CLEAN AIR ASIA

HOW BAD IS GANDHINAGAR'S AIR

Results from a Clean Air Asia Perception Survey on Air Pollution in Gandhinagar

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CONTENTS

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Clean Air Asia (CAA) would like to thank our enthusiastic youth group for planning and spending two days in the streets of Gandhinagar interviewing all the participants of this perception survey.

ABOUT CLEAN AIR ASIA

Clean Air Asia was established in 2001 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, transports, 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.

Clean Air Asia (CAA)'s work in India involves engaging with Indian cities for better air quality management (AQM). This aligns with the overall CAA work program on broad air quality (AQ) interventions. CAA's work in India involves providing scientific inputs to city governments for better air quality, sustainable transport/ mobility programmes and education/ communication for cleaner air. The focus of CAA's work in India is on cities with high impact potential as well as potential for leveraging wider change.

CAA is working in thirty cities in India to assess air quality management capacity leading to preparation of air action plans. Towards this, CAA is also supporting capacity building activities for air quality management. Clean Air Asia India has also facilitated the Clean Air Knowledge Network (CAKN), (www.allaboutair.in), a forum that connects air quality experts and practitioners from across India and city officials with an objective to promote knowledge sharing across cities on AQ issues and share best practices.

A major component of CAA's India programme is Education for better air quality. The Train for Clean Air: Clean Air for Kids is a bilingual (English and Hindi) programme for school children between the age of 12-14 years that engages with children to teach air quality issues. The programme involves interactive classroom and citizen science activities. CAA also works with primary school children to promote the message of clean air.

Clean Air Asia actively engages youth for technological solution and innovative ideas to improve Air Quality. CAA's Youth Clean Air Network (YCan) is a volunteer program where youth can passionately work together for better air quality.

Clean Air Asia has been actively working in India since 2008. In the past, the India team has worked on green freight and sustainable mobility projects, conducting Walkability Studies in Indian cities, Walkability App, the National Bus Fuel Efficiency Framework, the Green Trucks Toolkit for India, and an online freight brokerage platform etc.

YCAN

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/.

YCan is a group of young enthusiast people, working under CAA to achieve solutions for better air quality in Indian cities. Volunteers come from different academic backgrounds but work passionately about air quality issues, they believe in finding a solution through different and unique perspective. The projects undertaken by YCan focus on exciting and diverse ways of bringing air quality to the mainstream. Whether it is city specific awareness campaigns or discovering technology solutions, YCan's is to contribute to cleaner, safer air in Indian cities through discussion, innovation and collaboration.

The young India have 50 percent of the population under the age of 25, and it is important that we engage with youth who can help make positive contributions to critical issues like air pollution. The YCAN is currently active in Delhi/ NCR, Gandhinagar, Bhubaneshwar, Nagpur, Chennai and envisages to expand it to another 10 Indian cities soon, with the sheer efforts of our young volunteers.

YCAN: GANDHINAGAR CHAPTER

The Gandhinagar chapter of YCan started with a total number of 8 volunteers who surveyed the managers of Public Cycle Rental Stands in Gandhinagar about the preferences of people for the usage of cycles as a mode of transportation. It was conducted to understand the awareness of air pollution and basic measures among the citizenry. Soon, YCan conducted other activities like art competition for the volunteers and exhibited them across the campus of Gujarat Forensic Science University. Following this, a large-scale perception survey was conducted on September 2, 2018 to assess the understanding of the common populace of the dire issue of Air Pollution and Poor air Quality.

The mission of YCan Gandhinagar is to start a conversation of Air Pollution. It consists of making the youth realize that natural resources that we are using now, may not last forever and it is the need of the hour to work towards sustainable development and sustaining breathable air is a priority for the sustenance of future generations.

1. INTRODUCTION

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, Gandhinagar holds the title of 'Green City'. However, this city has some air quality issue too. A major cause of the pollution has been a sharp rise in the number of cars; dust from road and construction activities, burning of solid waste and industrial emissions. Ahmedabad, the neighbouring city to Gandhinagar is considered to be heavily polluted. A research in 2015 remarked that during winter season, especially in the month of January, the city observes a rise in suspended particulate matter levels crossing the permissible limit as per NAAQS, 2009. Also, it was found that the annual levels of respirable suspended particulate matter saw an increase in the last decade.

This leads to the inevitable question regarding the city's air quality and the changed perception of citizens of it. The current study was performed to understand the extent of air pollution in the capital city of Gandhinagar through the perception of its citizens.

2. ABOUT THE PUBLIC PERCEPTION SURVEY

The YCan led public perception survey was an effort to initiate the conversation about air quality in a 'Green' city. In recent years, there has been a rapid growth of population leading to increased human activities such as construction, and automobile transportation. The industrial areas of the city, viz. sector- 29, 30 have major manufacturing and processing plants. Along with that, the slums of the city have also contributed to the increased levels of particulate matter by poor waste management along with biomass burning (Pathak and Mandalia, 2015). 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.

3. METHODOLOGY AND SAMPLE

To conduct the survey, Gandhinagar city was divided into eight zones. The zones were selected by the planning and research team according to the population, type of human activities and major pollution sources. For example, zone 8 was selected because of a thermal power plant in the area which has been reported to be a major pollution source on numerous occasions by the populace. A total of 2400 surveys were collected from Gandhinagar divided into 8 zones. From each zone, 300 respondents across gender, occupation, and age were chosen at random. The survey had the sample size of 2400 respondents. 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*
1	Infocity, Kudasan, Urjanagar	Vehicular Emissions, Commercial Area, Waste Burning	300
2	Sector-1, 2, 7, 8	Residential Area, Vehicular Emission	300
3	Sector-3, 4, 5, 6	Residential Area, Vehicular Emission	300
4	Sector- 2, 13, 14, 15, 16	Residential Area, Construction, Waste	300
5	Sector-9, 10, 11, 17, 18	Student Area, Heavy Transport and vehicular Emissions	300
6	Sector-23, 24, 25, 26, 27	Commercial Area, City Market, Waste	300
7	Sector-28, 30, GSECL Colony	Thermal Power Plant Emissions, Biomass Burning, Commercial Area	300
8	Sector-20, 21, 22, 29	Construction, Vehicular Emissions, Waste	300

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

The respondents were chosen randomly in each region across the five zones. In each zone, the female population interviewed was average 38% and the male population fell at an average of 62%. The gender break up across each zone is given in the figure below:

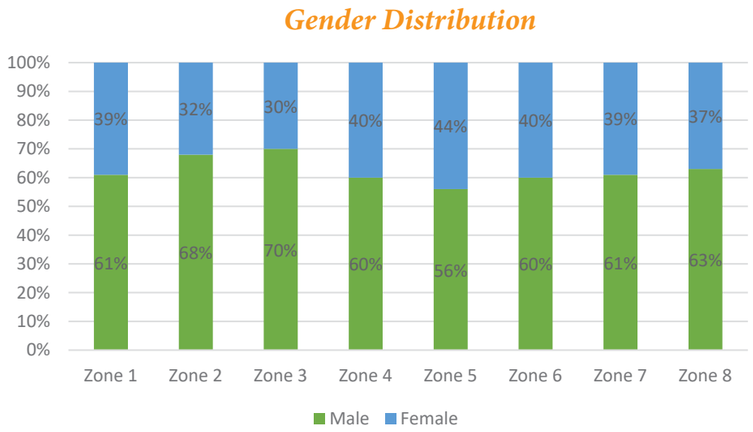

Figure 2: Gender distribution across eight zones in Gandhinagar

Similarly, the distribution of migrants and residents in each zone was mapped. Respondents were asked to identify themselves as either a migrant to the city or a resident. It addressed the purpose of assessing the perception of respondents of air quality on account of having come to the city from another town/city/village. This is a significant factor as many respondents remarked that Gandhinagar is less polluted than other cities or their hometowns.

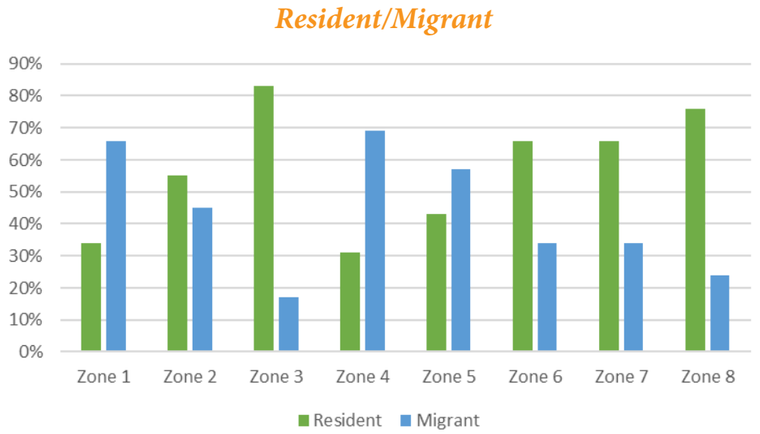

Figure 3: Resident/Migrants distribution across eight zones in Gandhinagar

4. RESULTS

4.1 Understanding the issue of Air Pollution

Respondents were asked what kind of pollution they perceive to be harmful or prevalent in their city. Only 26% respondents including migrants and residents, think that the air of Gandhinagar is polluted. Only 31% of the sample living or working near a thermal power plant (Zone 8) think that the air quality is poor in the city. Interestingly, waste is the major concern in the city as recognized by 51% of the respondents across the eight zones. Though this indicates that air pollution is relatively less of a plague to the city of Gandhinagar than waste, this also points towards the potential of the waste problem to raise the city's pollutants level in the air. Moreover, more than 10% of the overall respondents haven't considered air pollution to be an issue. Almost 30% of the populace interviewed claimed to not have suffered the symptoms of poor air quality.

Types of Pollution

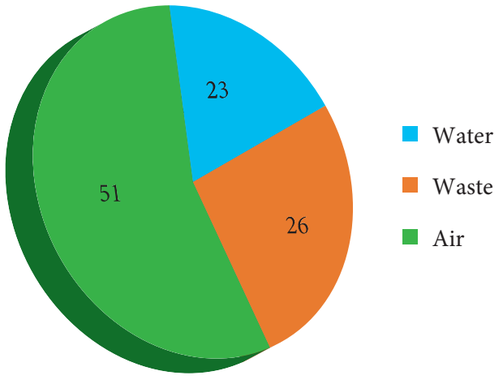

Figure 4: Types of Pollution

4.2 Effects of Air Pollution

To people who affirmed that the air quality was not up to the standards in their city, we enquired about the aspect of their life that they perceived to be affected by poor air quality.

While 30% the overall respondents think that air pollution affects their health, only 6% think that it has any effect on the quality of life. The challenging part is that only 27% of the population interviewed think that climate change is a dire issue or is related to poor air quality. Overall, less than 30% think that it affects their life. And the case is the same as the individuals interviewed from Zone 7. It was observed that a major portion of the population there was uneducated or illiterate.

Effects of Air Pollution

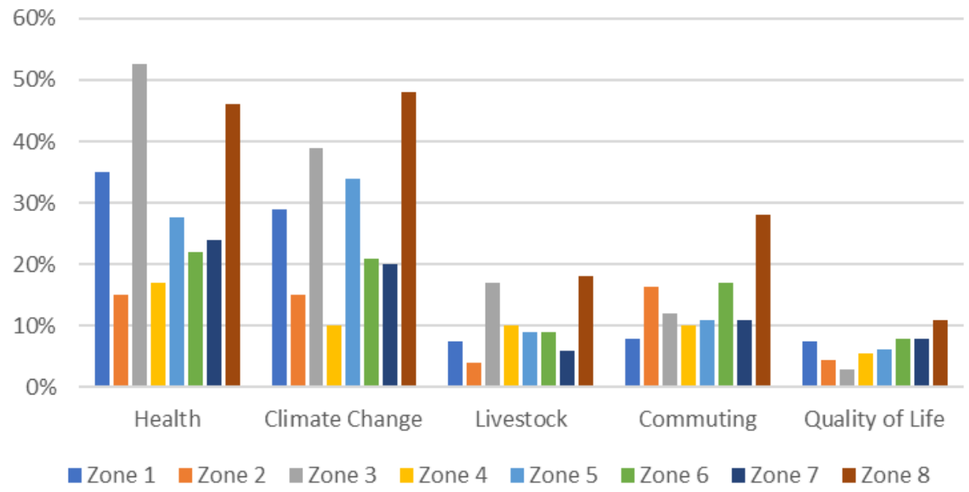

Figure 5: Effects of Air Pollution

4.3 Health Effects of Poor Air Quality

The next enquiry was made about the health toll of poor air quality and the overall impact on the quality of their daily life. Overall, 16% of respondents claimed to have faced breathing difficulties throughout the year, which was exaggerated during winters or Diwali festivities. With the deterioration of air quality, 9% of the populace interviewed spends less time outdoors. About 9% of the individuals surveyed reported the decrease in time spent outdoors, and takes safety measures to avoid harmful health effects of the pollutants.

The concerning factor was that 11% of respondents reported health effects and 6% of the populace questioned expressed the desire of migration to a city with better air quality. Generally, citizens expressed concerns regarding the health of sensitive group, especially children.

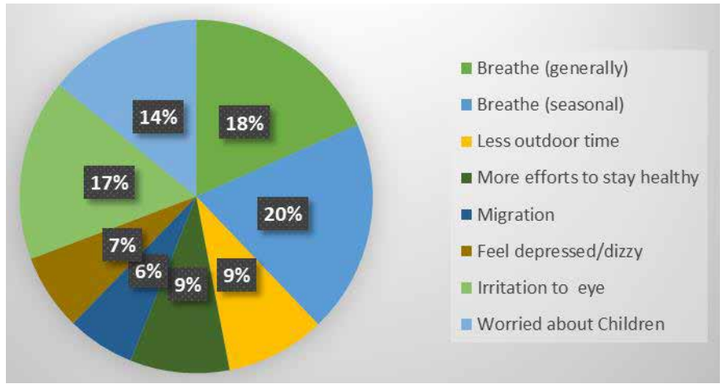

Figure 6: Health Effects of Poor Air Quality

4.4 Sources of Air Pollution

Upon enquiring about the major causes of pollution in their city, most respondents remarked that lack of awareness, along with ignorance among citizens is responsible. The major sources of pollution, according to the respondents, were vehicles and poor waste management strategies. Less than 20% of the sample, reported dust and energy generation as the leading source. The intriguing result is that most of the respondents do not consider roadside dust to be a source of Air Pollution. Fuel and Biomass burning is also not heavily claimed to be a source of air pollution. A volunteer remarked that a respondent claimed that burning wood/biomass/coal is essential to their life as they do not have access to better cooking fuel option. This was seen to be prevalent in the city among citizens below poverty line. However, fuel burning was not regarded as pollution source by the populace.

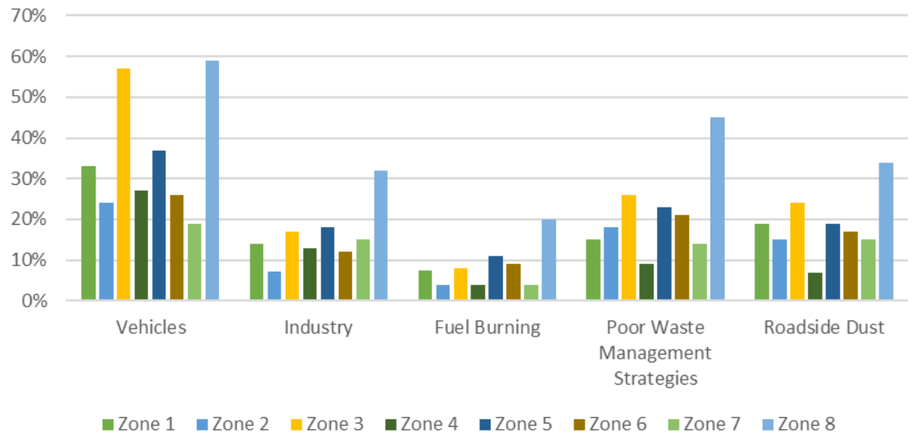

Figure 7: Sources of Air Pollution

4.5 Awareness of Climate Change

It was noteworthy that only 35-40% i.e. less than half the population of people surveyed holds knowledge of climate change and its association with poor air quality and air pollution.

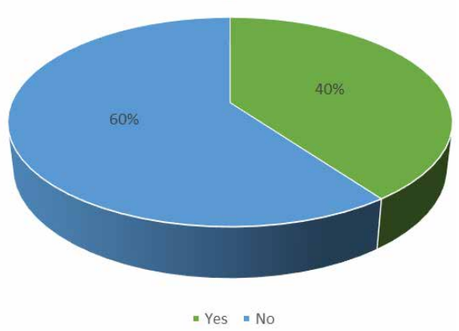

Figure 8: Awareness of Climate Change

4.6 Access to Air Quality Data

Interestingly, only 12% of the respondents reported access to air quality data, like AQI, the concentration of pollutants in the air etc. However, their access to real time data was not frequent and less than 5% were aware of the availability of this data on CPCB and State pollution control board's websites. A large fraction of the populace expressed that they could not make sense of the available data and infer the quality of air.

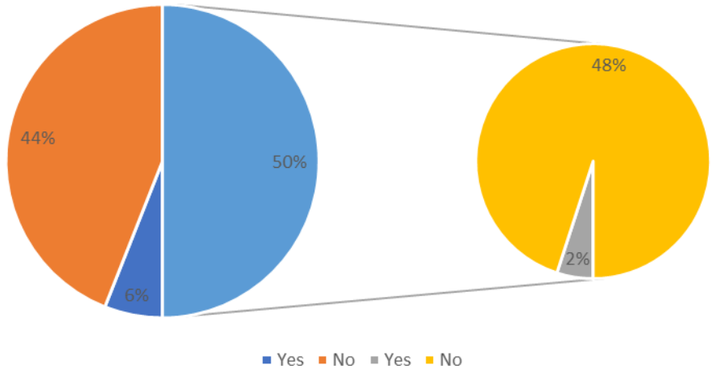

Figure 9: Access to Air Quality Data

4.7 Government Sponsored Initiatives

When asked about government initiatives to reduce air pollution, only 13% of the population claims to be aware of the government planned initiatives in their city to curb air pollution. Around 15% said that there is a ban on waste burning in their area, however many people seem to ignore the law.

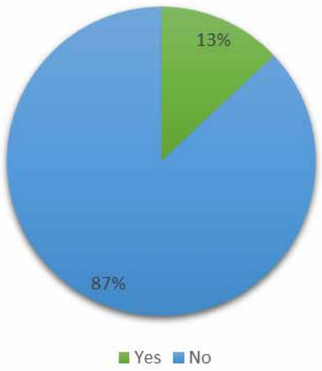

Figure 10: Awareness of Government Sponsored Initiatives

4.8 Trend in Air Quality

When asked about the trend in air quality and comparison of air quality of Gandhinagar with their hometowns, a population of 76% migrants reported that other cities has worse air quality than Gandhinagar.

When asked about their thoughts on the comparison of air quality with that of last year, almost 20% of the overall respondents said that is a little better this year. However, the same number of respondents claimed that the air has gotten much worse. A majority of these people were from the areas surrounding the thermal power plant. Almost 10% of the sample reported having experienced no major change in the air quality. It is also noteworthy that most respondents in areas surrounding thermal power plant, i.e. zone 7 reported that air quality is worse than the last year.

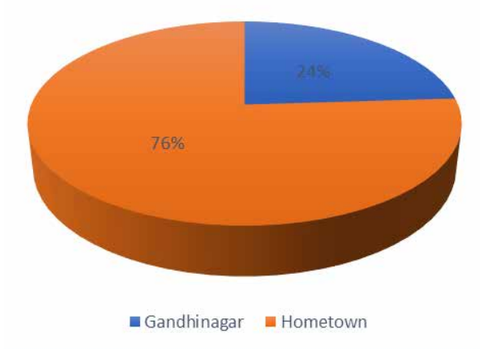

Figure 11: Air Pollution in Gandhinagar and Other Cities

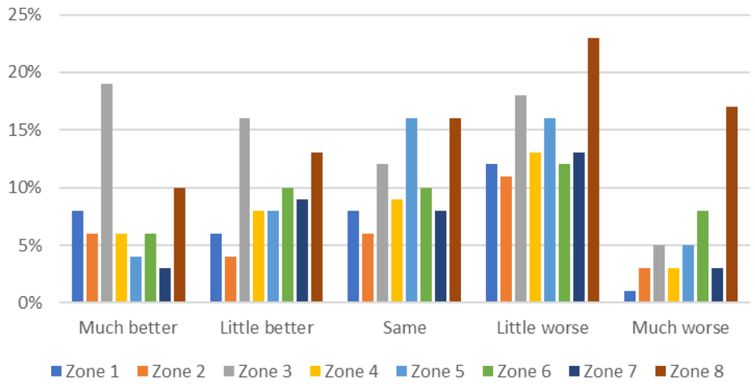

Figure 12: Air Quality Comparison with Previous Year

4.9 Proposed Individual Level Initiatives

Respondents highlighted that they will be willing to use better waste management strategies, supports plantation, and use of public transportation and carpooling to curb air pollution levels in their locality. Spreading awareness was also identified as an important solution.

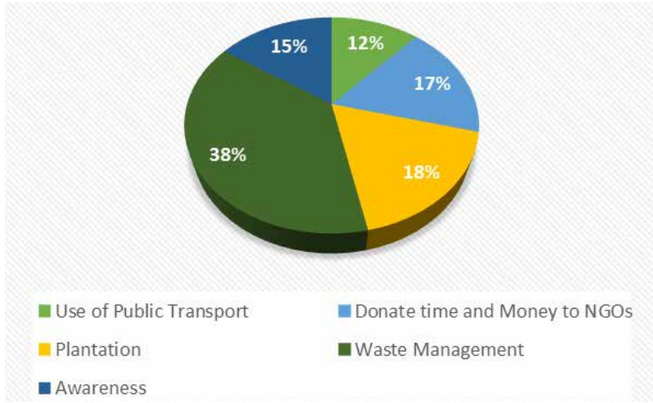

Figure 13: Proposed Individual Level Initiatives

4.10 Proposed Large Scale Initiatives

Respondents identified the role of government in improving air quality in their city. 20% of the sample claimed that the government should pass better laws, move industries and restrict vehicular movement. 10% of the respondents expressed concerns over poor quality of fuel and 14% regarded use of green technologies as a solution to the problem of air pollution. It was noticeable that up to 16% the respondents argued that CNG is a cleaner fuel to use for personal vehicles and that government should take this forward.

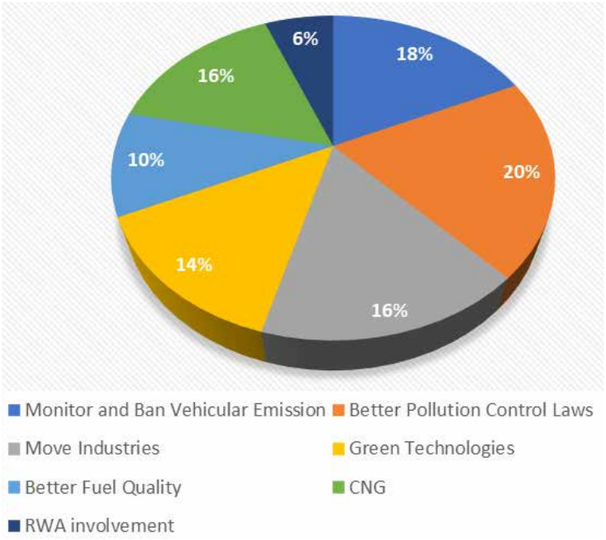

Figure 14: Proposed Large Scale Initiatives

CONCLUSION

The results of this survey show respondents are aware of air pollution. However, their knowledge is limited to the surface and they are either not aware of the majority of things or the comprehension lacks.

The efforts that individuals, institutions put in are limited to some basic efforts which are easily overshadowed by the activities contributing to poor air quality. There is an urgent need to understand that both proactive and reactive measures are required to curb air pollution. People are willing to participate in easy activities or inculcate behaviour changes that are seemingly possible or require fewer efforts. It is imperative for the betterment of air quality that we understand that air pollution is not an impossible issue to deal with, but an urgent one. It is a widely accepted notion that government, citizens and the private sector must take steps collaboratively to move in the direction of clean and habitable cities in the foreseeable future.

APPENDICES

Appendix 1

Schedule
Date: September 2, 2017

Zone 1: Infocity, Kudasan, Urjanagar – Madhuri

Zone 2: Sector 1, 2, 7, 8

Zone 3: Sector 3, 4, 5, 6

Zone 4: Sector 12, 13, 14, 15, 16

Zone 5: Sector 9, 10, 11, 17, 18

Zone 6: Sector 23, 24, 25, 26, 27

Zone 7: Sector 28, 30, GSECL Colony

Zone 8: Sector 20, 21, 22, 29

Appendix 2
Perception Survey Questionnaire

Respondent Details

Name: .....

Gender: .....

Age: .....

Occupation: .....

Neighbourhood: .....

Resident/Migrant: .....

In case of migrant, choose one: Business/work/labour migrant/ Education migrant

Other(please specify): .....

Country: India

1. What are the types of pollution in your city? (Tick more than one)

- ☐ Water
- ☐ Waste/Garbage
- ☐ Air (If yes, go to Q.3, If no, go to Q.2 and finish survey)

Other (Please Specify)

.....

2. Why do you think the air in your city is not polluted?

- ☐ Not experienced any difficulty
- ☐ I have never thought about it
- ☐ Water and waste are bigger concerns

Other (Please Specify)

.....

3. What aspects of your life is air pollution affecting? (Tick more than one)

- ☐ Health
- ☐ Environment/Climate Change/Weather
- ☐ Commuting in the city
- ☐ Livestock
- ☐ Quality of life

4. In which of the following ways do you think you are affected? (Can choose more than one)

- ☐ Breathlessness/Difficulty in Breathing/Asthma
- ☐ Respiratory issues during diwali and seasonal changes
- ☐ Doing less outdoor activities
- ☐ Doing more to stay healthy
- ☐ Want to move to other less polluted areas
- ☐ Feeling depressed/cold/dizziness
- ☐ Irritation to eyes/nose/throat/Poor Visibility
- ☐ Worrying about the living environment of children

Other (Please Specify)

.....

5. What is the major cause of air pollution in your city?

- ☐ Ignorance
- ☐ Lack of Awareness
- ☐ Cutting Costs and lack of conformance to QM and standard protocols

6. Are you aware of climate change?

- ☐ Yes
- ☐ No

7. What do you think are the sources of Air Pollution in your area? (Tick more than one)

- ☐ Vehicles
- ☐ Power Generation Plants/Industry
- ☐ Roadside Dust
- ☐ Unit Burning of Fuel/Biomass
- ☐ Waste Disposal/Waste Burning

Other (Please Specify)

.....

8. What are some initiatives in your area to tackle air pollution? (Tick more than one)

- ☐ Ban on waste burning
- ☐ Restriction on vehicular movement
- ☐ Closing of power plants
- ☐ Masks
- ☐ Air Purifiers

Other (Please Specify)

.....

9. Do you have access to air quality data?

- ☐ YES (Go to Q.8)
- ☐ NO (Go to Q.10)

10. How do you access air quality data for your city/locality? (Tick more than one)

- ☐ Newspaper
- ☐ CPCB/DPCC website
- ☐ Television
- ☐ Internet
- ☐ Display Boards
- ☐ Mobile App
- ☐ Through friends and family

Other (Please Specify)

.....

11. Have you heard of any of these pollutants? (Tick more than one)

- ☐ PM 2.5
- ☐ PM 10
- ☐ O3
- ☐ NOX
- ☐ CO2/CO
- ☐ SO2

Other (Please Specify)

.....

12. How do you compare overall air quality in your area in compare to last year?

- ☐ Much better
- ☐ Little better
- ☐ About the same
- ☐ Little worse
- ☐ Much worse
- ☐ Don't know

13. Is this city more/less polluted compared to your work/residential city?

- ☐ More
- ☐ Less
- ☐ Equal

Name your city:

.....

14. Do you know of any government sponsored initiative to tackle air pollution in the city?

- ☐ No
- ☐ Yes (please specify)

.....

15. What initiative must be taken to reduce air pollution in your area? (Tick more than one)

- ☐ Monitor and ban vehicles that fail emission tests and prohibit old vehicles from entering city
- ☐ Stronger and mandatory legal framework implemented by the government which prohibits industries, vehicles owners and others to emit pollutants into the air
- ☐ Shift the industries outside the city
- ☐ Government should establish air quality plans, short and long term plans that look at controlling emissions from all sectors
- ☐ Industry and power sector should adopt innovative and eco-friendly technologies for controlling and monitoring the release of emissions into the air
- ☐ Improve the quality of fuel and establish independent fuel quality testing mechanism
- ☐ Use of Electric or CNG vehicles instead of fuel running vehicles
- ☐ RWA to get involved in air pollution control

Other (Please Specify)

.....

16. What measures are you ready to take to reduce air pollution in your area? (Tick more than one)

- ☐ Use public transport/Carpooling more frequently
- ☐ Donate some money/time to organisations that works for improving Air Quality
- ☐ Better Waste Management Practices
- ☐ Planting more trees in your area and caring for them
- ☐ Spread awareness among friends and family

Appendix 3
List of Figures

Appendix 4
List of Volunteers

Aakash Arora
Sherin Kaul
Madhuri Marathe
Akanksha Singh
Navin
Shwetha Subramaniam
Manasi Rane
Dhara Savaliya
Dnyaneshwari S Pande
Aman Shaikh
Himani Sharma
Neha Jain
Swati Singh
Priyanka Jadon
Poonam Nalwade
Ishita Gupta
Pooja Rana
Asif Malik
Yesha Merchant
Keerthana
Saumya Rawat
Kumari Shivani Singh
Jaishree Dhyani
Nisha P Nair
Ashmita Anna Mathew
Medha Gayathri J Pai
Vanya Shukla
Esha Maria Anil
Bhooma Bhagat
Shivani Prajapati
Divyesh Parmar
Akanksha Khakse
Rajat S. Kakde
Onkar G. Phatnagre
Namita Verma
Heena Jadeja
Rumani Sengupta
Priya Srivastav
Vaishali Kutana
Neeha D'souza
Parina Ghodasara
Nirali Patel
Bicky Kuriappan
Pallavi
Lakshita Arya
Dhruva Chodankar
Simran Chandramohan Bagga
Veena Sameer Kamble
Vidhi Kiran Furia
Aishwarya Varadiya
Maya Parmar
Bhomika Parmar
Vaibhavi Naik
Gloria Christal L
Bhargavi Jayaram
Prajakta Vijay Manve
Shraddha Nagulwar
Bhagyasheree Kanerkar
Himayu Manohar Pawar
Pranali Rajesh Chhadi
Mismita Das
Thigulla Sai Sneha
Avni Pande
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