

Public Perception of Air Pollution in Proper Calcutta

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ABSTRACT The paper briefly reports the results of a sample survey of 1,724 respondents randomly selected from 56 localities of Calcutta Municipal Corporation to assess their level of awareness and knowledge of air pollution (AP) in Calcutta proper. About 78% of the residents were found to be quite aware of AP. According to them, foul smell, filthy drains and rotten garbages were the main sources of AP. Very few respondents attributed unburnt fuel emission from automobiles as a cause. About 70% of the male respondents and about half of the female respondents expressed their concern over AP. More concerted campaigns are needed to create public awareness and concern. These must be backed by legal ban on all sources of AP. Youth clubs in different localities can play an important role to initiate such campaigns in their own areas.

INTRODUCTION

This paper highlights some of the major findings emerging from a sample survey based on a probability sample of 1,724 residents drawn randomly from 19 pollution zones of Calcutta proper. It aims to provide a general picture describing how the residents think about air pollution, and what they feel should be done about it. The survey specifically dealt with the issue of decline in the quality of air and aimed at discovering how aware people were of this problem, who or what they felt was responsible for it and how it might be solved. The survey sought to determine the nature of air pollution as seen by the residents themselves and the nature of actions recommended for the abatement of air pollution. An additional aim was to work out associations, if any, between expressed awareness and concern over air pollution on the one hand, and other groupings of the residents in terms of their education, assets, family expenditure and attitudinal characteristics.

Although such surveys of public opinions dealing with their perceptions and attitudes have certain limitations, yet the findings emerging from these studies can provide a very useful

input into planning and policy making. Such surveys are very important in any democratic country where public expressions must be taken seriously by government decision and policy makers. Schusky et al. (1964) enumerated the following three reasons for the study of public attitudes toward air pollution: "to see character and significance of the problem in community, to guide a public information and education programme and to see the extent the public is prepared to accept and support control". In addition to these, a study of public responses to various issues of air pollution such as the present one can also help policy makers to estimate (rather than assume) the social costs that may be incurred by the deterioration of air quality or by any kind of environmental degradation.

Objectives of the Survey

The main purpose of the survey was to obtain general and specific data concerning the level of awareness and knowledge on the part of the sampled residents regarding air pollution and their attitudes towards the quality of air and atmosphere of the locality where they were living at the time of interview. The study also aimed at investigating into the people's perception of the effects of air pollution, their opinions

regarding the possibility of combating it and their willingness to pay for its abatement. A knowledge of these social and psychological aspects of air pollution is likely to facilitate the continued education of the public and the implementation of any legal controls since any future programmes of air pollution control in Calcutta must recognize the present level of awareness and perception of the population for whom the actions are being taken. These two psychological aspects of air pollution have been dealt with in this paper.

METHODOLOGY

Sampling Plan

For the present survey, the adult population (18 years old and above) belonging to the selected 56 National Sample Survey (NSS) urban blocks of proper Calcutta was subdivided into six substrata, namely, (1) Illiterate Males, (2) Illiterate Females, (3) Literate Males, (4) Literate Females, (5) Educated males, and (6) Educated Females. This stratification was possible after a door-to-door household listing in the selected 56 NSS blocks. Earlier these 56 blocks were drawn randomly (at the first stage) from a total of 5787 NSS blocks located in 19 pollution zones in Calcutta proper. For each pollution zone two or multiples of two NSS blocks were selected by simple random sampling without replacement (SRSWOR) method in the first stage. Almost five to 13 per cent of adults were then randomly selected in the second stage from each substratum within a sampled NSS urban block. In the second stage also, the SRSWOR design was followed to select approximately 1800 adults for the present survey. Details regarding the sampling design of the survey are given elsewhere (Mukherjee, 1993).

The Interview Schedule

Respondents were mostly interviewed in their own houses. In general, male interviewers were employed to canvass interviews from selected male respondents. Similarly, female

interviewers called upon most of the selected female residents in their own houses to collect the necessary data. To keep the survey as free from certain biases, every effort was made to structure the interview so as to maximize each respondent's freedom to relate and define the air pollution situation in Calcutta proper in his/her own ways. By selecting proper interviewers (both males and females) and by giving them adequate training, this goal was achieved to a great extent.

The schedule used for personal interview was finalized after about 4 months of pretesting in two localities adjacent to the CMC area. It contained mostly structured questions for each of which, an attempt was made to prepare more or less an exhaustive set of possible answers during pretesting. However, except for few items, the answers were never prompted by the interviewer or shown to the interviewee. The interviewer checked in most cases the first mentioned free response on the printed interview schedule. If the given answer did not fall in the list of specified response categories, it was recorded verbatim but coded under the "any other" category.

Open-end questions were specifically asked to the interviewees about the meaning and sources of air pollution. The interviewees were asked to state in their own words what they thought the words "air pollution" meant to them and what they personally thought to be its main source in their locality. These questions gave the respondents ample opportunities to structure responses in their own ways.

Through proper item construction and their sequence ordering, respondents were never put in the position of having to say that air pollution existed in their respective localities. After being sure that they knew what air pollution means, the interviewer asked the respondents if they thought there was any air pollution in their locality at any time during the year. These precautions were taken to avoid the bias of building into the questionnaire an overestimate of the seriousness of the Calcutta's air pollution situa-

tion or a prejudgement of the source, as defined by the respondents.

In addition to socio-economic, demographic, attitudinal and value items, questions pertaining to the use of domestic fuel, indoor air quality, and abatement of air pollution were asked to each respondent. Specific questions were asked to get some idea of the respondent's willingness to pay for improving the quality of air both in his/her own locality as well as for Calcutta as a whole.

Data Base

Respondents were interviewed in their houses. Data collected from about 1,740 respondents from 56 NSS urban blocks of Calcutta proper were scrutinized for incompleteness, duplication, erroneous recording, missed entry, wrong coding and other errors. A total of 16 questionnaires had to be discarded mainly on the ground of incompleteness. Thus, the survey results are based on the data obtained from 1,724 respondents. We note here that from almost every block, one or two sampled respondents could not be approached for the personal interview even after 3 call backs and as such the target of having a sample size of 1,800 respondents could not be attained.

However, the 1,724 records (completed questionnaires) analyzed for the study fulfill the basic requirements of internal consistency, completeness and satisfactory coding. Special computer programmes were written to check the sequence of records, range verification, and other internal consistency checks.

RESULTS

Table 1 shows the breakdown of respondents by various pollution zones. The total number of respondents whose particulars were listed in the door-to-door visits before the second stage of sampling is also shown against each block. The percentages of respondents showing unaided awareness of air pollution and their concern over it are shown in table 1. The results of the survey clearly indicate that about 78 per cent of

the residents of Calcutta proper are quite aware of the air pollution problem. About 65 per cent of the respondents indicated their concern or worry about air pollution problem in their respective localities. Interestingly, a high percentage of respondents from Esplanade, Bhawanipore, Khidderpore, Sealdah, and Tangra zones had some difficulty initially in recognizing the problem of air pollution. But once some examples of water pollution were given, the concept of air pollution became very clear in their minds. Such cases are treated here as "aided awareness". About 65 per cent of the illiterate respondents showed "aided awareness" of air pollution. Among those who indicated their awareness without any help, a substantially high percentage indicated that it was through newspapers they could come to know about air pollution in Calcutta. Radio and TV seem to be the second and third popular media of mass communication through which the respondents could know something about air pollution.

Meaning, Nature and Sources of Air Pollution

To check the estimate of the extent of awareness on the part of the respondents and to gain some understanding of its cognitive dimensions, the following question was asked to every interviewee: "What do you think the words *air pollution* mean to you"? In response to this question, majority of the respondents (about 64 per cent) associated air pollution with health injury. About 14.3 per cent associated the words with too much smoke and dust in the air. Nearly 8 per cent of the respondents perceived air pollution as a malodor problem. Only about 4 per cent thought the words mean poisonous gas and dust particles in the air not necessarily visible.

When asked as to which aspects of air pollution adversely affect them most, a majority of the respondents (about 34.5 per cent) indicated that it was foul smell. Nearly 22 per cent expressed that black smoke was the most

Table 1 : Percentage of respondents who showed unaided awareness of air pollution and concern about its presence in their own localities : By Pollution Zones

No.	Pollution Zone Name	Percentage of unaided awareness	Percentage expressing concern	Pollution index ¹	Index rank	Total adults listed	Total adults sampled
01.	Cossipore	81.97	59.84	35	13	1333	122
02.	Shyambazar ²	74.07	65.43	34	12	1504	162
03.	Maniktola	82.11	65.85	21	4	1189	123
04.	Sealdah	60.71	69.64	41	17	583	56
05.	Bowbazar	80.16	70.63	39	15	1408	126
06.	Esplanade	50.00	74.14	29	10	580	58
07.	Entally	85.00	68.75	23	5	1026	80
08.	Tangra Belegghata	58.59	61.61	46	18	958	99
09.	Kasba	80.85	57.45	25	6	567	47
10.	Ballygunge	92.31	64.10	14	3	502	39
11.	Alipore	68.92	52.70	11	2	1057	74
12.	Bhawanipur	74.44	76.67	33	11	1353	90
13.	Tallygunge	88.78	61.46	26	7	2208	205
14.	Dhakuria	70.00	56.67	28	9	433	30
15.	Khidderpur	57.41	59.26	40	16	554	54
16.	Behala	85.00	63.33	37	14	780	60
17.	Garden Reach	77.36	62.26	48	19 ^b	449	53
18.	Salt Lake	98.11	75.47	10	1 ^a	807	53
19.	South Dumdum	88.08	70.47	27	8	2011	193
1-19	Total	78.40	65.49	—	—	19302	1724

a Almost no air pollution

b Very high pollution index

1. As reported in D. Halder's (1984) book entitled "Pollution Rules over Calcutta" (p.48 f)

2. Also includes Bagbazar Zone

adverse feature of air pollution. About 15 per cent of the respondents complained about suffocation resulting from air pollution. About 10 per cent thought that dust particles have an adverse effect. Only 6 per cent of the respondents mentioned about gas fumes as adversely affecting them. Those who were affected by foul smell, black smoke and suffocation tend to be more concerned than other groups over air pollution in their respective localities.

In order to develop public policy relating to any problem, it is most important to identify the source of the problem. For this purpose, all respondents were asked to name what they thought contributed to or caused most of the air pollution in their localities. The contributor identified by the largest single group of

respondents (27.6 per cent) turned out to be foul smell and poor drainage. About 11.5 per cent of the respondents thought that smoke from factory chimneys caused most of the air pollution in their localities. A substantially high percentage of these respondents belonged to Hazra (Green) Park of South-Dumdum area and in fact some of the small chemical industries and melting shops are still thriving in this locality in spite of the Anti-Pollution Act.

Perceived Quality of Air

When the sampled residents were asked as to how they felt in general about the quality of air in their respective localities, about 18.9 per cent reported the quality as "very bad". Only about one third of the respondents thought that the quality of air in their localities was good. About

Table 2 : Percentage of respondents expressing bad and very bad air quality and air pollution as serious problem in their localities : By NSS Blocks

NSS Block Code	Type of Locality	Name of the Block	Percentage expressing air quality as		Percentage expressing air pollution as		Percentage showing unaided awareness
			Very Bad	Bad	Serious	Becoming serious	
01.	R	Satchasipara, Cossipore	8.1	13.1	35.1	54.1	83.8
02.	M	Debendra Bala Ghosh Lane	22.2	0.0	11.1	44.4	55.6
03.	R	Anath Dev Lane	6.5	25.8	29.0	54.8	96.8
04.	R	Khelat Babu Lane	2.2	26.7	42.2	42.2	75.6
05.	R	Sahitya Parisad	19.1	42.6	51.1	38.3	91.5
06.	S	Ramagan	50.0	38.5	88.5	7.7	61.5
07.	M	Baranashi Ghosh Street	19.0	33.3	33.3	28.6	80.9
08.	M	Durga Charan Mitra Street	25.0	48.5	69.1	23.5	64.7
09.	M	Vivekananda Road	0.0	44.4	33.3	33.3	77.8
10.	R	Kalimuddin Lane	4.5	40.9	36.4	40.9	86.4
11.	M	Bagmari Road	20.6	38.6	55.9	35.3	67.7
12.	M	Vanga Mohalla	24.1	39.7	50.0	44.8	89.1
13.	R	Muktaram Babu Street	11.1	55.6	66.7	33.3	66.7
14.	C	College Street Market	43.5	39.1	95.7	4.3	43.4
15.	M	Sagor Datt Road	10.0	40.0	60.0	30.0	80.0
16.	M	Armenian Street	21.4	50.0	57.1	28.6	78.6
17.	M	Keshab Sen Street	41.7	50.0	83.3	16.7	58.3
18.	S	Muchipara	24.1	37.9	50.0	34.5	70.7
19.	M	Mahatma Gandhi Road	28.0	32.0	44.0	28.0	88.0
20.	R	Akhil Mistry Lane	45.2	16.1	54.8	35.5	100.0
21.	M	Ripon Street	27.7	46.8	78.7	8.5	40.9
22.	M	Collin Street	9.1	27.3	27.3	72.7	63.6
23.	R	Taltola	13.3	26.7	46.7	53.3	86.7
24.	R	Durga Charan Doctor Road	3.6	32.1	28.6	50.0	78.6
25.	R	Linton Road	6.3	37.5	81.3	6.3	100.0
26.	C	Jannagor	28.6	42.9	71.4	14.3	80.9
27.	S	Charakdanga	20.0	33.3	43.3	33.3	87.5
28.	I	Tiljala Masjid Bari	55.3	39.5	92.1	5.3	39.5
29.	M	Tiljala Road	33.3	37.5	91.7	8.3	41.7
30.	R	Sridhar Roy Road	28.6	14.3	71.4	14.3	100.0
31.	R	B.B.Chatterjee Road	18.2	59.1	68.2	22.7	77.3
32.	R	Swinhee Lane	16.0	60.0	40.0	44.0	80.0
33.	R	Lake Terrace	0.0	21.7	26.1	21.7	91.3
34.	R	Charu Avenue	6.3	25.0	18.8	43.8	93.8
35.	S	Chetla Road	17.5	46.0	73.0	25.4	66.2
36.	R	Gopal Nagor Road	18.2	18.2	45.5	45.5	54.6
37.	M	Dr Rajendra Prasad Road	33.3	40.9	68.1	26.4	80.6
38.	R	Rani Shankari Lane	22.2	27.6	38.9	44.4	50.0
39.	R	Lake Gardens	7.2	25.3	28.9	30.1	91.6
40.	R	Vidyasagar Colony	6.6	33.6	18.9	38.5	86.9
41.	S	Jhil (Dhakuria)	43.3	20.0	66.7	26.7	66.7
42.	R	Teliapara	0.0	40.0	33.3	40.0	73.3
43.	S	Munsiganj	25.0	45.0	85.0	15.0	45.0

Table 2 : Contd.....

NSS Block Code	Type of Locality	Name of the Block	Percentage expressing air quality as		Percentage expressing air pollution as		Percentage showing unaided awareness
			Very Bad	Bad	Serious	Becoming serious	
44.	R	BMR Colony	20.6	20.6	50.0	17.6	64.7
45.	I	Chanditola	15.4	23.1	46.2	46.2	84.2
46.	S	P N Mitra Lane	15.8	21.1	57.9	21.1	78.8
47.	S	Tarponghat Road	0.0	83.3	100.0	0.0	50.0
48.	R	Jadu Colony	0.0	31.8	13.6	36.4	100.0
49.	I	Paharpur Garage	24.1	37.9	55.2	13.8	65.5
50.	R	Neogipara	25.0	45.8	66.7	29.2	91.7
51.	R	B A R C Colony, Salt Lake	0.0	88.9	33.3	66.7	100.0
52.	R	CPWD QR. Salt Lake	0.0	11.4	9.1	38.6	97.7
53.	R	Purba Sinthee	8.0	51.4	21.6	54.1	100.0
54.	R	Satgachi	13.8	16.9	24.6	41.5	84.6
55.	I	Hazra Park	32.8	48.3	70.7	25.9	77.6
56.	R	Lake Town	12.1	15.2	27.3	36.4	100.0

R = Residential Area M = Mixed Area I = Industrial Area C = Commercial S = Slum

23 per cent of the residents of the Jadu colony thought that the quality of air in their locality was "very good". On the other hand, a majority of the residents of Tiljala Masjid Bari, Rambagan, Akhil Mistry Lane (Bowbazar), Dhakuria Jheel, and College Street Market, perceived the air qualities in their localities as "very bad" (see Table 2). The perceived quality of air in the 19 zones where the survey was conducted was found to show negative association with the pollution index of the zone. The gamma correlation turned out to be -0.1468 . As expected to some extent, the higher the pollution index of a zone, the worse is the perceived quality of air in that zone. However, the relationship is weak although statistically significant at the .01 level. The gamma correlation between level of awareness and pollution index also turned out to be weak. These results are not surprising because people's perception of the bad air quality in their localities is supposed to be more influenced by pollution peaks rather than the mean value or an extended time period and other factors. For the same reason, it appears that the concern expressed about air pollution in a particular zone of Calcutta proper is not at all related ($r = -0.01$) with the actual pollution index.

Previous studies have shown that when dustfall level exceeds an annual mean of 10 tons/sq. mile per month, at least 10 per cent of the affected population would express concern about a nuisance situation.

However, it seems that most residents in Calcutta proper, and especially those living in slum areas have become so habituated to dustfall that they are not much concerned about it. Such environmental conditions are accepted by them as merely a part of their life or of their living conditions. Thus, the residents who are exposed to high levels of air pollution are likely to deny its severity for psychological reasons.

Perceived Seriousness of the Problem

In order to verify whether air pollution has become a focal point of concern for the Calcutta residents, they were presented with a list of 9 important problems connected with environmental hazards within the Calcutta Municipal Corporation area. Instead of air pollution, poor sewerage and drainage clearly was found as the most pressing problem by 30.45 per cent of the respondents. Only 19.37 per cent of the respondents identified Calcutta's air pollution as the number one problem. When they were

asked as to whether any member of the family including the respondent had ever been affected by air pollution, only 12.7 per cent answered in the affirmative. About 81.8 per cent answered in the negative. The remaining had some problems but not necessarily due to air pollution.

It appears from the above findings that individuals living in slum areas and under unhygienic conditions who are chronically exposed to air pollution are less reactive to the pollutants especially if they have low education and low socio-economic status. They cope with the effects of the pollutants more as an adaptive mechanism and thereby show less propensity to complain about air pollution than persons who are socio-economically well-off.

In the total sample, approximately 49 per cent of the respondents expressed that air pollution has already become a serious problem in Calcutta proper. About 31.84 per cent thought that "air pollution is going to be a serious problem". Less than one fourth residents sampled from Vivekananda Road as well as from Lake Town and Salt Lake thought that the problem was not as serious in these localities as in other parts of Calcutta. However, about one third of the residents of Salt Lake, B A R C colony and Vivekananda Road recognized air pollution as a serious problem in their localities (see Table 2).

Specific Knowledge of Air Pollution

Since people's attitudes and responses to air pollution are supposed to be strongly conditioned by their knowledge of air pollution, attempts were made to assess the broad spectrum of knowledge on air pollution by asking 4 different questions. As to the meaning of air pollution, only about 4.23 per cent of the respondents could correctly identify that air pollution refers to the collection of poisonous gas and dust particles in the air, not necessarily visible. Similarly, about one-fourth of the respondents could correctly recognize the inconvenience and adverse effects of air pollution during

winter months when maximum concentration of Sulphur-Dioxide (SO_2) is greatly monitored. About 29 per cent recognized that generally old people and children are most vulnerable or easy victims of air pollution. About 37.5 per cent of the respondents could mention that the civic authorities should be approached for taking action against air pollution in Calcutta.

Not many residents of Calcutta proper seem to have a clear knowledge of or at least some kind of familiarity with the main sources of air pollution in Calcutta. About 27.55 per cent of the respondents thought that poor drainage/foul smell causes most of the air pollution in their locality. About 11.43 per cent thought that smoke from the nearby factory chimneys might be responsible. Only about 6.61 per cent attributed air pollution in their locality mostly to domestic coal/garbage burning. About 61.6 per cent of the houses in the sampled localities were still using coal for cooking during the period of this study. Although about one-third of the respondents admitted that they had switched over in recent years to briquette oven, still more than one third frankly expressed their inability to switch over to briquette from coal. Only 23.5 per cent of the respondents agreed to shift to briquette burning rather than coal, if cost and supply be no factor. About 46.1 per cent of the respondents agreed with the statement that coal burning for cooking should be allowed because the amount of air pollution it causes is small as compared to other sources such as trucks and buses. Yet, most respondents, failed to acknowledge gaseous emissions of motor vehicles as the important source of air pollution in Calcutta proper.

It appears from the above discussion that the respondent's answers as to the most important source of air pollution in their locality clearly reflect an influence of the more immediately obvious nature of filthy drains and smoke as atmospheric pollutants. The most important finding in this connection is that about 40 per cent of the respondents could not name a specific source of air pollution in their locality

although they were clearly aware of its existence. Thus, although the level of awareness about air pollution among residents of Calcutta proper seems to be quite high, in terms of specific knowledge, the picture is not so bright. There is a wide difference in the degree of knowledge not only between community to community but also between one respondent to another in the same community.

Some Socio-economic Correlates

The aforesaid variation may be largely due to respondent's level of education, family assets, and exposure to different media. The product moment correlation between total knowledge score and these variables turned out to be 0.32, 0.28, and 0.39, respectively, all statistically significant at the .01 level. The respondent's socio-economic status was found to be an important differential factor underlying variations in public opinion. For example, family asset was found in this study to correlate significantly with respondent's anti-pollution values ($r = .3056$), unaided awareness of air pollution ($r = .3118$), use of T.V. as a source of information regarding air pollution ($r = .5719$), use of different types of mass media ($r = .5287$), and concern over air quality in the locality ($r = .2428$). Similarly, education correlated significantly with attitude scores ($r = .270$), anti-pollution value scores ($r = .3251$), concern over air pollution in one's own locality ($r = .318$), unaided awareness ($r = .564$), and total scores on four knowledge items ($r = .324$). Thus, a moderate positive relationship seems to exist between concern over the perceived quality of air and socio-economic status (SES). The higher the SES, to some extent, the greater the expressed concern. The stratification variable also showed a significant association with a number of measures. For example, the illiterate males living mostly in slum areas expressed that air pollution in their areas had already become a serious problem, even though their expressed concern over the quality of air was generally low.

Just as tanneries and chemical industries are polluting the air quality in and around the south-eastern part of Calcutta, the traffic fumes are equally accountable for the deteriorating air quality. Smoke emitting cars and trucks in Calcutta roads are very much accountable for air pollution in this city. The major pollutants emitted by an incomplete petrol-engine combustion are carbon-monoxide, nitrogen oxide, hydrocarbons, lead oxides and formaldehydes. Diesel engines emit carbon-monoxide in traces but produce thick smokes. However, only residents of College Street Market and Ripon Street could recognize the smoke from motor vehicles exhaust as one of the main causes of air pollution in these localities. However, not a single respondent from these areas could show any evidence of their knowledge about the ill effects of unburnt fuel emission from automobiles. Only a few educated male respondents had this knowledge.

Air pollution in various parts of Calcutta, especially in the Burrabazar, Shovabazar, Tiljala, Khidderpore, Tangra, and Paharpur areas is also caused by coal burning for domestic purposes. A small percentage of residents of these areas noted domestic coal burning as the main contributor to air pollution. Therefore, the movement against air pollution should start at home. Nearly 27 per cent of the respondents agreed with the statement that the burning of coal for domestic cooking purposes within Calcutta must be stopped by legal measure. Almost 63 per cent of the respondents disagreed with the statement that "Coal burning for cooking should be allowed".

All respondents were asked as to how much they felt concerned or worried about air pollution in their localities. In response to this question, about 70 per cent of the male respondents and about half of the female respondents expressed their concern. Male educated sample was found to be the major concerned group. About 43 per cent of the illiterates (both males and females) expressed no or slight concern about air pollution in their respective localities.

Interestingly, a slightly larger percentage of males and females felt concerned about air pollution problem in parts of Calcutta other than their own respective localities.

Contrary to expectation, the feeling of attachment with one's locality showed almost no association with one's concern over air quality in the locality. Among the 1130 respondents who expressed concern or great concern over air pollution in their respective localities, about 69.47 per cent admitted that they felt attached with the locality they were living in at the time of the interview. The percentage of respondents among the non-concerned groups expressing attachment with the locality was also found to be almost the same (70.03 per cent). The gamma correlation between attachment and concern turned out to be .009 only. However, concern over the quality of air in one's locality showed a significant negative correlation (gamma = .325) with respondent's satisfaction in residing in the locality they were living in. Among those 562 respondents who were dissatisfied, about 85.05 per cent of them felt concerned about air pollution in their locality. Among the satisfied group of 726 respondents, only about 52.9 per cent expressed concern over the air quality in their locality.

Thus, satisfaction in residing in one's locality has some inverse relationship with one's degree of concern about the air quality in the locality ($r = -.4017$). Satisfaction however, is found to be positively related to the perceived air quality in one's locality ($r = .511$). Among the 726 satisfied residents, about 69.5 per cent felt quite happy with the quality of air in their locality. Among the dissatisfied group of 562 residents, only 8.71 per cent felt that the quality of air in their locality was satisfactory. Among the 436 respondents who expressed neither satisfaction nor dissatisfaction in residing in the locality they were living at the time of interview, about 51.6 per cent felt that the air quality in their locality was at least good. Satisfied residents are to some extent more likely to be aware of the air pollution in the locality. The

gamma correlation ($r = .113$), however, is weak although statistically significant at the .01 level. As expected, most of those who were satisfied did not consider it essential to employ air pollution abatement measures in their locality. The gamma correlation turned out to be $-.2926$ between one's degree of satisfaction in living in the locality and how essential one believed in employing air pollution control in the locality. The corresponding statistic between attachment with one's locality and degree of emphasis for considering abatement programme essential turned out to be a non-significant value of .0574 only.

When the respondents expressing some concern were asked as to what they did to improve the air quality in their locality, almost 63 per cent of them admitted that they did nothing. A comparable percentage among the total sample of 1724 respondents expressed their inability to do anything when asked as to what measure did they usually take in the past to protect themselves and their family members from adverse effects of air pollution in Calcutta. Only about 14 per cent reported that they kept the windows shut. Only about 1 per cent of the respondents reported that they complained to the concerned authorities.

DISCUSSION

The survey findings clearly suggest that residents of Calcutta proper are quite aware of air pollution in their locality. Still the level of awareness is not so sufficient as to arouse strong concern over the ill effects of air pollution. The answer, therefore, lies in a concerted campaign to create more awareness and concern backed with a blanket ban on all sources which are destroying the quality of Calcutta's air by way of chimney smoke, unburnt fuel emission from automobiles and domestic coal burning. The residents seem to have a superficial knowledge of some of the possible adverse effects of it. This awareness to a considerable degree was generated by the mass media, especially newspapers, radio and TV. Yet, in terms of the level

of awareness and knowledge, especially on the part of illiterate residents, it is not enough for a series of successful policies connected with environmental protection. Such a step obviously calls for a higher level of awareness and understanding on the part of informed public. Therefore, it is necessary to make full use of the newspaper, radio, TV and other mass media such as puppet shows in order to communicate complex scientific information in a non-technical form. The module should be simple and lucid so that it can be readily understood by the low educated and even illiterate residents of Calcutta proper.

Concern and Level of Seriousness About Air Pollution Problem

The survey findings indicate that very few residents have accepted the seriousness of the problem. The low educated slum dwellers generally do not see much of the adverse effects of air-pollution on personal health and personal properties. Their responses do not reflect that air pollution can incur some extent of financial loss. As a result, the respondents in general exhibited some kind of passiveness in their responses to serious air pollution situation in Calcutta proper. Few were willing to initiate any remedial measures for air pollution control in their locality. There was not much of willingness on their part to contribute personal time and money for the abatement of air pollution for Calcutta as a whole and even for their own localities. If the residents were more prepared to acknowledge the existence of the financial loss due to air pollution and recognize the adverse effects of it on their health (a possible theme for future communication- information educational programme), then perhaps the decline in the volume of domestic coal consumption and control of auto-exhaust pollution could be accelerated. Then they will be getting organized to participate in anti-air-pollution campaign and take other necessary measures for the control of air pollution. They will be also then become more willing to pay for improving the quality of air in their neighbourhood. Without creating

any panic, it is absolutely necessary to impress upon the residents of slum areas the social, economic and health costs associated with continued air pollution. It is also necessary to impress upon them that different environmental hazards in their localities are due to population problem.

The results of the present survey also show that those who live in less congested localities such as in Jadu Colony, Salt Lake, Lake Town areas and who have higher income and education tend to be more sensitive to air pollution problems. They have not only higher level of awareness, knowledge and concern but also are more optimistic about their own ability to improve the quality of air in their respective localities. They also tend to be more willing to support the abatement action both in terms of time and money. Such respondents seem to have a potential foundation for an effective air pollution control programme.

Residents who are most aware of air pollution are most often males, have higher levels of education and occupation, high family assets, and make use of newspapers, TV and radio for information regarding air pollution. Such residents are supposed to be an effective focal point for starting local organizations for fighting air pollution. Parallel with specific actions by such persons and by local organizations, there is still an urgent need to improve general public awareness through population and environmental education programmes. These educational programmes must be further strengthened in the schools and colleges to discover the best ways to motivate and inform the young who in turn can raise the general level of awareness at home and within the mass about environmental hazards.

Respondents with low education and poor socio-economic status showed an overwhelmingly apathetic reaction to various issues of air pollution. Their concern with environmental dangers generally stems from catastrophic hazards, such as the recent Behala arsenic contamination case in the water source. The less spectacular and more pervasive dangers

in living in the urban slums while not so dramatic in their effects, actually outweigh the losses of life and property associated with such dramatic upheavals. Unless this tragic fact is effectively communicated to and internalized by the slum residents, pollution abatement programmes are not likely to have successful results. As long as they don't realize the dangers of the urban habitat, it will not be possible to infuse in them some sort of motivation to initiate organizational changes that are necessary for environmental protection. In their minds, environmental protection is not so salient a concern as the more profound socio-economic issues like poverty, unemployment, scarcity of food, shelter, and drinking water. Inadequate housing, sky-rocket living cost, factory lock-outs, community disputes, alcoholism, home conflict and corruption tend to have a more direct and powerful impact upon people in general and the slum-dwellers in particular than environmental degradation.

Although more than 80 per cent of the total population apparently believed that air pollution was going to be or had already become a serious problem in their localities, yet they did not take any actions to alleviate their concern. This passive response pattern suggests that the population has not conceptualised how complaints or action could alleviate air pollution. Thus, people must not only crystallize their perceptions about air pollution but also know what to do about them. Their actions regarding air pollution are blocked because hazard perceivers do not know the competent authorities to whom they should approach. Even among the few who knew, most of them do not use the communication channels for complaining against the hazard because they thought such complaints would be virtually ineffective. A lack of knowledge of avenues for solution to specific air pollution problems may lead residents of affected areas to give credence to simplified and unrealistic approach to pollution control.

The survey further reveals that feeling of attachment with one's stay in a particular locality is not associated with the expressed concern

for air pollution. It is not true that the more involved or identified the persons are with their localities, the more concern they tend to express with air pollution as a community problem. However, satisfaction with one's locality correlates negatively ($r = -.284$) with concern. Thus, concern with air pollution in Calcutta proper does express itself in terms of some negative feeling toward or rejection of the locality as a place to live in.

Perception of Hazards of Air Pollution

The awareness and knowledge data of the present survey clearly indicate that among the illiterate mass living in metropolitan cities, the presence of a hazard is not a sufficient condition for its recognition as a community problem. In many cases recognition that a hazard, such as air pollution exists must be learnt. In other words, the individuals who are just aware of it must have a clear recognition of the possible health and other hazards resulting from air pollution. Most respondents whose family members were affected by air pollution expressed serious concern about it. In general, there is not a strong relationship between awareness and concern. Therefore, mere awareness of air pollution problem does not always arouse concern about it. People living in marked pollution zones also more frequently than others expressed their knowledge and awareness of the problem, but not necessarily their concern about it. Only a large percentage of educated people were aware of the problem of air pollution and its hazard irrespective of the recorded level of air pollution in their localities. They also expressed their concern both for the air pollution in their localities as well as in other parts of Calcutta.

Thus, through mass media people who are illiterate should be made more aware of and concerned about the possible hazards of air pollution in proper Calcutta. These individuals, for example, must have the presence of smog in their locality, or soot inside their houses pointed out to them before they can recognise the problem and be concerned about it. Unless there is enough concern, there will not be much initiative in

taking any corrective measures. Once concern exists, it can be the base for developing some sort of actions necessary for the abatement of pollution.

In other words, once having recognized the presence of air pollution, the effects of it must be demonstrated to the individual to arouse sufficient degree of concern. Aside from overt physical symptoms, such as irritation of the eyes, other factors associated with air pollution such as the economic and physical well-being of the population may have to be identified before an immediate concern over the pollution problem is manifested. The issue is to define the ambient nature of air pollution to the population in more concrete and personal terms. Television programmes can document not only the unhygienic sanitary conditions prevailing in different parts of Calcutta but also show that air pollution, if not directly a cause of illness, can be thought of as an aggravating condition.

CONCLUDING REMARKS

The findings of this survey indicate that residents who are greatly concerned over air pollution in their localities tend to be also optimistic in their own efficacy in abating the pollution. Thus, attempts should be made, especially in the slum areas, by using mass media to arouse strong concern over the hazards of air pollution. The population-environment education programme in the school and colleges should be further strengthened. The findings also suggest the need for building up youth clubs in every locality of Calcutta proper which can act as the people's forum for all pollution complain activity and for immediate corrective action. Those residents who are still consuming coal for cooking purposes should be persuaded to switch over to briquette or gas oven. Since a large percentage of residents thought that within CMC area, poor sewerage and drainage is the

number one environmental problem and foul smell coming out of filthy drains, sewers and garbage as the main cause of pollution in their localities, it is imperative that necessary changes be brought by the municipal administration for improving civic services. A large percentage of residents recommended strict enforcement of anti-pollution measures. Therefore, the State and Central Government must also implement the Anti-Air Pollution Act more rigorously by closing down polluting factories within residential areas and cancelling the licenses of all smoke-emitting vehicles. The preservation of Calcutta's environment calls for a simultaneous planned change in the quality and quantity of population, social organization, technology and a strong political will on the part of the State government.

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