, a negligible 0.5% was categorized as "others," likely due to missing or outlier responses. Male respondents dominated (70%), while female participants made up 29.5%. This suggests a significant gender imbalance in the sample. BS Nursing had the highest representation (29.5%), followed by MBBS (20%). Other health sciences like BDS, DPT, D Pharmacy, and Psychology had smaller but notable shares. This shows a strong focus on medical and health-related fields among respondents. 4th-year students (or 7th–8th semester) were the largest group (38.4%). 2nd-year students (23.5%) and 1st-year students (20.5%) followed. Fewer respondents were in their 3rd year (16.8%), possibly due to clinical rotations or other commitments. An overwhelming majority (84.1%) studied in English-medium schools/colleges. Only 12.1% had Urdu as their previous medium, with a small percentage (3.7%) in "others." This indicates that most participants are comfortable with English as their academic language. University hostel residents were the largest group (37.4%). Others lived in shared/single rooms (21.6%), private apartments (20%), or with family (20.5%). This suggests a mix of on-campus and off-campus living situations.

**Table 1: Demographic Data of Medical Students of RLKU**

Demographic data	Frequency(n)	Percentage (%)
<b>Age in years</b>		
18-22	74	38.9
23-27	102	53.7
28-32	12	6.3
33-37	0	0
Others	1	0.5
<b>Gender</b>		
Male	133	70
Female	56	29.5
<b>Department</b>		
MBBS	38	20
BDS	20	10.5
DPT	16	8.4
D Pharmacy	15	7.9
BS Biochemistry	11	5.8
Allied Health Sciences	18	9.5
BS Psychology	15	7.9
BS Nursing	56	29.5
<b>Academic Year</b>		
1 <sup>st</sup> year or (1 <sup>st</sup> & 2 <sup>nd</sup> semester)	39	20.5

2 <sup>nd</sup> year or (3 <sup>rd</sup> & 4 <sup>th</sup> semester)	45	23.5
3 <sup>rd</sup> year or (5 <sup>th</sup> & 6 <sup>th</sup> semester)	32	16.8
4 <sup>th</sup> year or (7 <sup>th</sup> & 8 <sup>th</sup> semester)	73	38.4
<b>Previous Medium</b>		
Urdu	23	12.1
English	159	84.1
Others	7	3.7
<b>Residence</b>		
University hostel	71	37.4
Shared/Single room	41	21.6
Private department on by self	38	20
Living with family	39	20.5

### AWARENESS AND KNOWLEDGE RELATED TO SMOG

This table reveals key insights about public awareness and knowledge of smog. While most respondents (87.4%) had heard of smog, understanding varied significantly - only 44.2% knew its causes well ("To some extent/Very much"), though health effect awareness was higher (51.6%). Crucially, 55.3% strongly rejected the idea that smog could be beneficial, showing dominant negative perceptions. The data reveals an awareness-knowledge gap: while smog recognition is high, detailed understanding of causes lags behind health impact knowledge. About 20-24% consistently fell into the "Average" knowledge category across questions, suggesting a sizeable neutral group needing targeted education. The findings highlight successful public awareness about smog's existence and health risks, but indicate need for improved education about its sources and environmental mechanisms.

**Table 2: Awareness and Knowledge Related to Smog**

Knowledge Questions	Not at all	Little bit	Average	To some extent	Very much
8. Have you heard of smog before?	24(13%)	44(23%)	44(23%)	22(12%)	55(29%)
9. Do you think smog is good?	105(55%)	30(16%)	37(20%)	13(7%)	4(2%)
10. Do you know the causes of smog?	20(11%)	39(21%)	46(24%)	53(28%)	31(16%)
11. Do you know the effects of smog on health?	21(11%)	31(16%)	39(21%)	54(29%)	44(23%)

### Questions related perception of Smog

This table reveals important findings about public perception of smog. A strong majority (74.2%) consider smog a serious issue, primarily due to its life-threatening health risks (88.9% of those who view it as serious). Public concern is significant, with 66.9% showing moderate to high concern levels. Personal exposure matters - 59.5% experience smog frequently, mostly once (49.5%) or twice (31.6%) yearly. However, 11.1% remain uncertain about smog's seriousness, and 11.6% show no concern. The data shows that while most recognize smog's severity based on health risks and personal experience, a notable minority remains unconvinced or unaffected. These perceptions likely influence willingness to support mitigation efforts, suggesting targeted awareness campaigns could help address the knowledge-attitude gap among skeptics. The high personal exposure rates (59.5%) may explain the strong overall concern about this environmental health threat.

**Table 3: Perception regarding Smog**

Perception Questions	Not at all	Little bit	Average	To some extent	Very much
12. Are you concerned about smog?	22((10%)	41(22%)	45(24%)	42(22%)	40(22%)
13. Do you think smog is serious?	<b>Yes</b> 141(74%)		<b>No</b> 28(15%)		<b>Others</b> 21(11%)
13A. If yes then	<b>It can cause life threatening conditions</b> 169(89%)		<b>It can cause respiratory disease</b> 0		<b>Others</b> 20(11%)
14. Do you frequently experience smog?	<b>Yes</b> 113(60%)		<b>No</b> 63(33%)		<b>Others</b> 13(7%)
14A. If yes then	<b>Once in a year</b> 94(50%)		<b>Twice in a year</b> 60(32%)		<b>Others</b> 35(18%)

### Questions related attitude and behavior towards Smog

This table presents survey results on public attitudes and behaviors toward smog reduction. A majority (34.7%) believe individuals have an "Average" impact, while only 28.4% see significant personal influence. Government regulations receive stronger backing, with 23.7% supporting them "Very much." Regarding behavioral intentions, 24.7% are highly willing to use public transport, while 28.4% moderately favor energy-efficient appliances. Support for anti-smog organizations is split, with 44.8% expressing some level of commitment. Overall, responses show cautious optimism, with greater trust in policy measures than individual actions.



**Table 4: Attitude and Behavior towards Smog**

Questions	Not at all	Little bit	Average	To some extent	Very much
15. Do you think individuals make difference in reducing smog?	28(15%)	42(22%)	66(35%)	30(16%)	24(12%)
16. Do you support government regulations to control smog?	25(13%)	31(16%)	61(32%)	28(15%)	45(24%)
17. Do you plan to use public transport to reduce smog?	25(13%)	32(17%)	47(25%)	39(20%)	47(25%)
18. Do you plan to use energy efficient appliances to reduce Smog?	24(13%)	36(19%)	49(26%)	54(28%)	27(14%)

## DISCUSSION

**The study conducted at** Rashid Latif Khan University revealed critical insights into undergraduate students' demographics and their perceptions of smog. The sample mostly consisted of 23–27-year-old health sciences students (e.g., MBBS, BS Nursing), with a significant gender imbalance (70% male). Although the majority of participants (87.4%) knew about smog, only 44.2% knew what caused it. In spite of the high level of public concern (74.2% saw smog as significant, 88.9% citing health implications), 11.1% were not persuaded, indicating the need for focused education. In contrast to individual activities (28.4% believed in personal influence), behavioral reactions demonstrated a higher level of faith in government laws (23.7% strong support). According to the findings, improving smog mitigation initiatives requires closing knowledge gaps and utilizing policy-driven solutions, especially among younger, better- educated populations.

Rashid Latif Khan's research findings are supported by King Edward's research. KEMU students demonstrated more support for both personal change (70.8% vs. 28.4%) and government action (88.5% vs. 23.7%), as well as stronger knowledge (94.8% vs. 44.2%). Although RLKU students expressed worry, their lack of participation and expertise points to the need for focused instruction, in contrast to the more proactive KEMU group (Fatima et al., 2024).

The study in Korea and Rashid Latif Khan University present both similarities and contrasts in findings on smog and human behavior. Both studies demonstrate a small behavioral influence but emphasize pollution awareness.

The study in Korea and Rashid Latif Khan University present both similarities and contrasts in findings on smog and human behavior. Both studies demonstrate a small behavioral influence but emphasize pollution awareness. While the Rashid Latif Khan research revealed that students were worried but lacked a comprehensive knowledge and relied on government intervention, Wang et al. (2020) discovered that pollution had no influence on tourists' decisions. Overall, awareness exists, but action depends on context and demographic.

Both studies at RLKU and in Thailand highlight the harmful impact of smog but from different angles. According to Ontawong, prolonged exposure with smog results in decreased lung function and respiratory symptoms. According to the RLKU study, people are well aware of the health concerns posed by pollution, but they don't fully comprehend its sources, which emphasizes the need for improved policy and education (Ontawong et al., 2020). Studies conducted in Canada and at RLKU both emphasize how crucial awareness is in influencing attitudes and actions linked to pollution. The Rashid Latif Khan University study indicates that students have a high level of awareness but a limited comprehension of the reasons, but the Canadian study indicates that smog warnings boost knowledge and risk avoidance.

Although both studies value awareness, they differ in terms of public reaction and policy participation. The Canadian study highlights the efficacy of organized warnings, while the Pakistani study underlines the necessity for targeted education and policy trust (Mehiriz & Gosselin 2022).

Studies conducted at RLKU and China both show that people are aware of pollution, but they also point out important knowledge gaps about its sources. Although Yang discovered that Ningbo's public perception frequently deviates from reality and changes during emergencies, a survey conducted by Rashid Latif Khan University revealed that, in spite of widespread concern, only 44.2% of students were aware of the causes of pollution. Both stresses the need of focused instruction, but their settings are different—one reflects urban public opinion more broadly, while the other focuses on young, educated health students who place greater faith in government action than in their own initiative (Yang & Shi 2017).

The research conducted at RLKU and in India both deal with smog-related concerns, but they are contrast to each other—public perception vs environmental monitoring. Using satellite imagery and pollution statistics, attention was brought to Delhi's extreme air pollution during Diwali, demonstrating blatant environmental deterioration. The Rashid Latif Khan University research, on the other hand, concentrated on student awareness and exposed knowledge gaps as well as a preference for policy over individual initiative. One affirms the intensity of smog occurrences, whereas the other emphasizes the necessity of governmental involvement and education to mitigate its effects (Mushtaq et al., 2024).

Both studies at RLKU and in CMH are contrast to each other. Another study emphasized policy prioritizing while concentrating on a structured decision-making approach to determine the origins and effects of pollution. In contrast, research conducted by Rashid Latif Khan University examined the attitudes of young people and found that they preferred government-led solutions and had gaps in their understanding. Although one is based on perception, the other is driven by legislation and models both emphasize the significance of well-informed tactics and education for successful smog reduction (Kousar et al., 2025).

## **CONCLUSION**



- The study includes detailed demographic interruptions (age, gender, academic background, etc.), providing framework for the results.
- Most respondents (87%) were aware of smog, indicating successful public health messaging.
- A majority (74%) recognize smog as a serious issue, with 88.9% linking it to health risks, suggesting public accessibility to mitigation efforts.
- Behavioral Captures: Willingness to take actions that reduce pollution (e.g., public transport use, support for regulations).

### STUDY LIMITATIONS

- Overrepresentation of medical/health students (e.g., BS Nursing, MBBS) may limit generalizability to the wider population.
- Male-dominated sample (70%) may twist perspectives on smog perception and behavior.
- Risk of social desirability bias (e.g., overstating concern or willingness to act).
- Conducted at a single university; findings may not reflect regional or national trends.

### RECOMMENDATIONS

In future study, we should ensure gender balance and include non- medical students for broader insights. Since, we only gathered information from single university, which reflects regional or national trends, next time the research should be conducted at multiple universities to minimize these trends and provide information at rural or urban levels. In future, research project should enhance the education and policy towards smog mitigation efforts.

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