



**RESEARCH ARTICLE**

**A Study on Air Quality in Capital of India and Measures Required to Improve the Air Quality**

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**ABSTRACT**

*Air pollution is fundamentally the foreign substance in the air-can be manmade or arise naturally, in addition this, it is clustered where people are massed. Pollution is dangerous to health plus its prevention positions an economic load on the citizen. Further discharge cuts from automobiles, and transportation methods and programs will be extra problematic to achieve, but the challenge has been displayed. The choice is up to the community as to whether there shall be clean air for each and every one- and at what cost. Air pollution has been a threat in current years causing significant dangers to environmental and societal safety. Government, authorities and industry have been at the front position to confront air pollution with the support of strategy restructuring and scientific innovation. Paper highlights air pollution status all over the world and various measures taken worldwide. It displays status of air quality in Delhi and aims at coming up with more measures to reduce air pollution.*

**Keywords:** Air quality, Pollution, Social value

**INTRODUCTION**

There's nothing justly like opening the door and inhaling clean, fresh, air- however how dirt-free is the air you're inhaling right now? Except you're an expert with a chemistry laboratory, there's no actual means of knowing. The airs you're pulling up via your nose could be gradually slaying you: according to the World Health Organization, about *two million* individuals expire too early from the consequences of contaminated air every year. Pollution is nowadays a common term, that we are familiar to. We listen about the numerous types of pollution and read about it via the media. Air pollution is a considerable problem—and not only for individuals existing in smog- clogged cities: by means of such things like global warming plus harm to the ozone layer, it also has the capacity to have an effect on us all. Speedy urban progress and industrial development has tainted urban environment. Out of several urban ecosystem components impact on ambient air quality is more perceptible.

WHO reported the 2014 data about overall air contamination with certain troubling locates. The database eyed at the air contamination levels of- 1600 cities throughout 19 countries through a reading named PM10 and PM2.5. PM2.5 is trusted the best pointer of measuring wellbeing impacts from air contamination other than examines the centralization of little particulate contamination of 2.5 micrometers generally less in breadth (PM2.5). These components potentially be smoke, dust, or dust and their little size causes the real risks to human wellbeing since they can be taken in and heaped up in the respiratory framework. WHO tells there is no safe level of PM2.5

Below are the 10 most extreme contaminated nations on the globe.



Fig. 1: Most extreme contaminated nations on the globe.

Central Pollution Control Board (CPCB) in the first week of February 2016 published National Air Quality Indices (NAQI) for 24 cities. The AQI published with a color code and a numerical value will help in comparing pollution levels in each cities.

The NAQI is determined on the basis of concentration of eight pollutants, including Particulate Matter (PM<sub>2.5</sub> fine, respirable particles), Sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), ozone (O<sub>3</sub>), ammonia (NH<sub>3</sub>) and lead (Pb).

The national capital Delhi was coded as 'very poor'.

As per the World Health Organization (WHO), Delhi is the most polluted city in the world in terms of air pollution. In fact, air pollution in Delhi is 12 times higher than

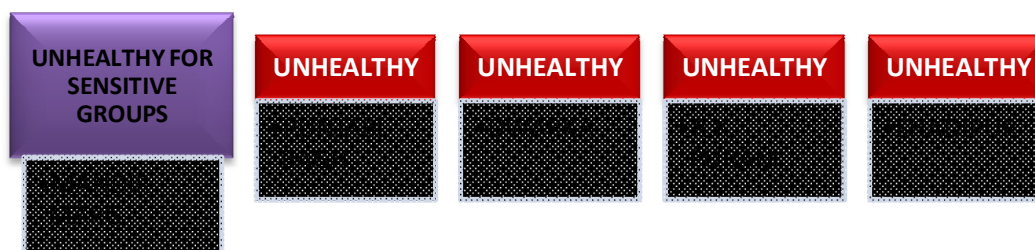


Fig. 2: WHO standards

While it might be easy to blame this on increased use of vehicles, industrial production or a growing population, the truth is that Delhi is a toxic pollutant punchbowl with myriad ingredients, all of which need addressing in the round.

### SIGNIFICANCE

While extensive scale industrialization builds the generation of material products and urbanization makes super urban communities, the evil impacts of these exercises are reflected as different natural issues. One such issue is the weakening of urban air quality in India and other creating nations. The principle contributing variables to air contamination are the staggering convergence of vehicles, poor transport framework and the foundation of commercial enterprises in urban agglomerations.

In developing nations, in any case, not very many investigations of this sort have been directed as such. The proposed study is an endeavor to discover more steps that can be taken to decrease air contamination and advantage the general population of Delhi in India.

## OBJECTIVES

**Primary:** To find out and develop more methods to reduce increasing air pollution in Delhi and know what more can be done by government to make people aware and motivate people of Delhi to participate in this cause.

**Secondary:**

1. To study what all steps are being taken all over the world to curb air pollution?
2. To identify the factors contributing to air pollution in Delhi.
3. To find how much people in Delhi are aware of increasing air pollution.
4. To understand the opinions of Delhi public on steps towards clean air.
5. To understand the opinions of Delhi public on steps towards clean air.

## LITERATURE REVIEW

### Valuation of Urban Air Pollution: A Case Study of Kanpur City in India

Content: Amongst the diverse types of air impurities, suspended particulate matter (SPM), especially Reparable Suspended Particulate Matter (RSPM), is known as the utmost significant in terms of health consequences. It can pass through bottomless into the breathing tract plus source an upsurge in cardiac respiratory diseases, even death; add to regular occurrence of respiratory indications; and cut respiratory lung task in children and adults. These disorders instigate operative limits as imitated by hammering work days, absenteeism from school, obstructive activity days, plus a rise in the appointments with doctor plus emergency rooms for serious asthma and added respiratory disorders.

**1. <http://www.thebetterindia.com/45195/isro-scatsat-to-predict-cyclones/>**

Content: Pollution being a progressively critical health worry in metropolitan area, it has converted into crucial to move our mass civic transport arrangement from fossil fuel to non-fossil fuel. By way of a publically accountable body, we suppose that electric bus would be an appropriate key we could bid," said Executive Director of JBM Group, Nishant Arya

**2. <http://www.dw.com/en/make-in-india-policy-could-increase-air-pollution-woes/a-18366909>, VANDAN SHIVA (ENVIRONMENTALIST)**

Content: The air quality index only allow us to know where air pollution levels stand. It is the equal to exercising a thermometer to take the temperature of somebody who is ill, to see how extreme the fever is. The thermometer does not tell the finding of the reason for fever, not the medication to bring it down. The air quality index by its own will not get the pollution down. Other strategy is required for that.

## RESEARCH METHODOLOGY

**SOURCES OF DATA COLLECTION**-The research will be based on:

1. **PRIMARY DATA:** for collecting the primary data, an open-ended questionnaire will be constructed which would be given to different people with different age groups, profession and gender and telephonic interviews will be done.
2. **SECONDARY DATA:** for theoretical overview, secondary data will be collected from different research papers, websites, newspapers and articles.

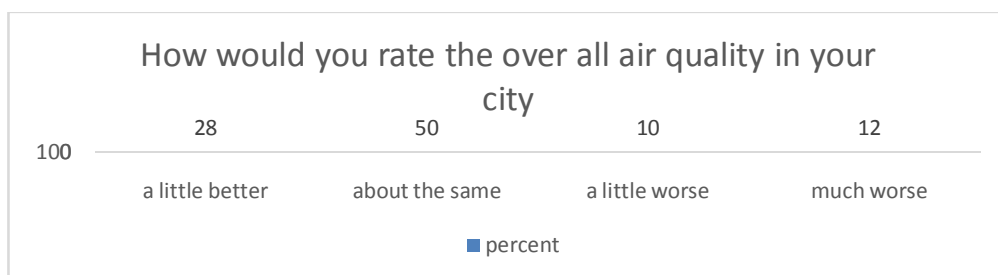
## RESEARCH DESIGN

This research is an Applied Research. It tries to find out how things can be changed. The research design for this research is descriptive as we will gather data from questionnaire responses.

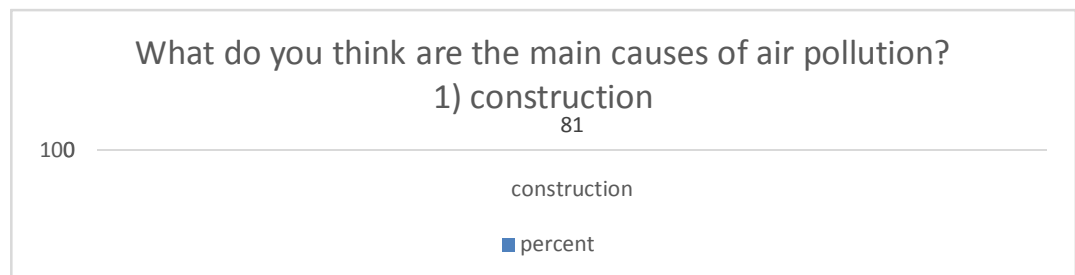
## SAMPLE SIZE AND SAMPLING DESIGN

Sample size- The sample size is restricted to 100. The sample for the research is categorized as auto drivers, bus drivers, environmentalists and general public of Delhi. The sample size would be 100, which would include auto drivers, environmentalists, scientist, NGO and general public. The Sampling Technique used in this research is Probability sampling, as the people to be questioned are decided already.

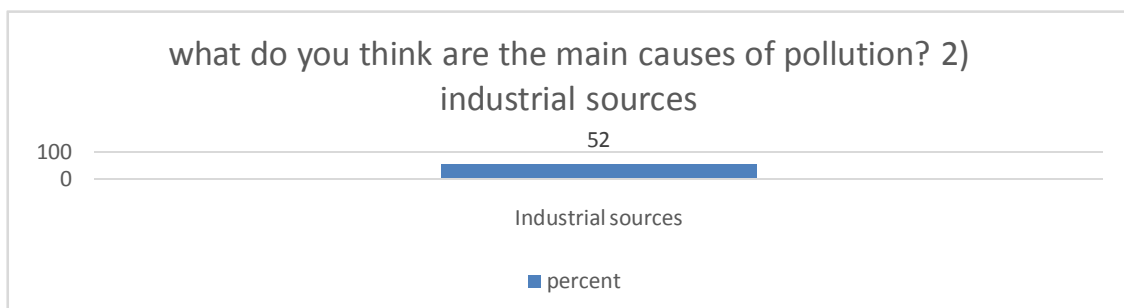
## DATA ANALYSIS



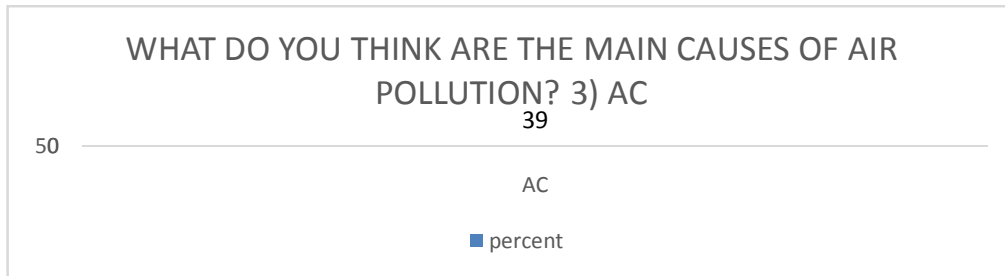
**Fig. 3:** INTERPRETATION: 50% respondents concurred that the general air quality in Delhi when contrasted with a year ago seems to be "About the same".



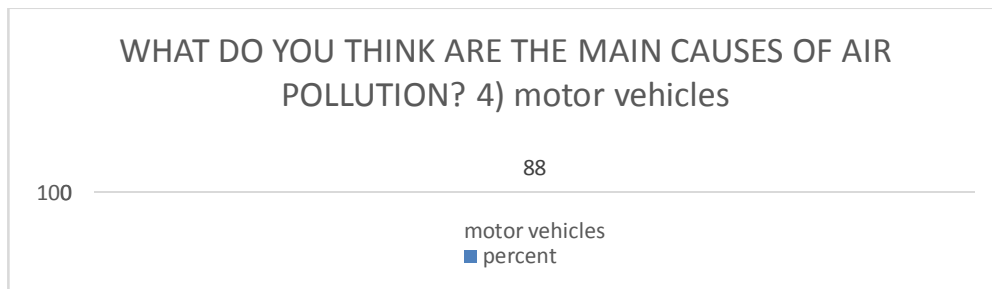
**Fig. 4:** INTERPRETATION: 81% of the respondents says that CONSTRUCTION is one of the main causes of air pollution.



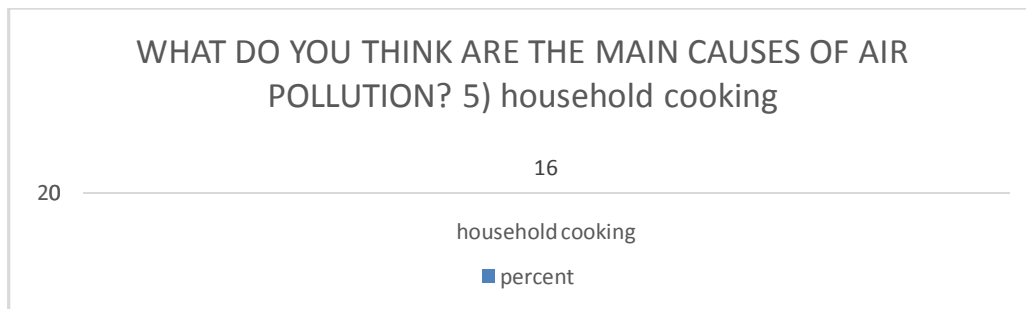
**Fig.5:** INTERPRETATION: 52% respondents says that INDUSTRIAL SOURCES are one of the primary driver of air contamination



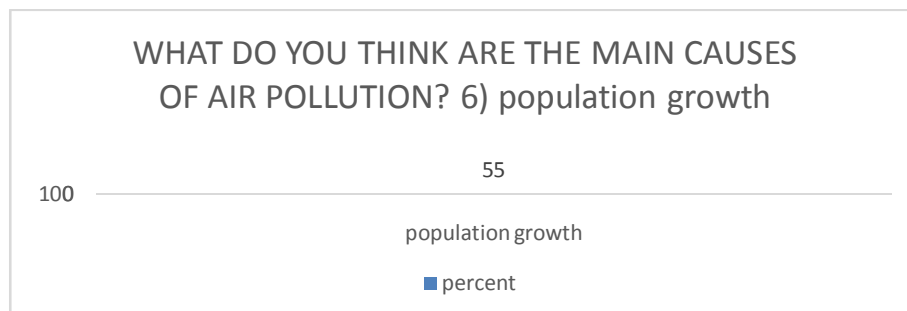
**Fig. 6:** INTERPRETATION: 39% respondents says that AIR CONDITIONERS are one the fundamental driver of air contamination.



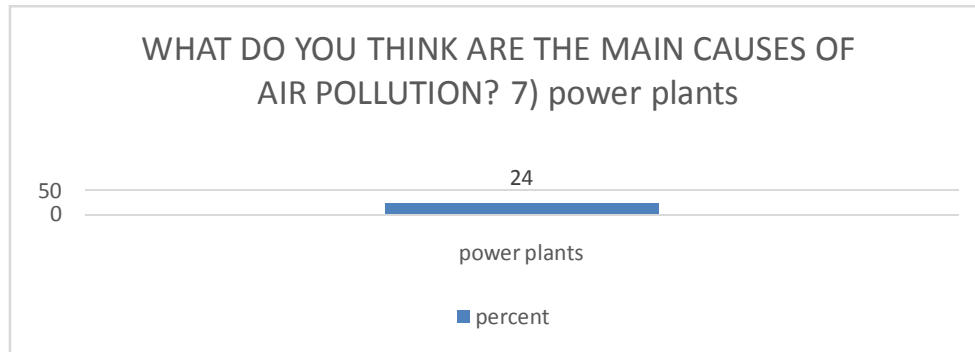
**Fig. 7:** INTERPRETATION: 88% of the respondents says that MOTOR VEHICLES are on the fundamental driver of air contamination.



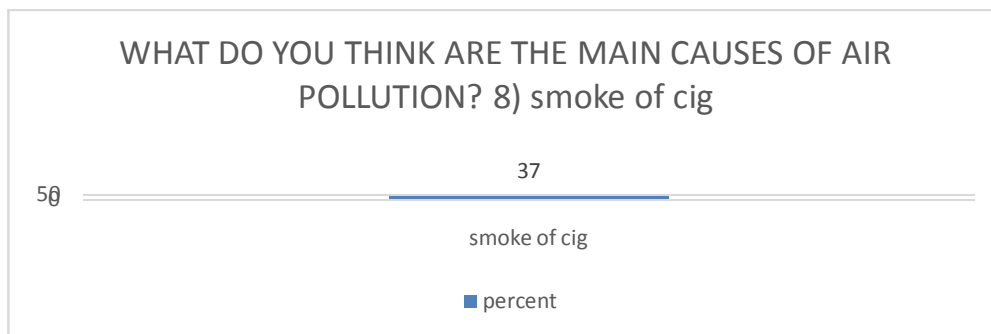
**Fig. 8:** INTERPRETATION: 16% respondents says that HOUSELHOLD COOKING is one of the primary driver of air contamination.



**Fig. 9:** INTERPRETATION: 55% respondents says that POPULATION GROWTH one of the primary driver of air contamination.



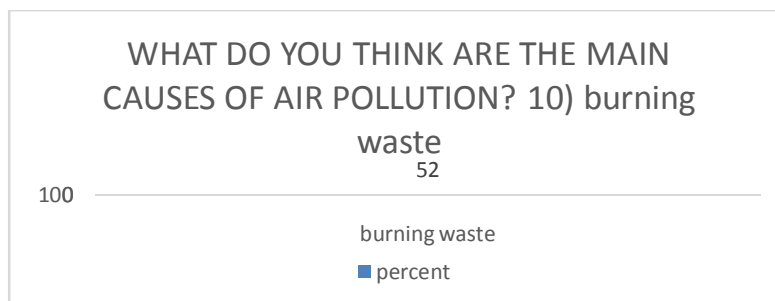
**Fig. 10:** INTERPRETATION: 24% respondents says that POWER PLANTS is one of the primary driver of air contamination.



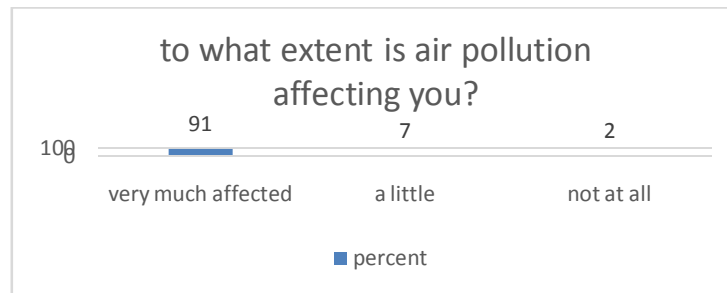
**Fig.11:** INTERPRETATION: 37% respondents says that SMOKE OF CIGARETTES is one of the primary driver of air contamination.



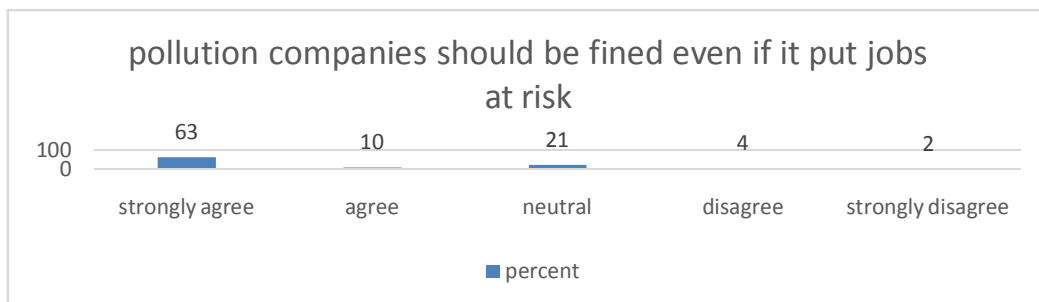
**Fig.12:** INTERPRETATION: 52% respondents says that WASTE DISPOSAL is one of the primary driver of air contamination.



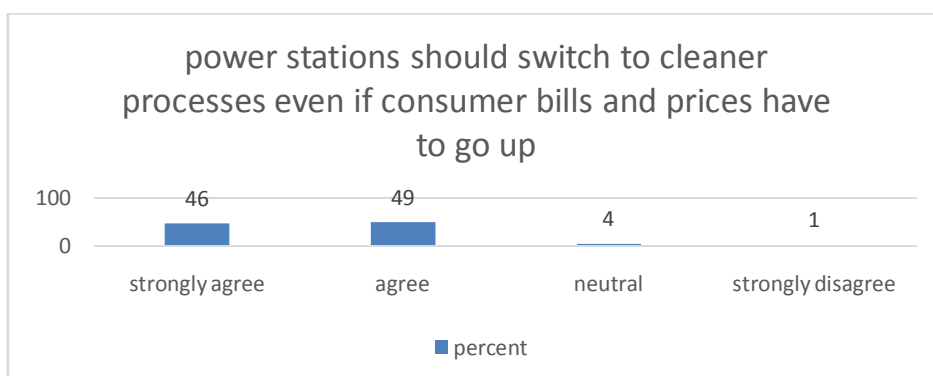
**Fig.13:** INTERPRETATION: 52% respondents says that BURNING WASTE is one of the primary driver of air contamination.



**Fig.14:** INTERPRETATION: 91% respondents says that they are VERY MUCH AFFECTED by the air pollution. 7% of the respondents says that they are A LITTLE affected by the air pollution. 2% of the respondents says that they are NOT AT ALL affected by the air pollution.

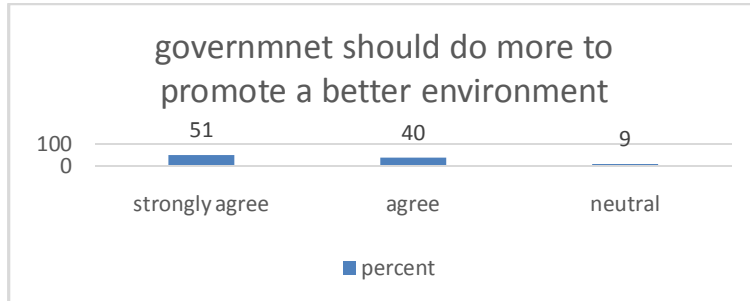


**Fig.15:** INTERPRETATION: 63% respondents STRONGLY AGREE to the statement that - Polluting organizations ought to be fined regardless of the possibility that it puts a few jobs at danger. 10% AGREE to the statement that - Polluting organizations ought to be fined regardless of the fact that it puts a few jobs at danger. 21% of the respondents are NEUTRAL to the statement that-Polluting organizations ought to be fined regardless of the possibility that it puts a few employments at danger. 4% of the respondents DISAGREE to the statement that-Polluting organizations ought to be fined regardless of the possibility that it puts a few employments at danger. 2% of the respondents STRONGLY DISGAREE to the statement that-Polluting organizations ought to be fined regardless of the fact that it puts a few employments at danger.

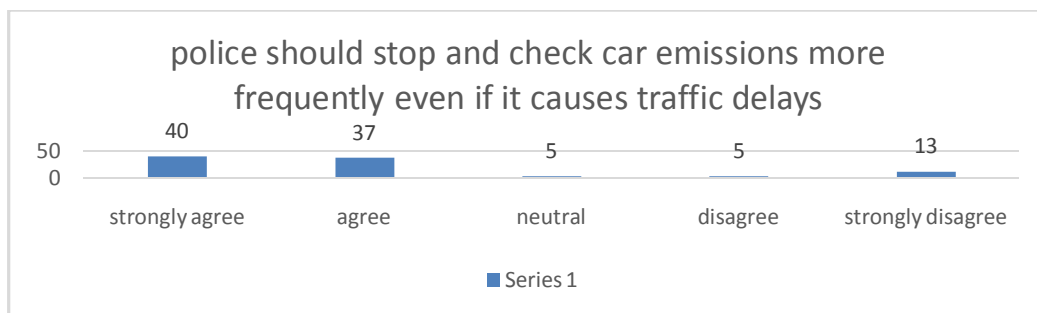


**Fig.16:** INTERPRETATION: 48% respondents STRONGLY AGREE to the statement that - Power stations and manufacturing plants ought to change to cleaner procedures regardless of the fact that customer bills and costs need to go up. 49% AGREE to the statement that - Power stations and production lines ought to change to cleaner procedures regardless of the fact that customer bills and costs need to go up. 4% respondents are NEUTRAL to the statement that-Power stations and industrial facilities ought to change to cleaner procedures regardless of the possibility that

customer bills and costs need to go up.1% respondents STRONGLY DISGAREE to the statement that-Power stations and plants ought to change to cleaner procedures regardless of the possibility that purchaser bills and costs need to go up.



**Fig.17:** INTERPREATION: 51% respondents STRONGLY AGREE to the statement that - Government ought to accomplish more to advance and empower a superior environment.40% AGREE to the statement that - Government ought to accomplish more to advance and support a superior environment.9% respondents are NEUTRAL to the statement that-Government ought to accomplish more to advance and energize a superior situation.



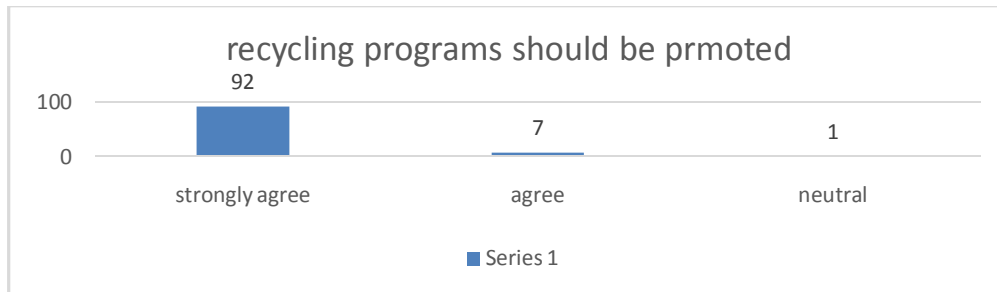
**Fig.18:** INTERPREATION: 40% respondents STRONGLY AGREE to the statement that - Police ought to stop and check auto discharges all the more as often as possible regardless of the possibility that it causes traffic delays.37% AGREE to the statement that - Police ought to stop and check auto outflows all the more much of the time regardless of the possibility that it causes traffic delays.5% respondents are NEUTRAL to the statement that-Police ought to stop and check auto emanations all the more every now and again regardless of the fact that it causes traffic delays.5% respondents DISAGREE to the statement that-Police ought to stop and check auto emanations all the more as often as possible regardless of the fact that it causes traffic delays.13% respondents STRONGLY DISGAREE to the statement that-Police ought to stop and check auto outflows all the more regularly regardless of the fact that it causes traffic delays



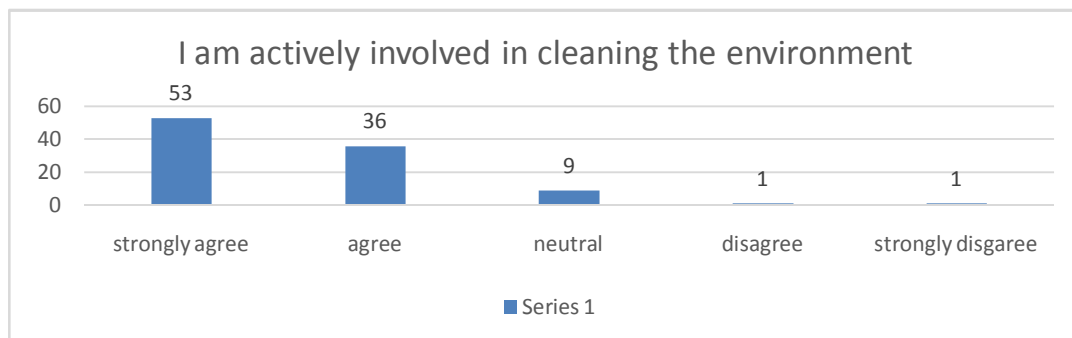
**Fig.19:** INTERPREATION: 85% respondents STRONGLY AGREE to the statement that - Improving the environment is the obligation of each citizen.14% AGREE to the statement that - Improving the



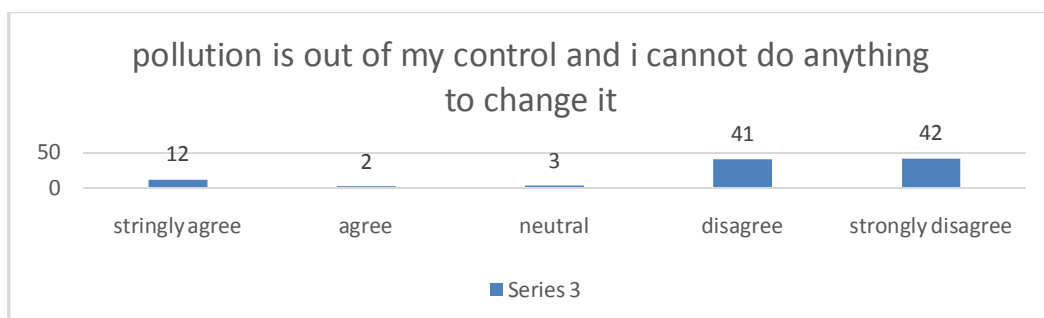
environment is the obligation of each native. 1% respondents STRONGLY DISGAREE to the statement that-Improving the environment is the obligation of each citizen.



**Fig.20: INTERPREATION:** 92%of the respondents STRONGLY AGREE to the statement that - Recycling program should be put in place and promotes across the whole city.7% AGREE to the statement that - Recycling program should be put in place and promotes across the whole city.1% of the respondents are NEUTRAL to the statement that- Recycling program should be put in place and promotes across the whole city.

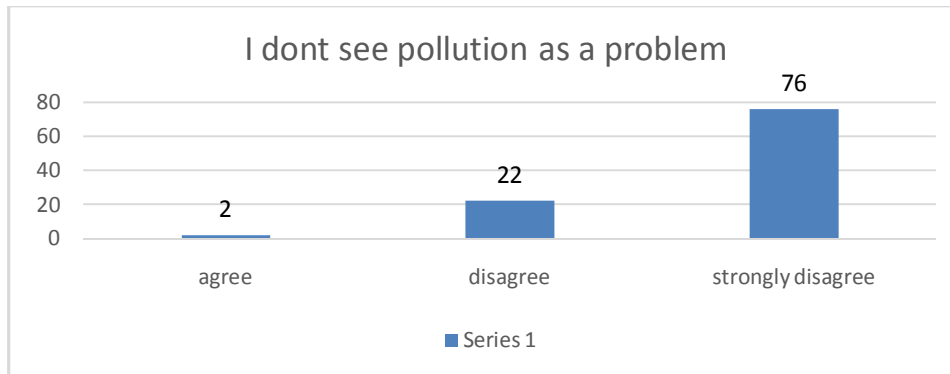


**Fig.21: INTERPREATION:** 53%of the respondents STRONGLY AGREE to the announcement that - I am effectively included in tidying up the environment.36% AGREE to the announcement that - I am effectively included in tidying up the environment.9% of the respondents are NEUTRAL to the announcement that-I am effectively included in tidying up the environment.1% of the respondents DISAGREE to the announcement that-I am effectively included in tidying up the environment.1% of the respondents STRONGLY DISGAREE to the announcement that-I am effectively included in tidying up nature.

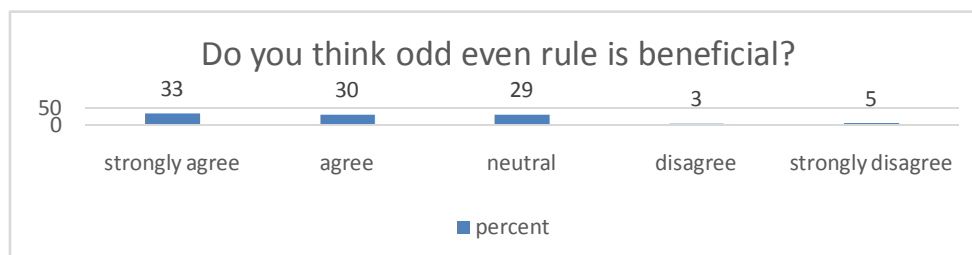


**Fig.22: INTERPREATION:** 12% respondents STRONGLY AGREE to the statement that - The contamination is out of my control and I can't do anything to improve it.2% AGREE with the statement that - The contamination is out of my control and I can't do anything to improve it.3% respondents are NEUTRAL to the statement that-The contamination is out of my control and I can't do anything to improve it.41% respondents DISAGREE with the statement that-The contamination

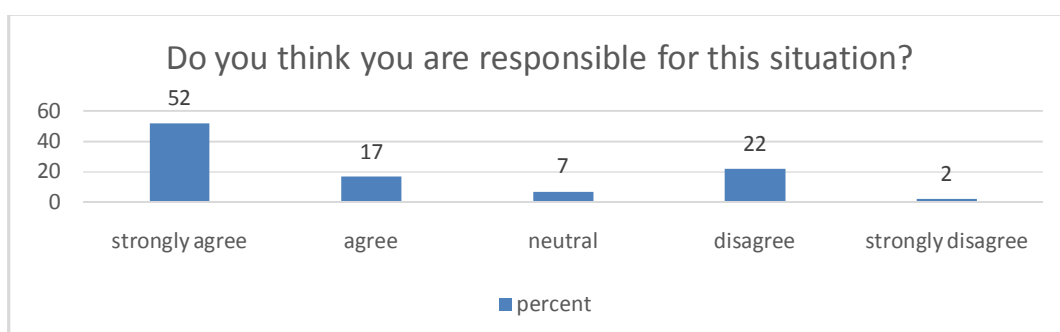
is out of my control and I can't do anything to change it. 42% respondents STRONGLY DISGAREE to the statement that-The contamination is out of my control and I can't do anything to improve it.



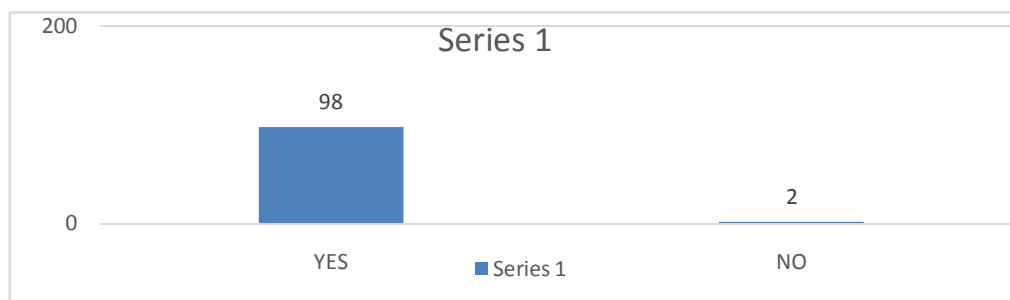
**Fig.23:** INTERPREATION: 2% AGREE with the statement that - I don't see the contamination as a problem.41% of the respondents DISAGREE with the statement that-I don't see the contamination as a problem.42% respondents STRONGLY DISGAREE with the statement that-I don't see the contamination as an issue.



**Fig.24:** INTERPREATION: 33%of the respondents STRONGLY AGREE that ODD EVEN IF BENEFICIAL. 30% of the respondents AGREE that ODD EVEN is beneficial. 29% of the respondents are NEUTRAL to the statement that- ODD EVEN is beneficial. 3% of the respondents DISAGREE to the statement that- ODD EVEN is beneficial.5% of the respondents STRONGLY DISGAREE to the statement that- ODD EVEN is beneficial.



**Fig.25:** INTERPRETATION: 52% of the respondents STRONGLY AGREE that they are responsible for the situation. 17% of the respondents AGREE that they are responsible for the situation.7% of the respondents are NEUTRAL to the statement that- They are responsible for the situation. 22% of the respondents STRONGLY DISAGREE that they are responsible for the situation. 2% of the respondents STRONGLY DISAGREE that they are responsible for the situation.



**Fig.26:** INTERPREATION: 98% of the respondents are willing to play any role in improving the air quality situation.2% of the respondents are not willing to play any role in improving the air quality situation.

### INFERENCES

From the data obtained from the questionnaire responses we can draw the following inference:

1. Most of the people believe that the air quality of Delhi is still the same as compared to last year.
2. The biggest contributors to air pollution according to most people are: Construction, industrial sources, population growth, waste disposal and burning of waste and motor vehicles.
3. Maximum people are highly affected by Air Pollution. Air Pollution is a great concern for them.
4. Most of the people support the idea that polluting companies should be fined.
5. Maximum people believe that Power stations and factories should switch to cleaner processes and for this they don't mind even if their consumer bills go up.
6. Most people support that Government should encourage and promote better environment.
7. According to most of the people Police should stop and check car emissions more frequently even if it causes traffic delays.
8. Maximum people agree that it is the duty of every citizen to save the environment.
9. Recycling programs are supported by maximum people.
10. Most of the people believe that they are actively involved in cleaning the environment.
11. Pollution is of great concern to most of the people.
12. Many people are ready to take active part in cleaning the environment.
13. ODD – EVEN rule is supported by maximum people and believe that it's beneficial.
14. More than half of the respondents agree that they are responsible for increasing air pollution.
15. Almost all the people are ready to play any role in improving the air quality.
16. Some people are ready to pay more taxes for clean air but still there are some people who don't want to pay more taxes.

### RECOMMENDATIONS

1. First and Foremost every citizen must contribute to control situation at their own level. Respect>Reduce>Reuse>Recycle>Restore We need to respect the nature, when we do so truly, we will start reducing our needs, and to still cater our needs we start reusing things, and then we have lesser left to recycle, and doing these four things we are able to restore the natural resources more effectively. This theory applies to equally to natural resources and knowledge. Activities like Plantation of more and more trees, less use of motor vehicles for nearby places, use of bicycles at least a week , adopting carpooling, indulge in recycling programs, following government rules, making sure other citizens also follow the rules and spreading awareness as charity starts at home . People need to be engaged and involved in community activities and change process, that's only when they really empathize with the situation. Action learning will help.
2. Government before imposing any rule should make sure that every citizen know and is aware of harmful effects of air pollution. People should know the consequences of their steps. Government

should try to get inner motivation from citizens so that they follow rules sincerely. Otherwise people just find ways to get away with the restrictions and try to break them for their comfort. Government should try encourage participation from public. More recycling programs should be implemented. Administration should come up with activities that can involve citizens for e.g. small activities in different societies which involve spreading the awareness.

A rich Nation is one where its people are proud of using its public transport. Strengthen it! Public transportation should be improved.

- Office buses should be promoted that can accommodate at-least 50 employees from the same route.

- Promote use of CNG vehicles, hybrid vehicles and use of cycles for shorter distances.

- Switch to cleaner modes of transport. Checking of vehicular emissions should be done.

- Carpooling. Resorting to carpooling by daily commuters will go a long way to achieve desired results in this direction owing to the following advantages:

a) reduced number of vehicles will result in corresponding reduction in vehicular emissions thus causing lesser air pollution.

b) huge saving on fuel and thus money spent in this process.

c) reduced travel time due to lesser traffic density, mitigating the car parking problem.

d) time spent on driving can be better utilized in constructive and meaningful activities such as reading, replying to e-mails etc. or just relaxing rather than spending that much time under constant tension and attention behind the steering wheel.

ODD-EVEN. Less Traffic > Saves time > saves fuel - Win-Win situation. The scheme can be supported by enhancement in public transport systems.

Administration should design a transport network which would include many adjustments and reasoning of choices: picking and integrating modes; upgrading of the existing network; filling significant gaps; incentivizing use of public transport by imposing tolls and taxes; subsidizing certain fuels; outlining regulations for decreasing emissions like efficiency criteria or driving restrictions like the odd-even formula.

Delhi's pollution issue won't be sincerely addressed till ultra-clean electric/hydrogen civil transport turn into the norm and the city's metro structure is significantly extended.

**1. WASTE DISPOSAL.** Burning of MSW (Municipal Solid Waste) in Delhi is extensive and adds to Delhi's air. "This discharge is anticipated to be outsized in the areas of economically lower divisions of the society which do not have appropriate arrangement for pooling and discarding of MSW. Complete ban on burning of MSW should be executed. Rigid measures that halt the burning of agriculture and roadside waste. Specialists consider that in place of burning the wastes in open, technologies are nowadays accessible that cost-effectively transforms the waste into either one power or biofuel. I recommend this will not only tackle pollution problems, but also support with India's energy security. To progress such know-hows, strict policy procedures are required. In the short term, transforming agriculture waste to electrical energy would be a good way out. Moist agriculture waste can be utilized to supply bio-energy. Cellulosic biofuel also named next generation biofuel can not only transform waste into a creation that would drive cars with no engine adjustments, it would cut India's huge oil import bill, and deliver added income to farmers. To promptly enhance this technology in India, the administration will need to offer policy incentives, just like USA.

**2. ROAD DUST.** Road dust is one of the biggest contributors to air pollution. If vehicular emissions are the priority for Delhi's government than road dust should be on the second place on that list. SWATCH BHARAT ABHIYAN was launched all over India. I strongly recommend that this campaign should be highly motivated across India and each and every citizen participation should be

encouraged. This campaign should be made compulsory in school and colleges. Cleanliness starts from home. This one step towards cleanliness will make the SWATCH BHARAT a reality.

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