

# Air Pollution and Awareness of Air Quality Index in Dhanbad

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**Abstract:** Air pollution poses a critical challenge in Dhanbad, India, intensified by rapid industrial expansion and urban development. This study delves into the public's understanding of the Air Quality Index (AQI) and its ramifications in Dhanbad, often referred to as the 'Coal Capital of India.' Looking closely at important coal mining and industrial activities, the study examines where pollution comes from and assesses how it affects people's health. Employing a survey-based methodology that incorporates both primary and secondary data, the study aims to measure levels of awareness and behaviours related to the AQI. Results highlight a limited awareness, with notable disparities among various age groups, revealing a paradoxical gap between awareness and action. Additionally, the study offers recommendations to address the air pollution challenge in Dhanbad and enhance awareness of the AQI index.

**Keywords:** Air Pollution, Air Quality Index, Dhanbad, Public Awareness, Respiratory Conditions, Health Impacts, Pollution Mitigation

## 1. Introduction

In recent years, the word 'pollution' has become a common term, referring to the contamination of our environment with harmful stuff. These harmful elements, like a mix of tiny solid particles that float around in the air, are a worry because they get into the air and start affecting people, plants, and animals. The combined impact of industrial growth and more people living in cities has seriously affected the quality of air in India. This problem comes in many forms, from the bad stuff that vehicles release to the unfiltered smoke coming out of factories. Urbanization, in particular, has led to more industrial areas without the needed public services and environmental protections. This often leaves cities covered in a fog of pollution because there are lots of vehicles and other human activities happening close together.

To understand and tackle this issue, cities across India have been carefully checking their air quality using something called the Air Quality Index (AQI). This index sorts air quality into categories based on the levels of specific air pollutants that directly affect people's health and overall well-being. These troublesome pollutants include Particulate Matter (PM 10 and PM 2.5), Sulphur Dioxide (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>), Lead (Pb), Ozone (O<sub>3</sub>), Ammonia (NH<sub>3</sub>), and Carbon Monoxide (CO).

Recognizing the importance of dealing with air pollution, the Central Pollution Control Board (CPCB) of India stepped in back in 1994. They set up and shared standards for the quality of air in different areas, whether they are industrial, residential, or sensitive regions. These standards cover a range of air pollutants, including sulfur dioxide, nitrogen dioxide, suspended particulate matter, respirable particulate matter, respirable lead, and carbon monoxide. These standards serve as a foundation for keeping people healthy by protecting them from the bad effects of air pollution and reducing harmful pollutants for people, plants, and animals.

One of the lively cities in India, Dhanbad, located in the state of Jharkhand, is often known as the 'Coal Capital of

India.' Dhanbad has made its way onto the list of the world's 100 fastest-growing cities, and it had a population exceeding 2.5 million as of the 2011 census with the literacy rate of 74.53%. Dhanbad Rail Division ranks second in revenue generation among Indian Rail Divisions. The city's lifeblood is coal mining, with companies like Tata Steel, BCCL, ECL, and IISCO leading the way. The major industries in Dhanbad involve coal mining, coal washing, and making coke. Companies like IISCO (now part of SAIL), BCCL, and ECL (part of CIL - Coal India Ltd) are big players in the coal mining sector, mainly running open-cast mines. These companies have also thoughtfully built towns to support their workers.

## 2. Methodology

This study aims to assess the awareness of the people of Dhanbad regarding the Air Quality Index through a survey conducted among randomly selected individuals in the city. The study will seek to identify the sources of pollution in Dhanbad and examine how it impacts people's health. Both primary and secondary data from existing research will be utilized in this study.

## 3. Findings

### Potential Causes of pollution in the city–

#### Coal Mining:

The heart of Dhanbad's economy beats to the rhythm of coal mining, a vital industry that, unfortunately, churns out substantial quantities of dust and particulate matter. This isn't just a local concern, as these airborne particles can travel far and wide, impacting the environment on a broader scale. There are currently 112 active coal mines in Dhanbad, according to the Bharat Coking Coal Limited (BCCL) website. BCCL is a subsidiary of Coal India Limited, which is the world's largest coal producer. The coal produced in Dhanbad is used to generate electricity, power steel mills, and produce other industrial products.

Coal mining in Dhanbad has also had a negative impact on the environment and the health of the local population. Air

pollution from coal mining is a major problem in the city, and it has been linked to a variety of health problems, including respiratory problems, heart disease, stroke, and lung cancer. In recent years, the government of India has taken steps to reduce air pollution from coal mining in Dhanbad. These steps include requiring coal mines to install pollution control equipment and using cleaner mining technologies. However, more needs to be done to protect the health of the people of Dhanbad from the harmful effects of air pollution.

**Vehicular Emissions:**

Dhanbad's streets teem with vehicles, many of which are showing their age and lacking in proper maintenance. These wheeled contraptions spew forth emissions that include carbon monoxide, nitrogen dioxide, and sulfur dioxide. These gases pose a threat to the local air quality and, in turn, the health of residents.

**Industrial Emissions:**

The city's industrial hubs contribute their own symphony of pollutants, which encompasses particulate matter, sulfur dioxide, and nitrogen dioxide. These emissions are a consequence of the manufacturing and production activities taking place within Dhanbad, further muddying the air quality.

**Construction:**

The bustling construction scene also plays a role in the pollution narrative. The dust and particulate matter generated during construction activities add to the already complex mix of pollutants in the air.

**Open Burning:**

The practice of open burning, whether it's waste or various materials, introduces a diverse array of pollutants into the atmosphere. Among these are particulate matter, carbon monoxide, and nitrogen dioxide. This uncontrolled burning not only harms local air quality but also contributes to regional pollution concerns.

**Underground coal mine fire:**

The coal mine fire in Jharia Coal Field is a major problem because it releases gases that harm the environment, not only in the local area but also worldwide. When these fires burn, they produce harmful things like tiny particles (PMs), water that's polluted with things like TDS (Total Dissolved Solids) and heavy metals, and they also damage the land. All of this has serious health effects on the people who live nearby.

**What AQI Suggests:**

The Air Quality Index (AQI) serves as a gauge for assessing the extent of air pollution in a specific location, categorized into six levels:

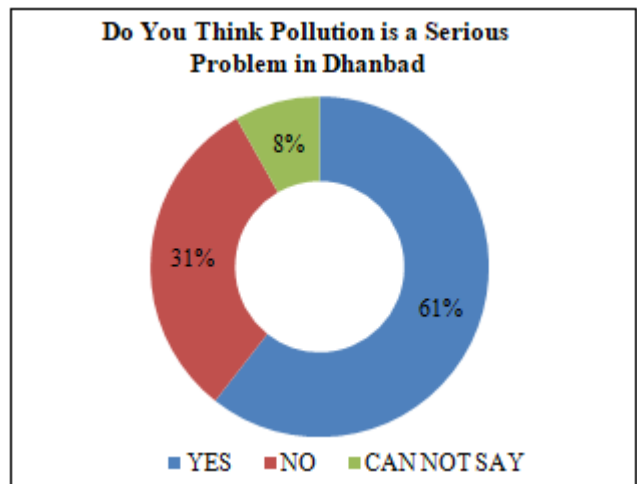
- Good (AQI 0 - 50): No restrictions on human activities are advised at this level.
- Moderate (AQI 51 - 100): Individuals with respiratory or heart conditions are cautioned to avoid strenuous outdoor activities.
- Unhealthy for Sensitive Groups (AQI 101 - 150): Children and older adults are recommended to limit prolonged or heavy outdoor exertion.

- Unhealthy (AQI 151 - 200): People with respiratory or heart conditions should refrain from any outdoor activity. Children, older adults, and others are advised to avoid outdoor exertion.
- Very Unhealthy (AQI 201 - 300): It is recommended that everyone avoids outdoor activities at this level.
- Hazardous (AQI 301 - 500): Everyone is advised to stay indoors and refrain from all physical exertion during conditions categorized as hazardous.

The AQI in Dhanbad fluctuates between Good and Hazardous levels throughout the year, according to the Plumlabs website.

**AWARNES OF AQI:**

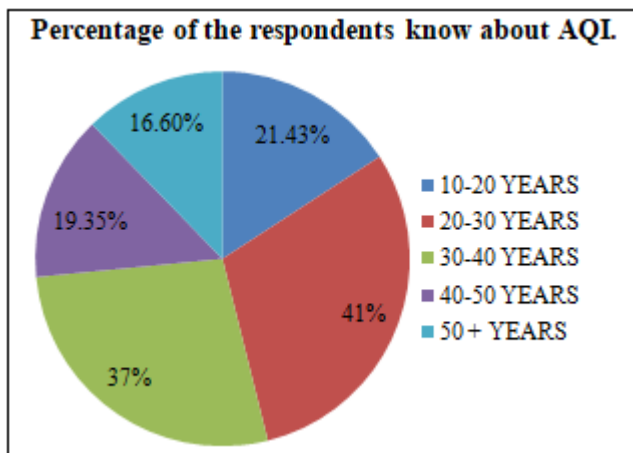
1) In this survey, a total of 237 participants were involved, Out of the total 237 participants, a significant 143 individuals, constituting an impressive 63.33%, unequivocally acknowledged the existence of pollution as a substantial and pressing problem in the city. This numerical representation underscores a collective awareness and recognition among the surveyed populace regarding the tangible and consequential impact of pollution within the fabric of Dhanbad's environmental landscape.



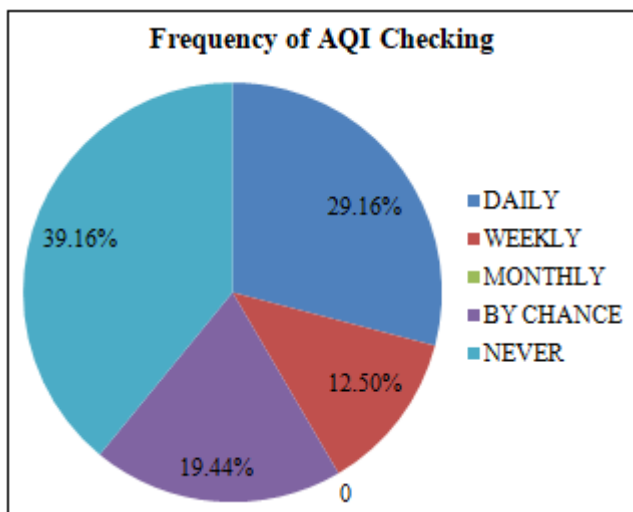
Age group of Respondents	Numbers of Respondents	Respondents Aware of AQI
10 – 20 years	56	12
20 – 30 years	83	34
30 – 40 years	43	16
40 – 50 years	31	6
50 + years	24	4

Total= 237 Total= 72

2) Out of the total 237 participants, the findings revealing that a modest proportion of respondents, specifically 30.40%, demonstrated awareness of the Air Quality Index (AQI). When analyzing the results based on age groups, respondents within the 20 to 30 - year - old category exhibited the highest level of awareness, with 41% acknowledging the concept of AQI. In the 30 to 40 - year age group, 37% of respondents were found to be cognizant of the AQI. In contrast, respondents aged 50 and above displayed the lowest awareness, with a mere 16% of individuals in this age group demonstrating familiarity with the AQI.



3) Among those respondents who possessed knowledge of the Air Quality Index (AQI), a mere 18.14% of the overall participant pool actively engaged in checking the AQI levels specifically in the Dhanbad region. Furthermore, it is noteworthy that a significant majority, constituting 61.10%, of those cognizant of the AQI did actively engage in monitoring it. This vigilance regarding AQI was distributed across various monitoring frequencies, with 29.16% of them conscientiously checking on a daily basis, 12.5% conducting weekly checks, and an additional 19.44% of respondents opting to check the AQI sporadically, often described as a chance - based approach. Intriguingly, a substantial portion of those with awareness of the AQI, totaling 39.16%, never undertook the practice of monitoring the AQI. This suggests a paradoxical situation where, despite possessing knowledge about the AQI, a significant percentage of respondents did not actively engage with it, reflecting a potential gap between awareness and behavioural action in the context of air quality monitoring in Dhanbad.



4) A mere 3.40% of the entire pool of survey participants were found to alter their behaviours in response to the Air Quality Index (AQI) results. This response rate indicates a relatively limited proportion of respondents who actively adjusted their actions based on the AQI data. However, among those who possessed knowledge about the AQI, a more pronounced 11.11% exhibited a noteworthy shift in their behaviour, aligning it with the information supplied by the AQI specific to their locality. This subset of respondents,

characterized by their AQI - informed behavioural adjustments, reflects a more significant degree of engagement with and responsiveness to air quality indicators. These findings underscore the variable degree of influence that the AQI exerts on public behaviour, signifying a need for further investigation into the factors that underlie such variations in response rates among individuals.

#### 4. Conclusion

Dhanbad, the bustling 'Coal Capital of India,' faces a critical challenge: air pollution. This study has explored the sources of this pollution, from coal mining and industrial emissions to vehicular exhaust and open burning. The findings paint a stark picture, revealing not only high levels of air pollution but also a disturbing lack of awareness and action regarding its impact on public health. The Air Quality Index (AQI) serves as a vital tool for understanding air pollution levels and their associated health risks. Yet, study found that only a modest 30.40% of the surveyed population possessed knowledge of the AQI. Even among those aware of the AQI, a significant 39.16% never actively monitored it, highlighting a crucial gap between awareness and action.

The health consequences of air pollution in Dhanbad are undeniable. Exposure to harmful pollutants like particulate matter, sulfur dioxide, and nitrogen dioxide can lead to respiratory illnesses, heart disease, stroke, and even cancer. These impacts are particularly concerning for vulnerable populations, including children, older adults, and individuals with pre - existing health conditions.

#### 5. Recommendations

- 1) Establish a comprehensive and integrated pollution control framework for Dhanbad, focusing on collaborative efforts between government bodies, industries, and local communities. This framework should incorporate stringent regulations and effective monitoring mechanisms.
- 2) Encourage industries, especially those involved in coal mining, to invest in and adopt cleaner technologies and pollution control measures. Incentivize the implementation of advanced equipment to minimize particulate matter emissions.
- 3) Launch extensive awareness campaigns targeting all age groups, emphasizing the importance of the Air Quality Index (AQI) and its relevance to health. Collaborate with local educational institutions and community centres to reach a broader audience. AQI of the city should be in the daily news papers with proper colour coding of danger level.
- 4) Facilitate community - led pollution monitoring initiatives, empowering residents to actively participate in data collection. This engagement can enhance the accuracy of pollution assessments and foster a sense of shared responsibility.
- 5) Strengthen the enforcement of existing pollution control norms, especially in industries and construction activities. Implement regular inspections and penalties for non - compliance to create a deterrent effect.
- 6) Organize regular dialogue sessions involving government agencies, industries, environmental experts,

and local communities. This platform can facilitate discussions on pollution mitigation strategies, address concerns, and foster cooperation.

- 7) Explore avenues for diversifying the economy of Dhanbad to reduce dependency on coal mining. Encourage the growth of cleaner industries and sustainable practices that contribute to economic development without compromising air quality.
- 8) Advocate for and invest in green transportation alternatives to reduce vehicular emissions. This could include promoting electric vehicles, improving public transportation, and creating infrastructure for cycling and walking.
- 9) Support ongoing research initiatives to continually monitor air quality, identify emerging pollutants, and assess the effectiveness of pollution control measures. Regularly update pollution control strategies based on the latest scientific findings.
- 10) Advocate for national and international collaboration to address underground coal mine fires, which contribute significantly to air pollution. Engage with environmental organizations and research institutions to develop effective strategies for extinguishing these fires.
- 11) Introduce incentives for individuals and businesses that actively contribute to improving air quality, based on their adherence to AQI - informed practices. This could include tax benefits, recognition, or other tangible rewards.

By implementing these recommendations, Dhanbad can work towards creating a sustainable and healthier environment, ensuring the well - being of its residents and the longevity of the region's economic growth.

## 6. Limitations

This study is limited by its small sample size and may not be representative of the entire population of Dhanbad. Additionally, the survey data relies on self - reported information, which may be subject to bias.

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