Hygienic Assessment of Air Pollution Perception and Environmental Comfort Among Urban Residents of The Fergana Valley

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Abstract
This study evaluated public perception of atmospheric air quality and its influence on environmental comfort among urban residents of the Fergana Valley. A cross-sectional questionnaire survey involving 180 residents of Fergana, Kokand, and Margilan cities was conducted in 2026. The study assessed perceived air quality, dust exposure, transport-related pollution, subjective health complaints, sleep quality, and environmental comfort indicators. The findings demonstrated that more than half of respondents considered local air quality unsatisfactory. Frequent complaints included dust accumulation, unpleasant traffic-related odors, headaches, fatigue, eye irritation, and sleep disturbances. Residents living near major roads reported significantly lower levels of environmental comfort compared with those residing in less congested areas. The results indicate that atmospheric air pollution affects not only physical health but also daily well-being and perceived quality of life. Strengthening environmental monitoring and implementing preventive measures may contribute to improved urban environmental comfort and public health outcomes.

Keywords: *atmospheric air pollution, environmental comfort, urban population, air quality perception, public health, environmental hygiene, Fergana Valley*

Introduction
Atmospheric air represents one of the most important environmental determinants influencing human health, well-being, and quality of life. Air quality directly affects physiological functions, respiratory health, mental performance, and overall environmental comfort experienced by populations living in urban areas. Rapid urbanization, increasing motor vehicle traffic, industrial development, and population growth have contributed to growing concerns regarding atmospheric pollution in many regions worldwide.

In recent decades, environmental health researchers have increasingly emphasized that the impact of air pollution extends beyond clinically diagnosed diseases. Environmental exposure may influence subjective perceptions of health, psychological well-being, daily comfort, sleep quality, productivity, and social functioning. Consequently, evaluation of public perception regarding air quality has become an important component of environmental hygiene and public health research.

Urban populations are continuously exposed to various atmospheric pollutants including particulate matter, vehicle emissions, industrial aerosols, nitrogen oxides,

sulfur compounds, and other contaminants. Even when pollution levels remain below thresholds associated with severe disease, prolonged exposure may contribute to discomfort, irritation of sensory organs, fatigue, headaches, and reduced environmental satisfaction. Such effects may negatively influence quality of life and community well-being.

The Fergana Valley is one of the most densely populated regions of Uzbekistan and experiences substantial transportation activity and urban expansion. Increasing traffic density and urban development may contribute to deterioration of environmental conditions in certain residential areas. Despite growing attention to environmental protection, information regarding public perception of atmospheric air quality and environmental comfort remains limited.

Assessment of population-based perceptions provides valuable information regarding environmental conditions that may not be fully reflected by routine environmental monitoring. Understanding how residents experience and evaluate air quality can assist public health authorities in identifying priority environmental concerns and developing targeted preventive interventions.

The present study aimed to evaluate public perception of atmospheric air quality and determine its impact on environmental comfort and daily well-being among urban residents of the Fergana Valley.

Materials and Methods

A cross-sectional population-based survey was conducted between February and May 2026 among residents of three major urban centers of the Fergana Valley, including Fergana, Kokand, and Margilan. The study was designed to evaluate public perception of atmospheric air quality and determine its influence on environmental comfort and daily well-being. A total of 180 adult residents participated in the investigation.

Participants were selected using a stratified sampling approach to ensure representation of different residential districts and demographic groups. Inclusion criteria included permanent residence within the study area for at least three years, age above 18 years, and willingness to participate in the survey. Individuals with severe cognitive impairment or inability to complete the questionnaire were excluded from the study.

Data collection was performed using a structured questionnaire developed specifically for environmental hygiene assessment. The questionnaire consisted of demographic characteristics, residential environment information, perception of atmospheric air quality, frequency of exposure to dust and traffic emissions, environmental comfort indicators, and self-reported health-related complaints associated with air pollution exposure.

Respondents were asked to evaluate local air quality using a five-point scale ranging from “very good” to “very poor.” Additional questions assessed the presence of visible dust accumulation, unpleasant odors associated with vehicle emissions, frequency of window opening, perceived environmental cleanliness, and overall satisfaction with residential environmental conditions.

To evaluate the potential influence of air quality on daily well-being, participants were asked about the occurrence of headaches, eye irritation, fatigue, sleep disturbances, difficulty concentrating, respiratory discomfort, and general environmental

dissatisfaction. Information regarding proximity of residences to major roads, industrial facilities, and areas of heavy traffic was also collected.

Environmental comfort was assessed using subjective indicators including satisfaction with neighborhood conditions, perceived freshness of outdoor air, comfort during outdoor activities, and overall quality of the residential environment. Respondents were categorized into high, moderate, and low environmental comfort groups according to their questionnaire scores.

The collected data were entered into an electronic database and analyzed using standard statistical methods. Quantitative variables were expressed as means and standard deviations, whereas qualitative variables were presented as frequencies and percentages. Comparative analyses were performed to identify associations between perceived air quality and environmental comfort indicators. Statistical significance was accepted at $p < 0.05$.

The study was conducted in accordance with ethical principles of public health research. Participation was voluntary, confidentiality was maintained throughout the study process, and all respondents provided informed consent prior to completion of the questionnaire.

Results

The study included 180 urban residents living in different districts of Fergana, Kokand, and Margilan. The mean age of participants was 38.7 ± 12.4 years. Among respondents, 52.2% were female and 47.8% were male. Most participants had resided in their current neighborhoods for more than five years, providing sufficient experience for evaluation of local environmental conditions.

Assessment of atmospheric air quality perception demonstrated that environmental concerns were widespread among the surveyed population. More than half of respondents expressed dissatisfaction with local air quality, while only a small proportion considered atmospheric conditions to be good or very good. Residents living near major roads and densely populated urban districts reported less favorable assessments of air quality compared with those residing in relatively less congested areas.

Visible dust accumulation represented one of the most frequently reported environmental problems. Many respondents stated that dust deposits on windows, balconies, vehicles, and household surfaces were observed regularly throughout the year. Transport-related emissions were also identified as a major source of environmental concern. Nearly half of participants reported frequent detection of unpleasant odors associated with vehicle exhaust gases, particularly during periods of heavy traffic.

Table 1. Public perception of atmospheric air quality among respondents (n = 180)

Indicator	Number	Percentage (%)
Air quality considered satisfactory	38	21.1
Air quality considered moderate	38	21.1
Air quality considered unsatisfactory	104	57.8
Frequent dust accumulation observed	94	52.2
Traffic-related odors regularly perceived	89	49.4

Outdoor air considered fresh	46	25.6
Dissatisfaction with environmental conditions	97	53.9

The investigation further demonstrated that perceived atmospheric pollution was associated with various subjective health complaints affecting daily well-being. Headaches and general fatigue were among the most commonly reported symptoms. Respondents frequently associated these complaints with poor air quality and environmental discomfort, particularly during warm seasons characterized by increased dust levels and traffic density.

Sleep quality was another important indicator influenced by environmental conditions. More than one-third of participants reported occasional or frequent sleep disturbances, which they associated with outdoor environmental factors, including poor air circulation, unpleasant odors, and urban noise accompanying traffic-related activities. Eye irritation and respiratory discomfort were also commonly reported among individuals expressing dissatisfaction with local air quality.

Table 2. Self-reported complaints associated with perceived atmospheric pollution

Complaint	Number	Percentage (%)
Frequent headaches	75	41.7
General fatigue	80	44.4
Sleep disturbances	64	35.6
Eye irritation	56	31.1
Respiratory discomfort	50	27.8
Difficulty concentrating	42	23.3
Reduced outdoor activity	58	32.2

Environmental comfort assessment revealed substantial differences between respondents depending on residential location. Individuals residing near major roads and high-traffic intersections reported significantly lower environmental comfort scores. These residents more frequently described their neighborhoods as noisy, dusty, and less pleasant for outdoor activities. In contrast, respondents living in areas with greater green space and lower traffic density reported higher satisfaction with their environmental conditions.

Overall environmental comfort analysis demonstrated that 29.4% of respondents belonged to the high-comfort category, 38.3% to the moderate-comfort category, and 32.3% to the low-comfort category. Lower environmental comfort scores were strongly associated with negative perceptions of air quality, frequent dust exposure, and transport-related pollution.

The findings indicate that atmospheric air quality is an important determinant of environmental comfort and subjective well-being among urban residents of the Fergana Valley. Although most reported effects were not severe medical conditions, they substantially influenced daily comfort, satisfaction with living conditions, and perceived quality of life. The results suggest that improvements in urban environmental management and air quality protection may contribute to enhanced public well-being and greater residential satisfaction.

Discussion

The findings of the present study demonstrate that atmospheric air quality is closely associated with environmental comfort and subjective well-being among urban residents of the Fergana Valley. Unlike many environmental health investigations that focus primarily on clinically diagnosed diseases, the current study evaluated how residents perceive air quality and how these perceptions influence their daily lives, comfort, and overall satisfaction with their living environment. The results indicate that environmental conditions affect not only physical health but also psychological well-being and quality of life.

More than half of respondents considered local air quality unsatisfactory, suggesting that environmental concerns are widespread among urban populations. Similar findings have been reported in studies conducted in rapidly urbanizing regions where increasing traffic density and population growth contribute to deterioration of environmental conditions. Public perception of air quality often reflects cumulative exposure to visible dust, odors, traffic congestion, and other environmental factors that directly influence everyday experiences.

Dust accumulation emerged as one of the most frequently reported environmental problems. Residents regularly observed dust deposits on household surfaces, windows, and vehicles, indicating continuous exposure to airborne particulate matter. Although the present study did not include direct measurement of atmospheric pollutants, perception of excessive dust may serve as an indirect indicator of environmental degradation and reduced residential comfort. Previous environmental health studies have demonstrated that visible environmental contamination strongly influences public satisfaction with neighborhood conditions.

Transport-related pollution also represented an important source of environmental dissatisfaction. Nearly half of participants reported frequent perception of vehicle exhaust odors. Urban transportation systems are recognized as major contributors to atmospheric pollution, particularly in densely populated areas where traffic intensity remains high throughout the day. Exposure to transport emissions has been associated with reduced environmental satisfaction, annoyance, and negative perceptions of neighborhood quality.

An important observation of the study was the relationship between perceived air pollution and subjective health complaints. Headaches, fatigue, sleep disturbances, and eye irritation were frequently reported by respondents who expressed dissatisfaction with local air quality. These findings suggest that environmental factors may influence everyday well-being even in the absence of clinically diagnosed disease. Similar associations have been described in international studies evaluating the psychosocial impacts of environmental pollution.

Sleep quality represents a particularly important component of environmental comfort. More than one-third of participants reported disturbances in sleep that they associated with unfavorable environmental conditions. Adequate sleep is essential for physical recovery, cognitive performance, emotional stability, and overall health. Environmental discomfort caused by poor air quality, unpleasant odors, and urban pollution may therefore contribute indirectly to reduced quality of life through impairment of sleep patterns.

The study additionally demonstrated significant differences in environmental comfort according to residential location. Individuals living near heavily trafficked roads reported lower satisfaction with environmental conditions compared with residents of less congested neighborhoods. This finding highlights the importance of urban planning and environmental management in protecting population well-being. Green spaces, traffic regulation measures, and environmental protection initiatives may contribute to improvement of perceived environmental quality and residential comfort.
The concept of environmental comfort has gained increasing importance within environmental hygiene and public health research. Traditional approaches to environmental assessment frequently emphasize objective measurements of pollutants; however, subjective perceptions also provide valuable information regarding community experiences and environmental quality. Residents often identify environmental problems before measurable health effects become evident. Consequently, population-based perception studies may serve as useful tools for environmental monitoring and public health decision-making.
The results of the present investigation support the need for strengthening environmental protection measures in urban areas of the Fergana Valley. Regular monitoring of atmospheric air quality, reduction of traffic-related emissions, improvement of urban landscaping, and enhancement of environmental awareness programs may contribute to improved residential comfort and public satisfaction. Such interventions may also reduce the burden of environmental complaints and promote healthier living conditions.
Several limitations should be considered when interpreting the findings. The study relied primarily on questionnaire data and subjective assessments rather than direct environmental measurements. Individual perceptions may be influenced by personal experiences, expectations, and socioeconomic factors. Furthermore, the cross-sectional design does not permit establishment of causal relationships between environmental conditions and reported complaints. Nevertheless, the study provides valuable information regarding public attitudes toward atmospheric air quality and highlights important environmental concerns within the urban population of the Fergana Valley.
Overall, the findings indicate that atmospheric air pollution represents not only an environmental and hygienic problem but also a factor affecting daily comfort, well-being, and perceived quality of life. Consideration of population perceptions may therefore complement traditional environmental monitoring and contribute to more effective environmental health policies.

Conclusion

The present study demonstrated that atmospheric air quality significantly influences environmental comfort and subjective well-being among urban residents of the Fergana Valley. More than half of respondents expressed dissatisfaction with local air quality, indicating widespread concern regarding environmental conditions in urban areas.
Visible dust accumulation and transport-related pollution were identified as the most important environmental factors affecting public perception of air quality. Residents exposed to these conditions reported higher frequencies of headaches, fatigue, sleep disturbances, eye irritation, and respiratory discomfort. Although these complaints do

not necessarily indicate severe disease, they substantially affect everyday comfort, environmental satisfaction, and perceived quality of life.

The findings revealed that environmental comfort varies according to residential location. Individuals residing near major roads and areas characterized by intense traffic demonstrated lower levels of environmental satisfaction compared with residents of less congested neighborhoods. This observation highlights the importance of urban environmental management and pollution control measures for improving living conditions.

The study confirms that assessment of public perception provides valuable information regarding environmental quality and may complement traditional environmental monitoring systems. Consideration of community experiences and environmental concerns can contribute to more effective public health planning and environmental protection strategies.

Implementation of measures aimed at reducing atmospheric pollution, controlling dust generation, increasing urban green spaces, and improving environmental awareness may contribute to enhancement of environmental comfort and improvement of population well-being. Continued monitoring of environmental conditions and population perceptions is recommended to support sustainable urban development and protection of public health.

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