

How Bad is Delhi Air



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Clean Air Asia was established in 2001 as the premier air quality network for Asia by the Asian Development Bank, the World Bank and USAID. Today, we are registered as an international non-governmental organization that leads the regional mission for better air quality and healthier, more livable cities in Asia. We aim to reduce air pollution and greenhouse gas emissions in 1000+ cities in Asia through policies and programs that cover air quality, transport and industrial emissions and energy use. We work with ministries (energy, environment, health and transport), cities in Asia, private sector and development agencies to provide leadership and technical knowledge for Air Quality Management. Clean Air Asia is headquartered in Manila and has offices in Beijing and New Delhi.

In order to harmonize approaches in Asian countries, the United Nations Environment Programme and Clean Air Asia jointly came out with the Guidance Framework to provide authoritative guidance in implementing the long-term vision for urban air quality in Asia. CAA India works on issues to do with air quality management in Indian cities which will be based on the six areas identified in the Guidance Framework. They are, Area one: Ambient air quality standards and monitoring systems; Area two: Emission inventory and source apportionment; Area three: Health and other impacts; Area four: Communicating air quality, health and co-benefits; Area five: Governance and Area six: Clean air action plans.

ABOUT Y-CAN



In order to engage the youth and spread awareness on air quality Clean Air Asia launched the Youth Clean Air Network (YCan), in December 2016, as a voluntary platform to engage young people in finding solutions for better air quality in Indian cities. YCan is involved primarily in evidence based advocacy and finding local innovative solutions to meet the challenge of air pollution. The activities of YCan and membership can be found on the website <http://youthforcleanair.com/>.

This report is the result of a survey project launched and conceptualized by YCan. The youth members that compose the YCan in Delhi, worked with CAA India to learn about air pollution issues, devise the survey tool, brainstorm on the methodology and implement the survey, followed by assisting in the analyses of data. Fifty YCan members implemented the survey tool on Earth Day (22nd April, 2017) across 15 locations in Delhi in a sample of 1,500 respondents. These regions were chosen by YCan members as neighbourhoods in which they lived and as areas with major air pollution sources. The choice of the region in each zone was a selection made by the youth volunteers keeping in mind a certain distinguishing criterion with regards to sources of air pollution. YCan members met with Clean Air Asia on weekends over 4 months to learn and discuss about air pollution data, pollutants, causes and issues in the city and ways to identify solution based actions. The survey, its design, implementation and analysis of data accrued was developed through a consultative process with YCan members. This report summarizes the results of the survey.



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INTRODUCTION

Air pollution has become one of the chief environmental concerns across the world today. It has implications for human health, urban development, and sustainable growth. WHO (2016) estimates that air pollution is the cause of one in nine deaths across the world of which, nearly 3 million deaths are attributable to ambient or outdoor air pollution, affecting people across regions, socio-economic categories and age groups.

Increasing urbanization and the rapid pace of industrial growth, has led to an acceleration in the percentage of pollutants and particulate matter in the atmosphere. Common pollutants include – sulphur dioxide, carbon monoxide, nitrogen dioxide, ozone and particulate matter (PM10 and PM2.5). Urban centres are the sites of the highest concentrations of pollutants as they are the locations of rapid development and increasing population density. The share of the world's population living in cities has grown from 35% in 1970 to 50% in 2001, and is estimated to cross 70% in 2030 (UN-Habitat 2001). Thus, a majority of the world's population will soon be living in the most polluted areas of the world.

Within India, Delhi is a booming metropolis with deteriorating air quality situations. A major cause of these alarming levels of pollution has been a sharp rise in the number of cars; dust from road and construction activities, burning of municipal solid waste and industrial emissions. But most, importantly, expert studies have shown that Delhi's location in the Indo-Gangetic Plain, and the transboundary air pollution from adjoining states, causes it to become a funnel for pollutants to accumulate (Kumar et al. 2015; Narain and Krupnick 2007; Ghosh et.al 2014). Although, scientific research on air pollution in Delhi is developing steadily there is a crucial need to involve citizens and especially the youth to not only understand the repercussions of air pollution but to spearhead individual and collective efforts and spread awareness on the issue of air pollution to lead to effective solutions.





PUBLIC PERCEPTION SURVEY

A public perception survey is an opinion poll that is a scientific and unbiased method to gather and analyse the opinions held by a population about a given issue.

Paul Edwards (2010) a historian of information, has argued that it has become increasingly difficult to talk of global ecology without making reference to expert-driven models. This is the result of knowledge production and policy on environmental issues being an exclusively expert driven domain which places any involvement of the non-specialized layperson as being inferior or unworthy. The YCan led public perception survey was an effort to combat this trend, to make conversations around pollution and air quality more accessible to the larger public. This is crucial as a collaborative change in air quality is possible only with the active involvement of Delhi's citizens in changing their lifestyle and demanding effective policy measures and laws.

In 'Public Understanding of Air Pollution: the 'localisation' of environmental risk' (2001), Bickerstaff and Walker demonstrate the need to study public perception with special regard to air pollution by arguing that 'air pollution represents a thoroughly social problem' (Bickerstaff and Walker 2001; 133). That is if a sustained improvement in air quality is to be achieved a change in personal behaviour is necessary, such as decisions that mark a move towards more sustainable ways of living. It is only when people are engaged and perceptive

to the effects and scenario of air pollution that such changes will take place. Thus, an intrinsic knowledge in people's perceptions of air pollution is seminal (Bickerstaff and Walker 2001). It is within this setting that this study was undertaken. Further, while there has been exponential growth in techno-scientific research on air pollution in the recent past, in terms of emission sources, technologies to combat air pollution, health effects and air pollution, yet there is a paucity of research on the behavioural response to air pollution. In 2013, Centre for Science and Environment undertook a perception survey for residents of Delhi on the link between air pollution and health. According to the survey, a majority of respondents felt that there was a link between health and air pollution. In 2014, CSE also undertook a rapid perception survey for residents of Gurugram, which brought out that a majority of the citizens feel that respiratory health is being effected as a result of air pollution. The survey undertaken by CAA in 2017 is an addition to prior perception changes as a means to document changing trends, but most importantly it differs from previous attempts in that it was conceptualized and implemented by a network of young individuals who conscientiously want to address the issue of air pollution in their city.

¹ <http://www.cseindia.org/content/perception-survey-outdoor-air-pollution-and-its-impact-our-health-0>

² <http://www.cseindia.org/content/concern-over-poor-air-quality-and-traffic-congestion-gurgaon-action-must-gather-momentum-pro>



One study shows that each extension of the metro rail resulted in a decline in nitrogen dioxide and carbon monoxide in Delhi.

Ref:
Hanzalaaman 2017, A Comprehensive Study Of Air Pollution In India

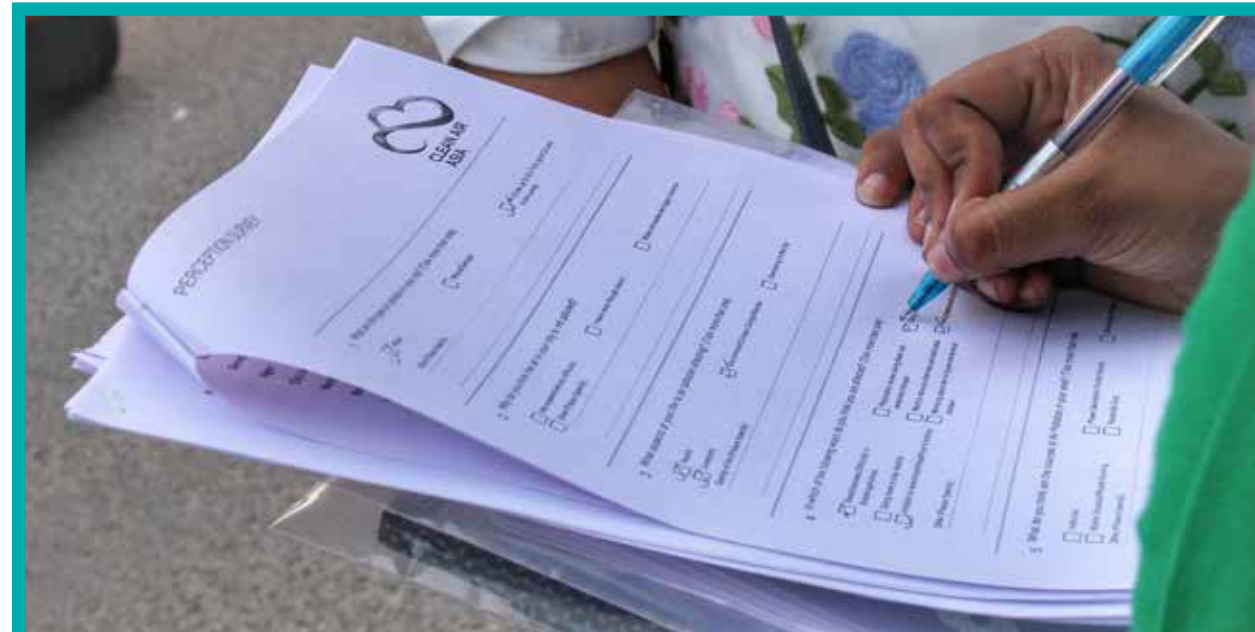


METHODOLOGY AND SAMPLE

In order to conduct this survey, the entire city of Delhi was divided into five zones - North, South, East, West and Central. In each zone three regions were chosen to conduct the survey. These regions were chosen by YCan members as neighbourhoods in which they lived and as areas with major air pollution sources. From each zone 300 respondents were chosen across gender, occupation, and age and randomly surveyed by face to face questioning. The survey had a sample of 1500 respondents in all. The choice of the region in each zone was a selection made by the youth volunteers keeping in mind a certain distinguishing criterion with regards to sources of air pollution. For instance, in Central Delhi, Pragati Maidan was chosen as a potential site of inquiry because of a nearby construction site. Rohini, Punjabi Bagh and ITO were chosen as they are commercial areas with heavy traffic. A break up of the sample with the main identified pollution source is given in the below table.

Zone	Region	Main Source of Pollution	Surveys
North	Haiderpur Badli	Waste burning and construction	100
	Hudson Lane/GTB Nagar	Residential and commercial area with heavy traffic	100
	Rohini	Commercial area with heavy construction	100
South	Satya Niketan	Student area with construction activity	100
	Okhla Landfill Area	Heavy construction and traffic	100
	South Ex Flyover	Landfill and slum area	100
East	Laxmi Nagar	Busy market and commercial area	100
	Nirman Vihar	Construction area	100
	Mayur Vihar	Construction and residential area	100
West	Punjabi Bagh	Busy market and residential area	100
	Peeragarhi Chownk	Construction and heavy traffic area	100
	Kirti Nagar	Residential, industrial, garbage and landfill area	100
Central	Mandi House	Residential area	100
	Pragati Maidan	Construction site	100
	ITO	Heavy traffic area	100
		Total Surveys	1500

Figure 1: Sample break-up according to zone, region and main source of pollution.



The respondents were chosen randomly in each region across the five zones. The gender break up across each zone is given in the figure below:

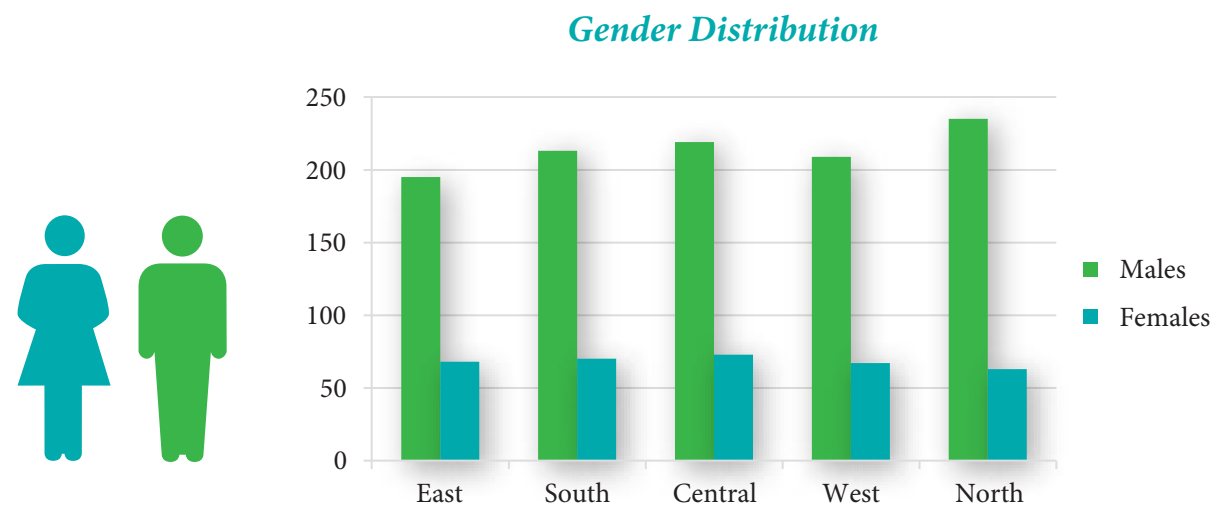


Figure 2: Gender distribution across five zones in Delhi.



Progressive Steps to curb Air Pollution:

To address the issue of air pollution, India constituted a Steering Committee in 2014 whose members include health sector workers and those in non-health sectors such as renewable energy, petroleum and natural gas, rural development, as well as development partners such as the WHO.

Ref:
Basudev Mahapatra. 2017:
*Air pollution in India, a threat to
human lives bigger than terrorism*

In each zone, the female population interviewed was more than 50 people while the male population fell between the ranges of 200 – 250 people. That is about 24.15% of the sample size was composed of women and the rest were men.

Similarly, the distribution of residents to migrants was fairly equitable with the exception of the East zone which had a larger number of residents than migrants. Respondents were asked to identify themselves as being either a migrant or resident of the city according to their own perception. The intent was to see if a migrant perceived air pollution in Delhi differently on account of having come to the city from another town/city/village with varying pollution conditions versus an individual that had spent the larger part of their life in Delhi and was able to identify a change over time in the same city. This became an important factor as a YCan member from the east zone shared that while conducting the survey, a respondent who identified himself as a migrant consistently remarked that Delhi was much more polluted than their hometown on account of the high vehicle density in the city.

Resident/Migrant

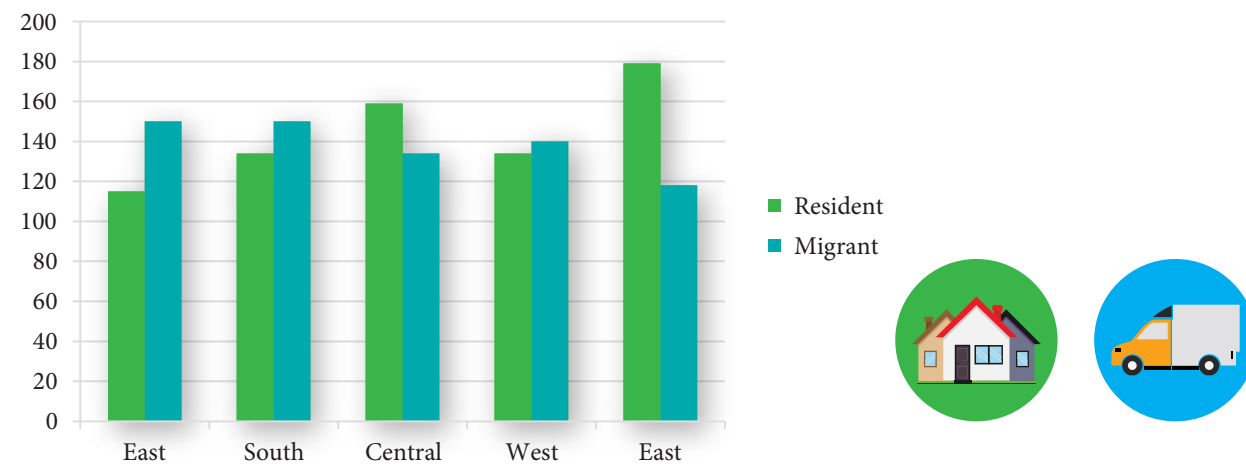


Figure 3: Resident/Migrant distribution across five zones in Delhi.



The age distribution of the sample is given below. The range of respondent's age was from 16 years to 90 years, with the bulk of the respondents falling in the category of 18 – 45 years of age.

Age Groups

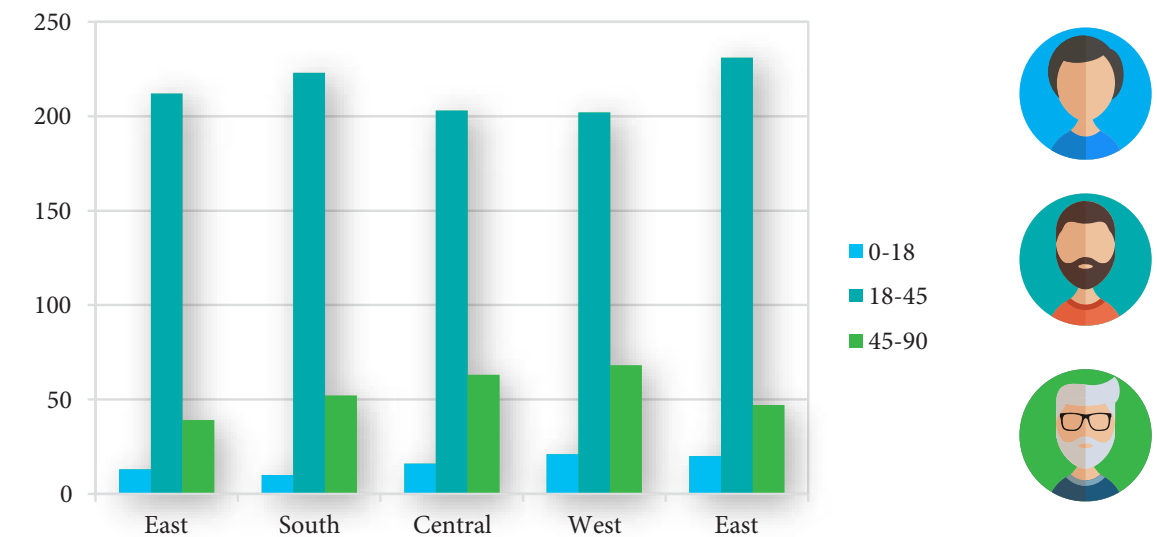


Figure 4: Age distribution across five zones in Delhi





RESULTS

Importance of Air pollution:

Respondents were asked what sorts of pollution they identified as perceptibly harming the city. Interestingly, air pollution (55.63%) emerged as the most important cause of concern, over water (17.88%), waste (26.49%) and other types of pollution (0.0%). Every respondent in the sample indicated that one of the sources of pollution – water, air, waste – were important issues and no respondent chose the ‘others’ or ‘pollution is not an issue’ option. This is indicative of a slow but steady realization amongst the citizenry of the city on the manner in which air pollution is becoming an issue in the city. The importance attached to air pollution was spread differently across both genders, about 84% of male respondents identified air pollution as the most important type of air pollution plaguing the city, while 68.45% of female respondents attached primary importance to air pollution.

Types of Pollution

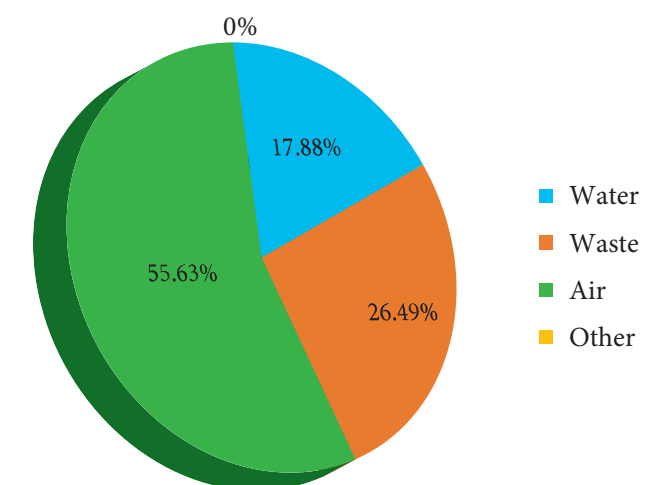


Figure 5: Types of pollution that are most detrimental to the city of Delhi

“ One shopkeeper told me that he is not affected by air pollution as he is in an air conditioned room most of the time. ”

- Paragi , YCan Member

Progressive Steps to curb Air Pollution:

Mobile enforcement teams from Transport Department are being deployed on regular basis at road locations for prosecution of polluting vehicles and vehicles not having PUC Certificates.



Photo credit: Jyoti Singh



Progressive Steps to curb Air Pollution:

Public awareness campaigns are conducted to raise social consciousness on the issue and educate motorists about the health hazards, statutory provisions and control measures viz. engine tuning and maintenance.

2017-2018

EFFECT OF AIR POLLUTION ON LIFE QUALITY:

Among aspects of people's lives severely affected by air pollution, health stood out across all five zones followed closely by environment, difficulty in commuting and effect on livestock. In each zone, more than 50% of respondent's adjudged that air pollution let to detrimental health effects which were related to issues of breathlessness, an increase in respiratory disorders and desire to move out of the city due to general discomfort. Whereas 72% of female respondents identified the detrimental effects of air pollution on health, 74.88% of male respondents had similar perception with regard to the link between air pollution and health. One female respondent in the East zone, highlighted that she was especially perceptive of the negative effects of air pollution on health as she suffered from asthma. Thus, the realization that air pollution is becoming an important issue in the city is manifested for people in the negative health effects they experience and this is potentially an indication of an increased identification of the link between air pollution and health.

Effects of Air Pollution

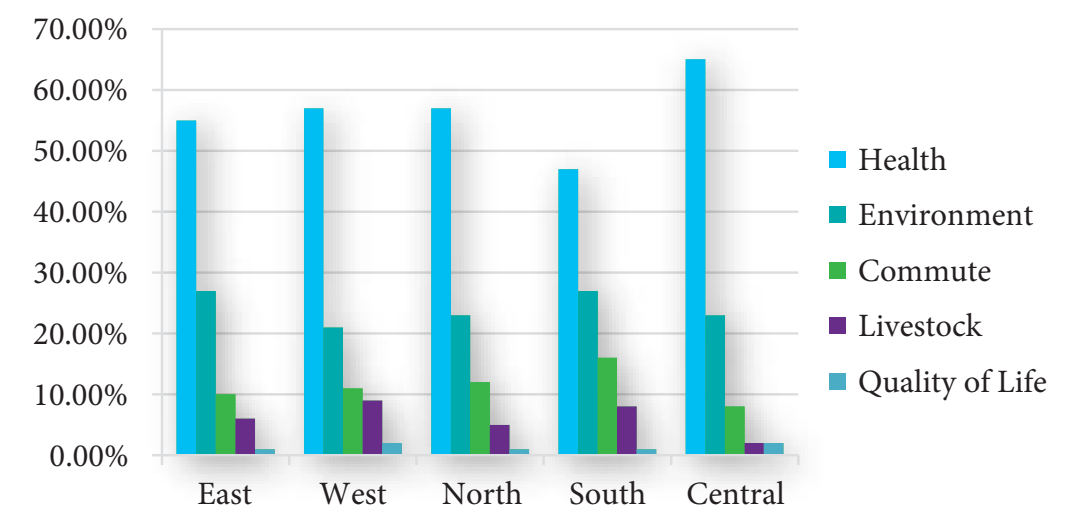


Figure 6: Zonal Distribution of effects of Air Pollution

CAUSES OF AIR POLLUTION:

Forty-five percent of respondents identified vehicular pollution as the most potent cause of air pollution in the city. Fugitive dust emerged as the second most important cause, followed by burning of municipal solid waste and industrial emissions. Thus, the realization that air pollution is a complex issue and a result of diverse sources is still nascent. This could be linked to two reasons; firstly, the lack of source apportionment and inventories on air pollution studies in Indian cities and secondly, the inability to communicate the learnings from these kinds of research to the general citizenry through outreach and education. In order to bridge this gap Clean Air Asia, has been implementing air pollution outreach programs and is working with various stakeholders on the issue.

Main Sources of Air Pollution

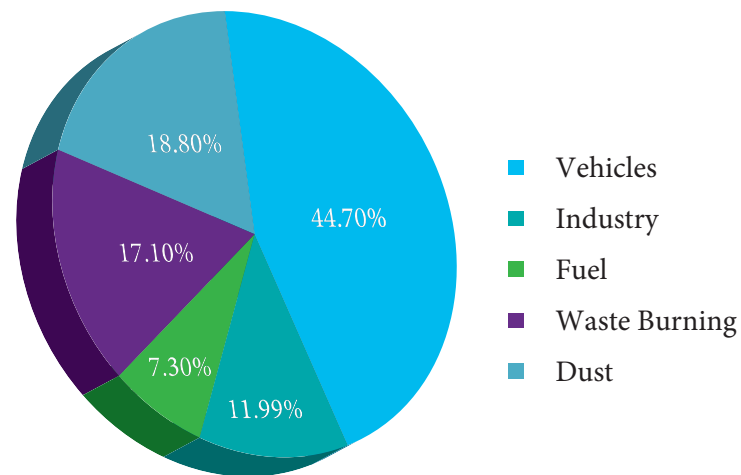


Figure 7: Main Sources of Air Pollution in Delhi

Progressive Steps to curb Air Pollution:

Supreme Court issued ban in CWP No. 13029 of 1985 of vehicles which is more than 15 years old commercial/ transport vehicles, Autos and Taxis driven on conventional fuels and diesel driven city buses to tackle vehicular pollution.



“ One man was really interested to know what the survey was about, what we were going to do afterwards and he asked us many questions as to what the organisation is about and where can he read more about it. ”

- Shreya, , YCan Member

INITIATIVES TAKEN TO TACKLE AIR POLLUTION:

Each zone identified different initiatives taken to abate air pollution. Banning burning of waste accounted for the most important initiative (33%) undertaken for respondents in the South zone; while restriction on vehicular movement emerged as the most important initiative in the Central zone (29%). For respondents from the East zone the usage of masks emerged as the most important initiative (27%) while for the North and West zone the two most important initiatives were restriction on vehicular movement and banning waste burning. Such responses indicate that people are aware of the efforts that are being undertaken by the state (restricting of polluting vehicles), judiciary (ban on burning of waste) and individual efforts (such as wearing protective masks) to curb the detrimental effects of air pollution.

Initiatives Taken to Mitigate Air Pollution

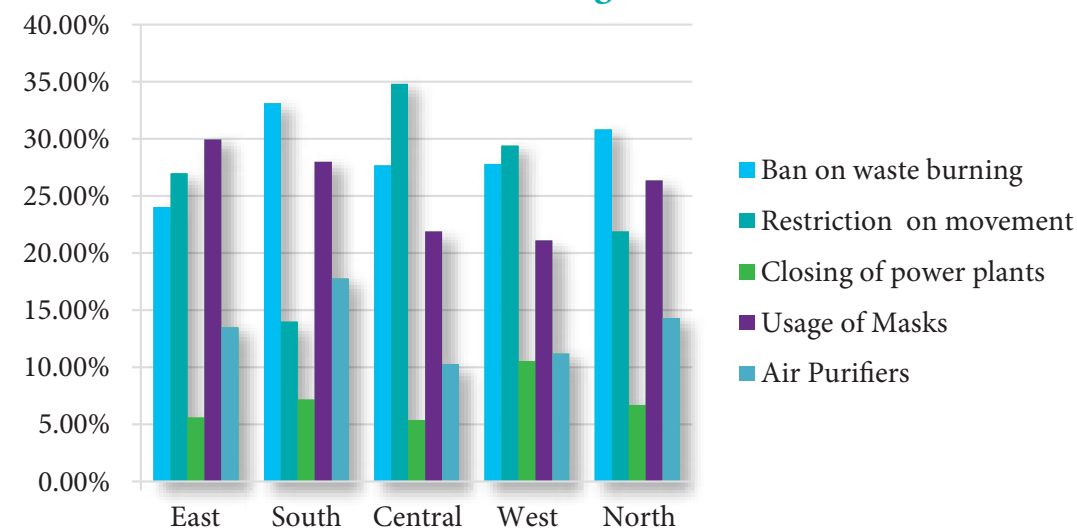


Figure 8: Zonal Distribution of initiatives taken to mitigate air pollution



Government Sponsored Initiatives

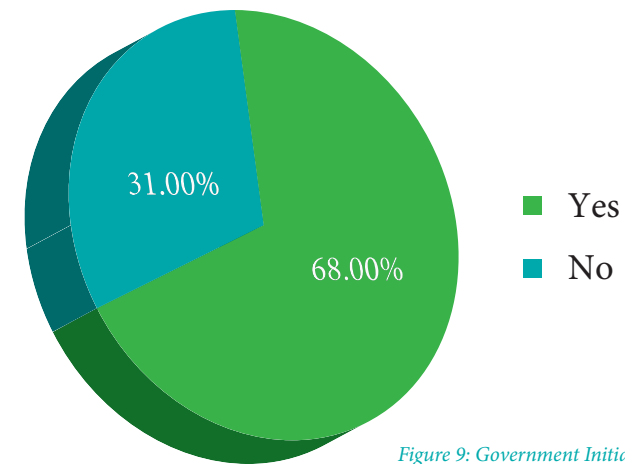


Figure 9: Government Initiatives

Government Initiatives:

When asked about government initiatives to reduce air pollution, the majority of respondents (68%) identified the Odd-Even rule and the Swach Bharat Abhiyaan as interventions to reduce air pollution. That said, most respondents felt that these initiatives did not achieve their intended goals. Respondents in the East zone told YCan members that they were aware of the PUC, that is the pollution check for vehicles in Delhi and thought it needed to be implemented better.

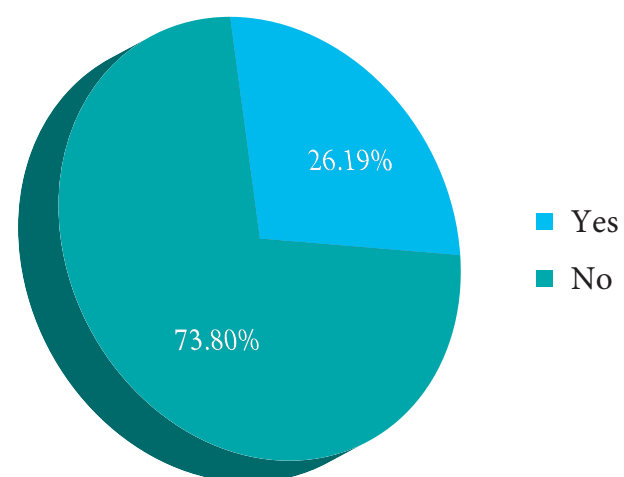


“ One woman invited me to her house to have a more detailed discussion on air pollution. She thought I was from the government and we were trying to come up with solutions. She was severely effected by air pollution related ailments due to road side dust and construction activities right next to her house. When I approached her for the survey she was pouring water on the road outside her house to dissipate the movement of dust. ”

- Paragi, YCan Member

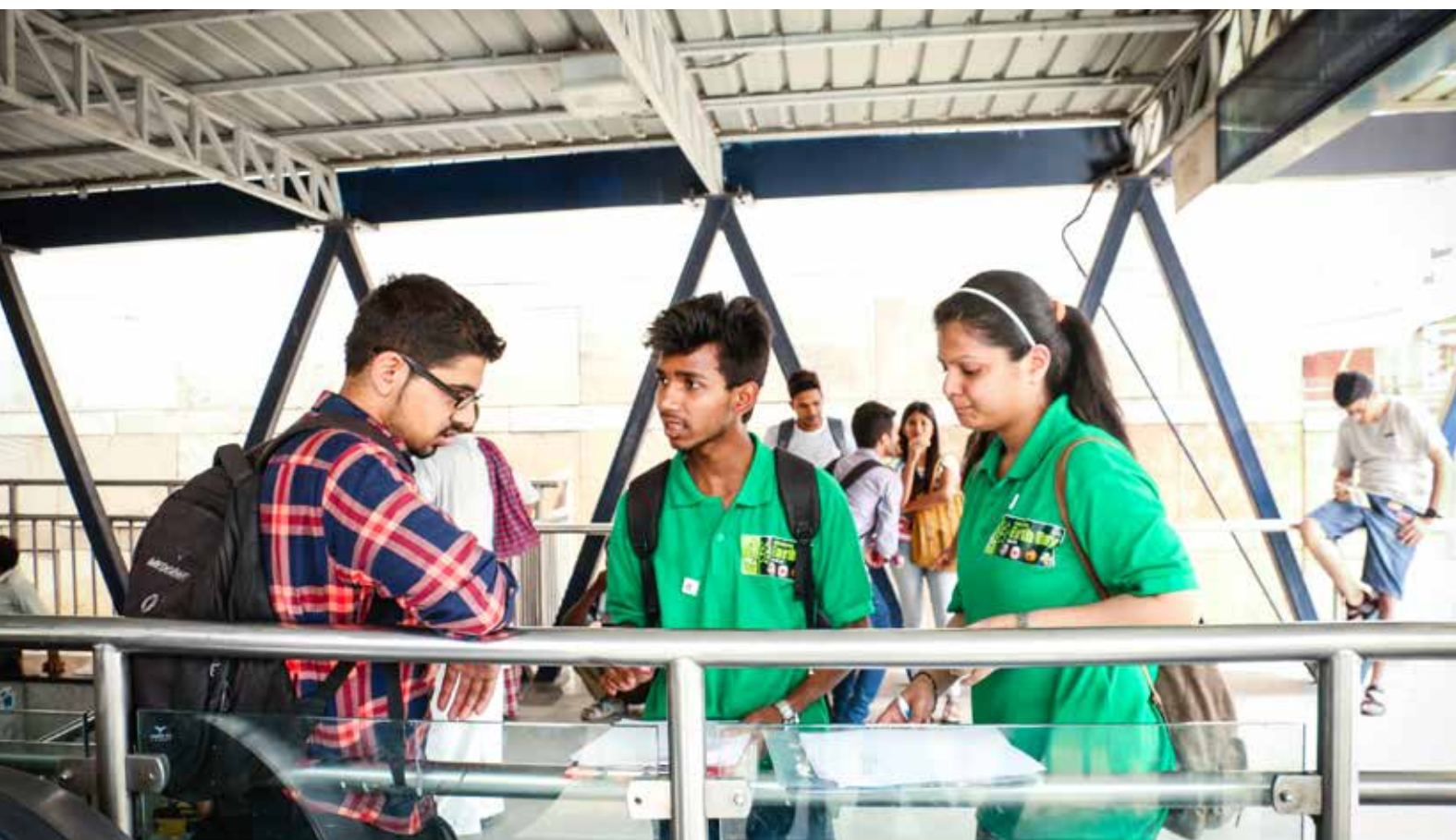
ACCESS TO AIR QUALITY DATA:

Access to Air Quality Data



A large proportion of the sample were not aware that they had access to air quality data. Those that did relied mainly on mobile phone apps and the internet as resources for accessing such data. Among the 1500 respondents only 26.19% attested to having access to air quality data. Of this the majority was composed of male respondents (88%) and 12% of respondents who has access to air quality data were women.

Figure 10: Accessibility to Air Quality Data



TREND IN AIR QUALITY:

Overall Air Quality

Most respondents identified a decline in the quality of air quality in Delhi. As much as 40% of the sample thought that the air quality was much worse than the year before while the remaining respondents felt that either the air quality was the same or a little worse when compared to the year before.

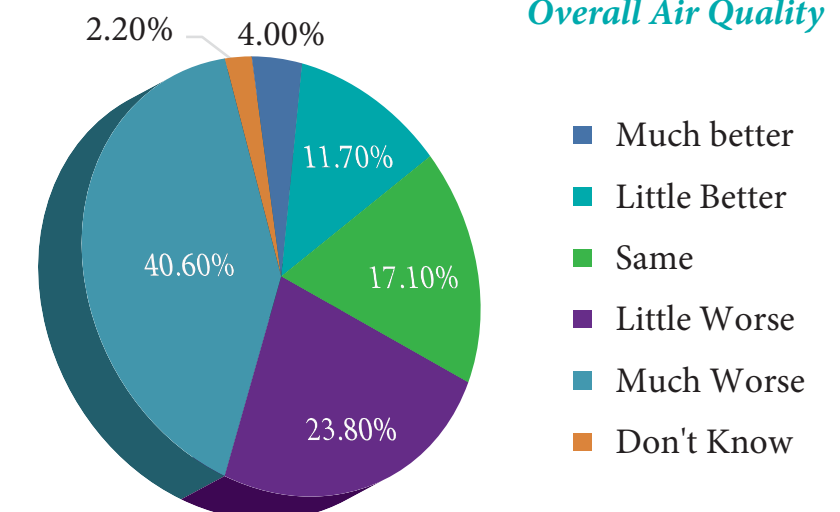


Figure 11: Perception of Overall Air Quality in Comparison to the Previous Year.

Overall Air Quality : Zonal

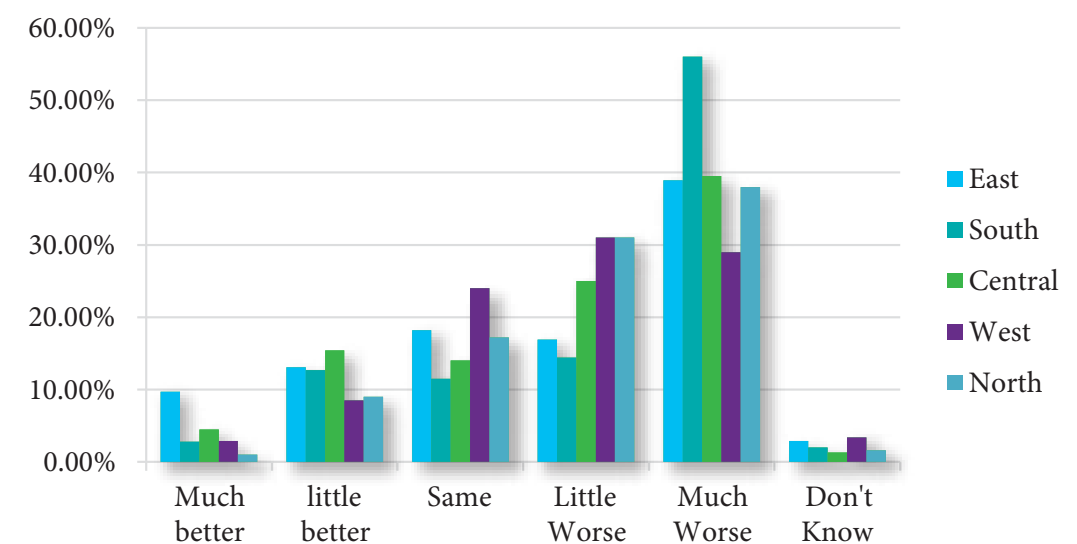


Figure 12: Zonal Perception of Overall Air Quality in Comparison to the Previous Year.

Progressive Steps to curb Air Pollution:

Workshop and creative activities are conducted for school children to raise awareness about air pollution in their schools and neighbourhood.

“People were only willing to participate in those activities which seemed possible and effective in their view. If we want more participation from people to decrease air pollution, we need to make them understand that it isn't an impossible issue to deal with and there are initiatives that can lead to change.”

- Kamna, YCan Member

PROPOSED LARGE SCALE INITIATIVES:

Respondents identified large scale initiatives that they thought would improve the quality of air of which banning polluting vehicles was foremost followed by clean fleet management, better government initiatives and a strong legal framework for implementation of existing policies.

Proposed Initiatives to Mitigate Air Pollution

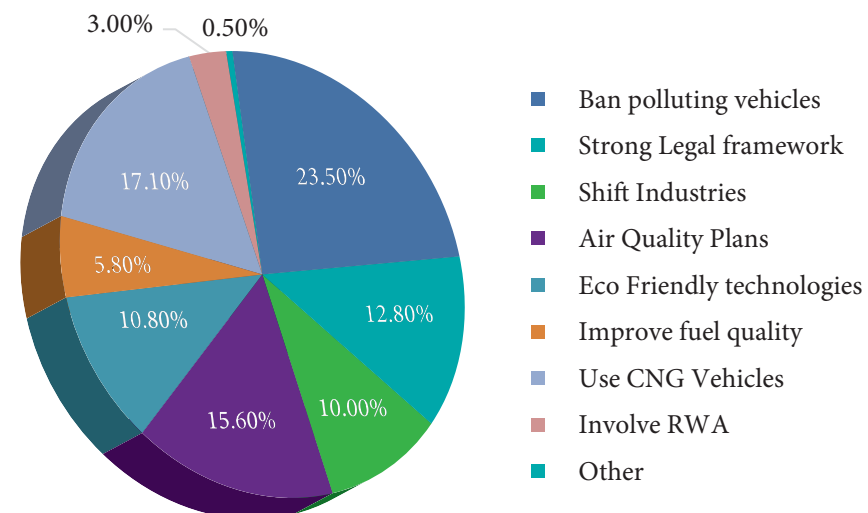


Figure 13: Proposed Large Scale Initiatives in Delhi to Decrease Air Pollution

“This survey changed my thinking and it also helped me raise my confidence. I think that there is a lack of awareness due to which air pollution is increasing.”
- Mukul, YCan Member

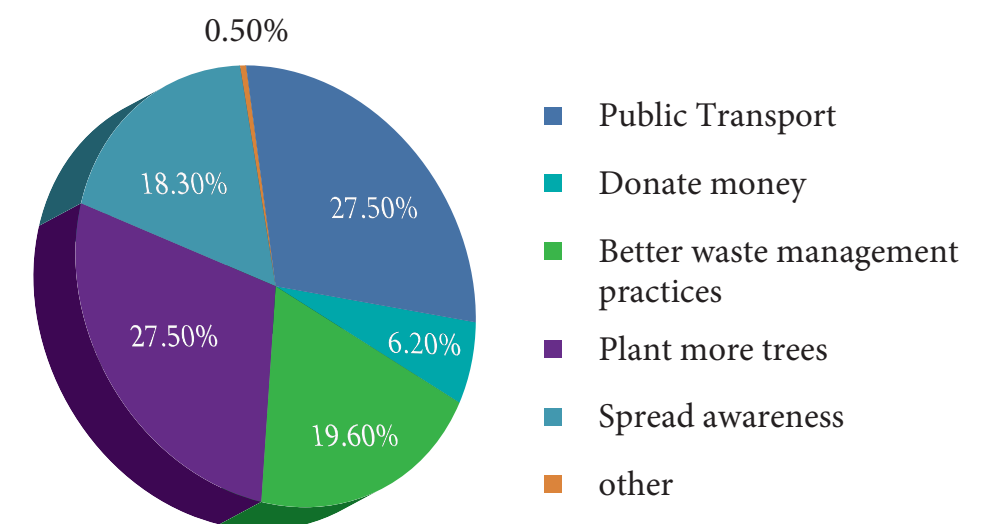
Progressive Steps to curb Air Pollution:

Odd-even scheme, based on the last digit of the vehicle registration number was implemented twice to bring down the pollution level in Delhi.

PROPOSED INDIVIDUAL LEVEL INITIATIVES:

On an individual level as an effort to reduce air pollution, respondents highlighted that they would be willing to use public transport, carpool and plant more trees. Spreading awareness about air pollution and practicing better waste management practices were also identified as important solutions. Of the individual initiatives identified, 48% of female respondents felt that planting of more trees followed by better waste management practices were the key issues to take up. Of the male respondents 51% felt that choosing public transport over private transport, followed by better waste management practices were the two main initiatives to take up.

Proposed Individual Initiatives to Mitigate Air Pollution





2017-2018

WAY FORWARD

The perception survey is part of CAA's efforts to increase the general knowledge base and intensify outreach for action on air pollution in cities in India. Increasingly, there is acceptance of the fact that collaborative efforts between the government, civil society, industry and general citizenry will be needed to make cities cleaner and liveable in the future. In order to move in this direction, CAA has launched the Clean Air Knowledge Network to serve as a platform for collaborative efforts, repository for knowledge and sharing of best practices across civil society, the government and specialists across cities in India.

Simultaneously, CAA continues to engage with YCan in Delhi and increase the networks membership for which a website has been launched: youthforcleanair.com. YCan has also been launched in Gandhinagar and we are in the process of starting an YCan in Guwahati. In the foreseeable future, we aim to take the YCan to other Indian cities to carry on the campaign for clean air with the youth, while strengthening the Clean Air Knowledge Network to encourage city level symbiotic efforts at the inter and intra city level to conceive and implement solutions on air quality management.

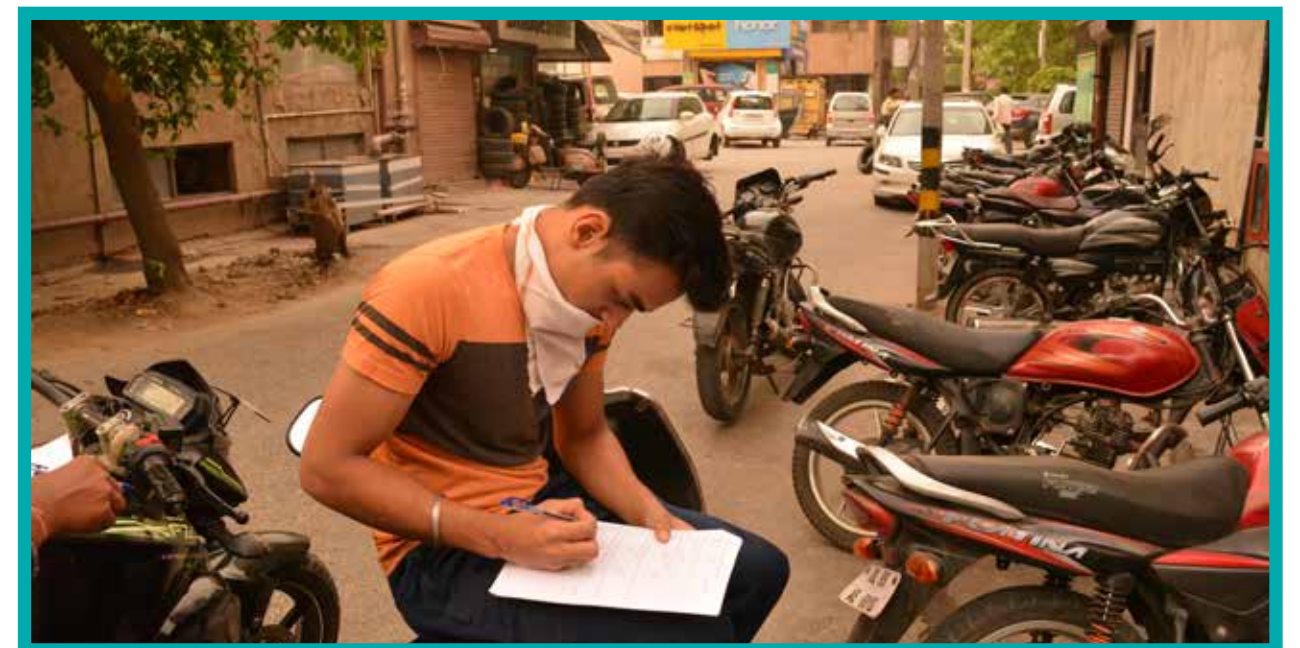




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PERCEPTIONS ABOUT THE PERCEPTION SURVEY BY YCAN MEMBERS



“ In the Haiderpur area most respondents live in slums. They identified waste burning as a huge issue that causes air pollution. But, when authorities came to the area to oppose the practice, residents of the area resisted as there were no other waste disposal options. ”

- Anirudh, YCAN Member



“ One respondent was seriously considering moving out of the city as his wife has severe health problems due to air pollution. In the GTB Nagar area, I noticed many people wearing masks. ”

- Paragi, YCAN Member



“ The perception survey was a good learning experience for me. While talking to different people I learnt that unless they are directly affected by air pollution they are not perceptive to it. One respondent told me that he had asthma and had immense difficulty breathing. He was willing to do anything to improve the quality of air. ”

- Mughil, YCAN Member



“ I was pleasantly surprised how people took out time to speak to us about air pollution. I learnt new things in the process, such as how people are affected by air pollution. ”

- Pallavi, YCAN Member



“ A woman in the Uttam Nagar area told me about the severe effects of air pollution in the area. I was surprised to learn that there was black smoke that led to deposits on her skin and one couldn't survive without masks. ”

- Kamna, YCAN Member



“ I remember talking to a middle-aged man who was the security guard in a company. What started as a simple conversation with a few questions from the survey, took a turn when the conversation got intense and we discussed education, human health, pollution and government activities. The kind of awareness this man had about all the happenings in his locality and air pollution astonished me. It made me realize that one's willingness to bring change is really what is needed to lead to effective change. ”

- Aashima, YCAN Member

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