



Urban Air Pollution

South Asia Urban Air Quality Management Briefing Note No. 15

Urban Air Pollution in India: Perceptions of Stakeholders

How do people who work in air-pollution-related areas view urban air quality trends and management? To answer this question, a questionnaire was sent out in early 2004 to stakeholders in India. Nearly half of the 81 who responded said that air quality in their cities was deteriorating. Transport was considered the most important cause of air pollution. Delhi residents were more optimistic about air quality management than those in other cities. Asked about barriers to effective air quality management, respondents cited a lack of political will as the greatest obstacle, followed by a lack of information and knowledge at the decision-making level. Consistent with these answers, sharing knowledge and lessons from international experience and assisting sectors that influence air quality were seen to be the most important support international agencies could provide.

How do people working in air-pollution related areas in India view air pollution in their cities? To gain a better understanding of opinions and perceptions, a questionnaire was circulated using the listserv for the Clean Air Initiative for Asian Cities and by post in early 2004. Respondents lived in Bangalore, Chennai, Delhi, Hyderabad, Kolkata, Mumbai, and a few other cities in India. The questionnaire asked about recent trends in air quality in their cities, contributing sources, activities and policy interventions that had improved or worsened air quality in recent years, and the key actors in air quality management. One purpose of the survey was to compare the perceptions of stakeholders to the findings of the recent analyses of air quality trends and sources of particulate air pollution in Indian cities [1–3]. The questionnaire is available in [3, 4].

A total of 81 individuals responded, comprising 25 working for governments, 19 for the private sector, 12 in academia, 10 for non-governmental organizations (NGOs), 5 for international development agencies, and 10 in other areas. Thirty-five respondents were from Delhi. Sixty-two percent of the respondents worked directly in air-pollution related areas. More than 50 percent were involved in research or analysis or both, and 40 percent in the dissemination of information. Technical articles were cited as the most frequently used sources of information on air pollution (69 percent of all respondents), followed by the media (48 percent).

It is important to stress that the survey was not designed to yield statistically significant results. It was rather a modest attempt to get a broad-brush picture of the perceptions and understandings of informed observers of urban air pollution in India.

Air Quality Trends

More than 90 percent of the respondents thought air pollution in their cities was serious or moderately serious (see Table 1). Nearly 50 percent of all respondents, and 59 percent of those who said air pollution was serious, thought air quality was deteriorating. Eighty-eight percent of respondents replied that the adverse impact on health was the single most important consequence of urban air pollution.

Table 1 Perceived State of Air Pollution

| Air pollution is: | % ¹ | Air quality is | % ¹ |
|----------------------|----------------|--------------------|----------------|
| Serious | 36 | Improving | 36 |
| Moderately serious | 55 | Deteriorating | 47 |
| Not serious or other | 9 | No change or other | 17 |

¹Percentage of total respondents

However, there was a large difference between Delhi and other cities: 63 percent of Delhi respondents said air quality was improving, whereas 67 percent of the respondents in other cities said it was deteriorating. Of those who said that air quality was improving, half reported that it was deteriorating earlier but began improving in recent years. Government officials tended to cite improving air quality the most (although less than one-fourth resided in Delhi) whereas academics were more inclined than others to say that air quality was deteriorating.

Particulate matter was viewed as the pollutant of most concern, followed by carbon monoxide (CO), and oxides of sulfur and nitrogen. Ozone ranked low. Quite a few respondents expressed concerns about hydrocarbons in the air, especially benzene.

Determinants of Air Quality

Transport was universally considered by far the most important cause of air pollution. This view was held across all professions, and by 78 percent of all respondents. Transport was followed by industry (including power generation and small industry activities), and finally household fuel use, construction, refuse burning, and other urban activities.

Respondents were asked about specific measures that might have affected air quality. There were some differences between Delhi and other cities. Delhi respondents were twice as likely to say that old vehicle phase-out, industry relocation, and industry closure have had a positive impact on air quality than the others. This is not surprising, given that old vehicle phase-out and industry relocation/closure have been pursued much more extensively in Delhi than elsewhere.

The measure that the highest percentage of respondents cited as having had a positive impact on air quality was transport fuel quality improvement. This was followed by the construction of new roads and flyovers (excluding the period of construction), industry closure, and cleaner domestic fuels. The positive measures are ranked in Table 2 in order of decreasing percentage of total respondents that indicated that a given measure had a positive impact on air quality. The responses are shown for all respondents, as well as those from Delhi and from other cities. The largest difference between the cities is seen for the phase-out of old vehicles.

Table 2 Measures with Positive Impact on Air Quality, Percentage of Respondents

| Measure | Total | Delhi | Other cities |
|-------------------------|-------|-------|--------------|
| Cleaner transport fuels | 73 | 89 | 61 |
| New roads/flyovers | 67 | 66 | 67 |
| Industry closure | 64 | 86 | 48 |
| Cleaner domestic fuels | 60 | 51 | 67 |
| Old vehicle phase-out | 59 | 89 | 37 |
| New vehicles | 59 | 57 | 61 |

There were large differences among different professions. Government employees and NGOs were much more positive about cleaner transport and domestic fuels than others. Government employees were also much more positive about the use of cleaner fuels in industry and compliance with industrial regulations. At the opposite end of the spectrum were academics who tended to be more skeptical about cleaner fuels.

Construction was cited by the highest percentage of respondents as having had a negative impact on air quality, followed by public transport. As Table 3

shows, the differences between Delhi and other cities are not as large for measures with negative impacts as those with positive impacts. The reference to the negative impact of newer vehicles on the road presumably refers to the impact on air quality of growing vehicle population through new vehicle additions.

Table 3 Measures with Negative Impact on Air Quality, Percentage of Respondents

| Measure | Total | Delhi | Other cities |
|------------------------|-------|-------|--------------|
| Construction practices | 53 | 57 | 50 |
| Public transport | 36 | 29 | 41 |
| Newer vehicles | 26 | 29 | 24 |

Lastly, several measures were perceived to have had little, if any, impact on air quality (see Table 4). Zoning was considered by the largest percentage of respondents to have had little impact, followed by bans on open burning of refuse and other items. Some of the measures cited were considered by nearly as many respondents to have had positive effects on air quality as no effects: use of cleaner fuels in industry (46 percent replied that it had a positive impact), a shift from industry to service (43 percent), and compliance with industrial regulations (41 percent).

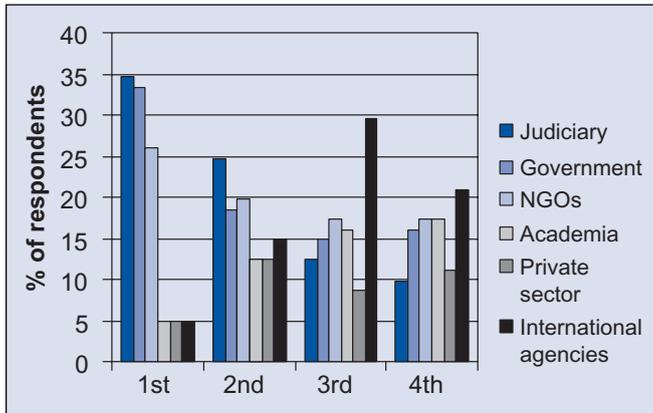
Table 4 Measures with Negligible Impact on Air Quality, Percentage of Respondents

| Measure | Total | Delhi | Other cities |
|---|-------|-------|--------------|
| Zoning to segregate different land uses | 64 | 66 | 63 |
| Ban on open burning of refuse and other items | 56 | 51 | 59 |
| Shift from industry to service sector | 52 | 63 | 43 |
| Compliance of industry with regulations | 51 | 57 | 43 |
| Switch to cleaner fuels in industry | 48 | 49 | 48 |

Institutional Involvement

Respondents were asked to rank institutions in terms of the efforts made to address air quality concerns in their cities. The results are summarized in Figure 1. The judiciary, followed closely by government, was considered to be most actively involved. In fact, 60 percent of respondents said that the judiciary was the most or second most active institution in air quality management. This was closely followed by government at 53 percent and NGOs at 45 percent.

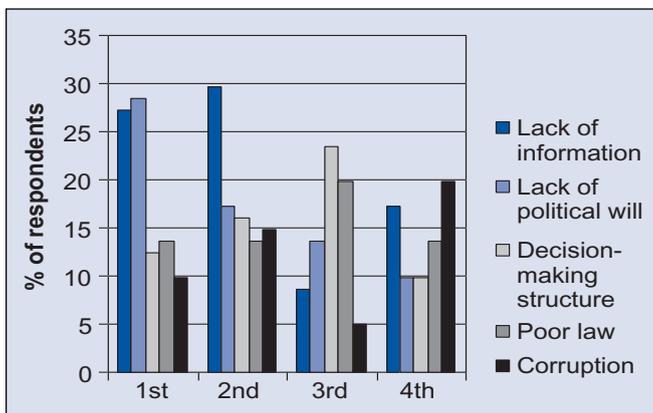
Figure 1 Ranking of Institutions According to Level of Efforts Devoted to Air Quality Improvement



Barriers to Effective Air Quality Management

The respondents were asked to rank barriers to air quality management in their cities. The greatest problem was seen to be a lack of political will. Aggregating the top three rankings, a lack of political will was cited by 59 percent of all respondents, a poor decision-making structure by 52 percent, and a lack of information and knowledge at the decision-making level by 51 percent. Aside from the entries shown in Figure 2, “poor/outdated technologies” and “lax standards” were two other options given for ranking. They ranked the lowest, especially poor/outdated technologies.

Figure 2 Ranking of Impediments to Effective Air Quality Management



Interestingly, government employees cited a lack of political will as the most serious barrier to effective air quality management. NGOs and the private sector cited a lack of information and knowledge at the decision-making level as the most serious obstacle. Comparing Delhi with other cities, Delhi residents viewed a lack of political will as being a much more serious impediment than those in other cities. A lack of information and lenient standards were also viewed more seriously in Delhi. Residents in other cities, on the other hand, saw outdated technology and corruption as posing greater challenges.

Role of International Agencies

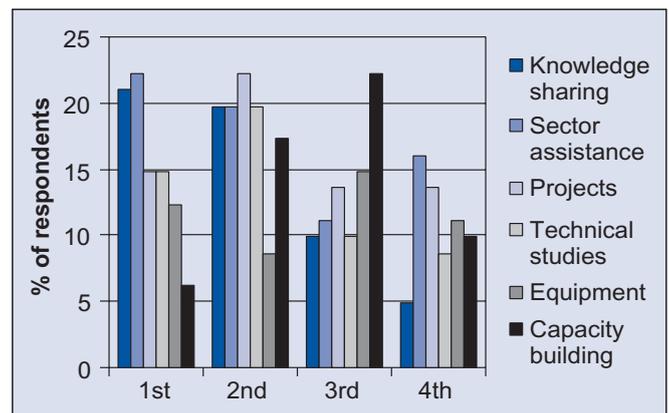
The last section of the questionnaire asked whether international agencies such as the World Bank had a role to play in air quality management, and if so, where they could most effectively assist such efforts.

Ninety-eight percent of respondents said international agencies should be active in addressing air quality concerns. Most respondents suggested engagement at the city rather than the national or state level.

Respondents were asked to rank different roles that international agencies could play. The options given were: knowledge sharing based on international experience; provision of equipment for air quality monitoring; formulation of policies, standards, and regulations; technical studies; stand-alone environmental projects; assistance through sectors that affect air quality (such as transport, energy, and urban development); training and capacity building; awareness-raising; and others.

The top four rankings are presented in Figure 3. Assisting sectors that impact air quality, knowledge sharing based on international experience, and stand-alone environmental projects ranked the highest. Among different professions, government employees saw knowledge sharing as the most important role international agencies could play. Academics cited knowledge sharing and stand-alone environmental projects as the two most important activities, while NGOs and the private sector gave stand-alone environmental projects and assistance to sectors that impact on air quality as the most important.

Figure 3 Ranking of Activities by International Agencies for Air Quality Improvement



Comparison with Recent Study Findings

It is interesting to compare these responses with recent analyses of urban air quality in India. An examination of airborne fine particulate matter (PM_{2.5}) in Delhi, Kolkata, and Mumbai [1, 2] showed that sources differ by city and season. In particular, coal and biomass combustion appears to account for a larger fraction of total PM_{2.5} than vehicular emissions in winter in Kolkata and Delhi when particulate air pollution is at its worst. Therefore,

while transport is an important contributor to particulate air pollution, other sources may be contributing even more depending on the time of year and geographical location.

A review of ambient PM₁₀ (particles smaller than 10 microns) concentrations in Chennai, Delhi, Hyderabad, Kolkata, and Mumbai between 1993 and 2002 [3] showed that air quality improved in most cities during the ten-year period. Industry closure and relocation may have had a particularly strong impact in Delhi in the latter half of the 1990s. Concentrating on the five-year period between 1998 and 2002, however, there is no improvement or even deterioration in Delhi. During this period, there was a steady decline in PM₁₀ levels in Mumbai, a general decline in Hyderabad, a decline in 2001 and 2002 in Chennai, but a decline only in an industrial area in Kolkata. Limited air quality data collection restricts conclusions that can be drawn, but it is possible that the perception of worsening air quality is not entirely consistent with the actual air pollution trends.

These studies [1–3] also indicate that ambient particulate levels differ considerably from city to city, being significantly higher in Delhi and Kolkata than in other cities. However, the questionnaire responses showed no marked difference in the perception of whether air pollution is serious: 38 percent of residents in Delhi and Kolkata said air pollution was serious, against 34 percent of residents in other cities.

Conclusions

The survey results reported here can be said to represent “informed” perceptions: nearly all respondents have been actively engaged in air pollution issues and some have in fact been working exclusively in air quality management for great many years.

The predominant perception was that air pollution was serious or moderately serious. Nearly half also believed that air quality was continuing to deteriorate. Against this background, addressing a lack of information, a lack of political will, and a poor decision-making structure was considered the most urgent. The respondents suggested that a number of measures had helped, most notably cleaner transport fuels, new roads and flyovers, and industry closures. Public transport was considered problematic by quite a few, presumably on account of large numbers of gross polluters among public transport vehicles.

Comparison with recent study findings suggests that some of the perceptions may not be supported by data. This underscores the importance of systematic data collection and analysis, and equally important, information dissemination.

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A full set of briefs and other materials are available at <<http://www.worldbank.org/sarurbanair>>.

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