



# **Knowledge, Attitude and Awareness on Effect of Air Pollution on Children among Parents**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. Author AK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author GD managed the analyses of the study. All authors read and approved the final manuscript.*

## **Article Information**

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## **ABSTRACT**

**Introduction:** The World Health Organisation [WHO] recommended that breathing clean air reduces the risk of diseases such as Asthma and Lung cancer. Inhaling low quality of air causes several health problems such as headaches, nausea and tiredness. The main aim of this study is to create awareness among parents about the effect of air pollution on children.

**Materials and Methods:** This is a cross sectional survey study. The standard questionnaire was prepared and distributed as Google forms to nearly 100-120 parents. The population was randomly selected. A self-administered structured questionnaire was prepared based on Knowledge attitude and awareness on effects of air pollution on children among parents. It was circulated to participants through an online platform (google forms). The statistics were done using SPSS software, chi square test was used to check the association and P value of 0.05% was said to be statistically significant.

**Results:** 78.53% of the populations were aware that air pollution affects cognitive ability. 50.98% of the population responded that exposure of polluted air to pregnant female's cause's premature birth. 45.28% of females were aware that air pollution affects neuron development in the brain. As

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a result of this study most of the parents were aware about air pollution and its effects on their children.

**Conclusion:** In this study females were slightly more aware about air pollution than males. If this awareness persists among all the people in the society many harmful effects such as air pollution and other related problems can be solved.

*Keywords: Knowledge; attitude; air pollution; children; parents.*

## 1. INTRODUCTION

Air pollution is the presence of some toxic or presence of some gases in excess amount or presence of particulate matter in air. The main cause of air pollution is the use of fossil fuels, industrial emissions. The pollution by the use of fossil fuels is demonstrated by many western countries [1,2]. There are effects of air pollution on cardiovascular and respiratory systems. Composition of air pollution differs by various parameters such as emission rate, source, sunlight and wind. Gaseous components of air pollution are Carbon Monoxide[CO], Sulphur Dioxide[SO<sub>2</sub>], Nitrogen Dioxide[NO<sub>2</sub>], ozone [O<sub>3</sub>] [3-5].

Carbenous part of air is called particulate matter which is adsorbed with organic chemicals and reactive elements. Components of PM are polycyclic aromatic hydrocarbons, endotoxin, nitrates, sulphates. Metals and Zinc, Vanadium, Nickel, Copper, Iron [4-6]. Particulate matters are classified accordingly: coarse [PM<sub>10</sub>.diameter < 10 microns], fine [PM<sub>2.5</sub>.diameter < 2.5 microns], ultra fine [PM<sub>0.1</sub>.diameter < 0.1 microns]. Coarse are obtained by numerous natural and artefecant sources and cannot penetrate the upper branches. Fine and Ultra fine particles are released by the combustion of petroleum, diesel and natural gas so called fossil fuels [7,8]. As their sizes are too small, they penetrate small airways and settle on alveoli causing many respiratory diseases such as Asthma and the toxic metals have numerous effects on the cardiovascular system and the location where they are transferred [9,10].

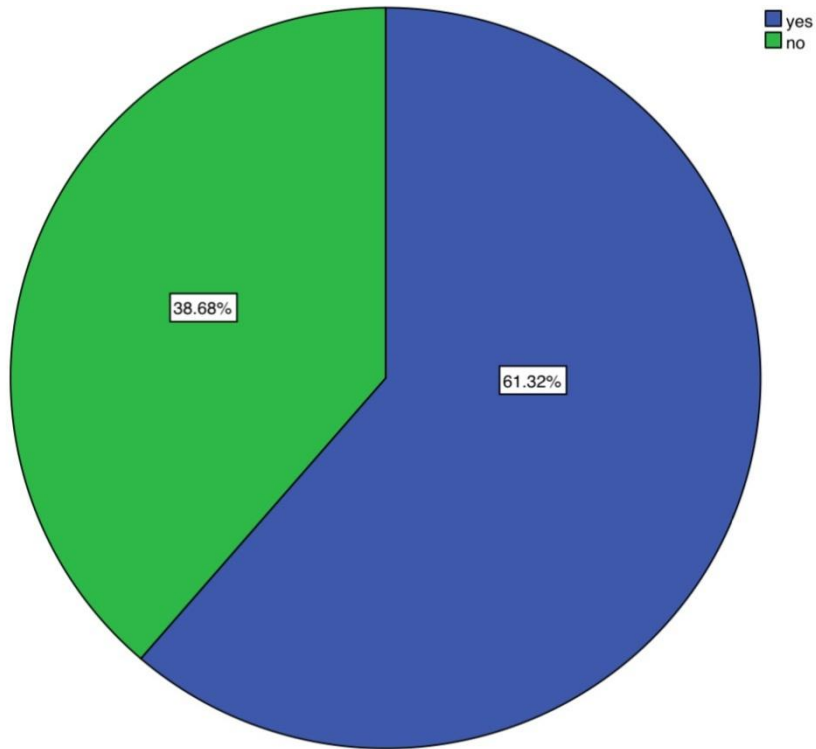
The effects of air pollution on children are high in recent years. Children often fall as prey to air pollution. Mothers inhaling polluted air at the time of pregnancy can lead to foetal loss. Children are more prone to many dangerous health effects due to their immature immune system, high minute ventilation, longer time they spend outdoors, involvement in vigorous activities and mainly due to their developing lungs [11,12].

There are various literatures which have shown an association between exposure to certain air pollutants and morbidity and mortality outcomes in children [13,11]. Ambient levels of air pollution caused adverse pregnancy outcomes such as premature birth, intrauterine death, growth retardation, abnormal birth length and low birth weight [10]. Our team has extensive knowledge and research experience that has translate into high quality publications [14–18].

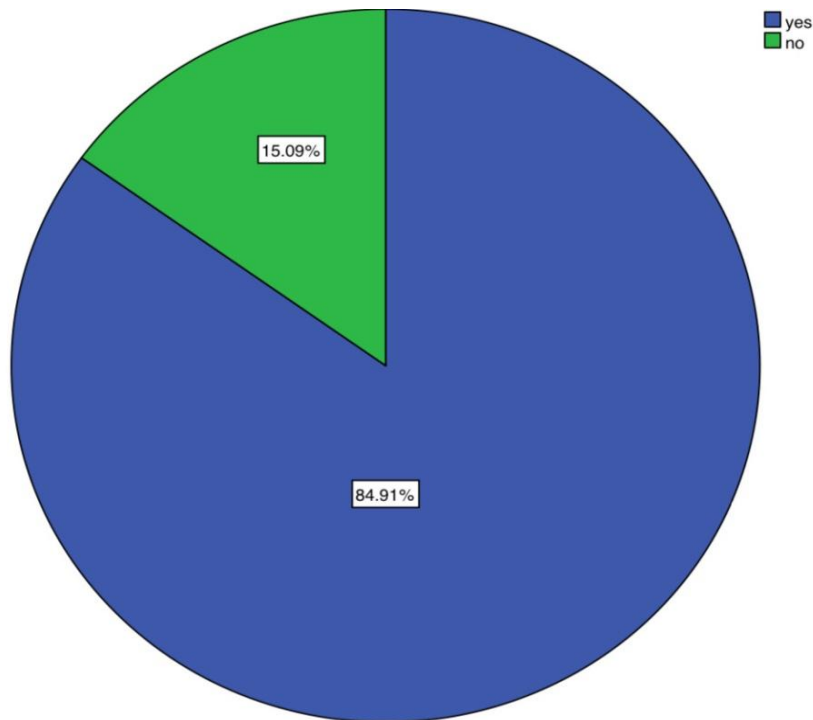
Air pollution causes increased risk of vitamin D deficiency rickets, altered immunity, adverse respiratory health outcomes and increased risk of birth defects. Our team has extensive knowledge and research experience that has translated [19] into high quality publications. The aim of this study is to create awareness of air pollution on children among the parents to prevent many future health related problems.

## 2. MATERIALS AND METHODS

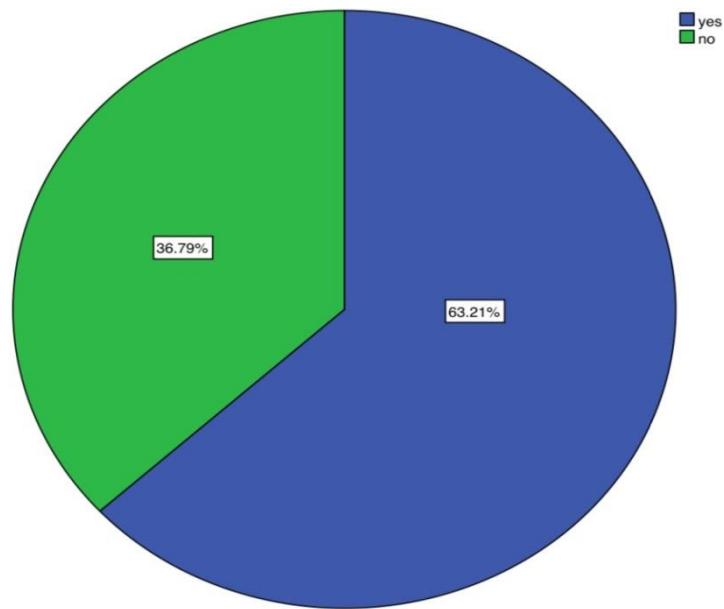
This is a cross sectional survey study. The standard questionnaire was prepared and distributed as Google forms to nearly 100-120 parents. The population was randomly selected. This survey was conducted in February 2021. The questionnaire mainly deals with the effects of air pollution on children. The pros for this study are that online surveys are easy to reach people. People get ideas about air pollution and online surveys help with easy selection of a random population. The disadvantage of this study is limited to a smaller geographic area. Some homogeneous study populations were selected and questionnaire error options are present. The data is statistically analyzed by using SPSS software version 23. The independent variables are height, weight, gender, tone. The dependent variables are education, profession, food habits, occupation, age and area of living. Type of analysis used is descriptive analysis. Chi square test was used to check the association and P value of <0.05 was said to be statistically significant.



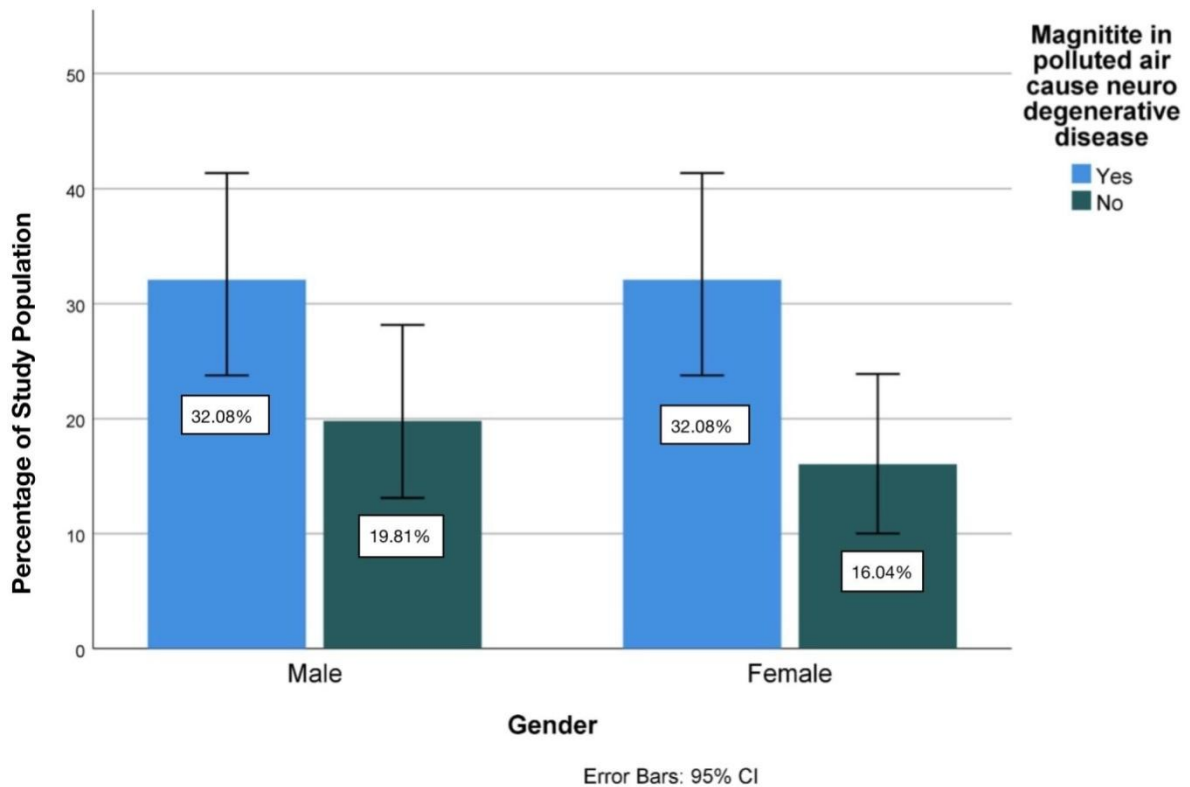
**Fig. 1. Pie chart showing the percentage distribution of participants' knowledge on neurodegenerative disease. 61.32% answered yes [blue] while 38.68% answered no [green]**



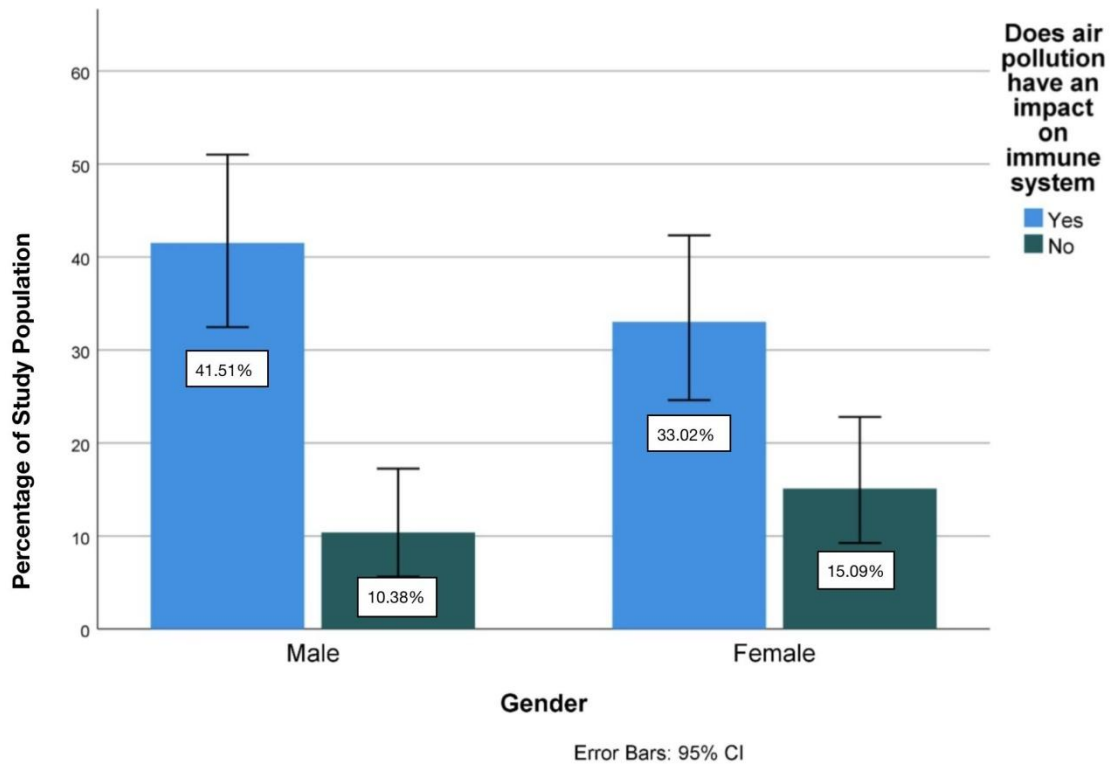
**Fig. 2. Pie chart showing the percentage distribution of participants' knowledge on the effect of air pollution on neuron development in the brain. 84.91% answered yes [blue] while 15.09% answered no [green]**



**Fig. 3. Pie charts showing the percentage distribution of participants' knowledge on air pollution causes lower respiratory infection. 63.21% answered yes [blue] while 36.79% answered no [green]**



**Fig. 4. The bar graph showing association between gender and air pollution causes neurodegenerative diseases. X axis represents the gender and Y axis represents the number of responses. The blue color denotes Yes and green color denotes no. Females were more aware that air pollution causes neurodegenerative diseases than males. Chi square test showed p value was 0.002 (<0.05), which is statistically significant**



**Fig. 5. The bar graph showing association between gender and air pollution has an impact on immunity. X axis represents the gender and Y axis represents the number of responses. The blue color denotes yes and green color denotes no. Females were more aware that air pollution has an impact on immunity than males. Chi square test showed p value was 0.113 (>0.05), which is statistically insignificant**

### 3. RESULT AND DISCUSSION

About 59.43% of the population responded that there were more trees in their locality. 61.32% of the respondents are aware that magnetite in polluted air causes neurodegenerative disease [Fig. 1]. Vegetation acts as a barrier for air pollution. Different plant species or combinations of plant species helps in removal of pollutants in air [20,21]. 84.9% of the population responded yes as they were aware that air pollution imparts neuron development in the brain [Fig. 2]. Animal models exposed to air pollution caused RNA, DNA changes and degradation and early hallmarks of Parkinsons and Alzheimers disease [22,23]. 63.21% of the population responded yes as household ambient air pollution causes lower respiratory disorder [Fig. 3]. 73.58% of the respondents answered yes as air pollution affects cognitive ability. Cognitive impairment is a main concern in old population changes that occur 15-20 years prior to symptoms [6–8,24–26,27]. 76.42% were aware that air pollution affects lung development. 71.70% of the respondents were cautious that high exposure to

air pollution causes cardiovascular disease. 50.94% of the population responded yes that pregnant women exposed to air pollution gave birth prematurely. 55.66% of the population responded yes that air pollution affects behaviour. 68.98% of the population responded that air pollution affects neuron communication. Mechanically air pollution affects neurons in the nervous system through a variety of cellular, molecular and various inflammatory pathways [28]. 71.70% of the population responded that air pollution causes cardiovascular disease. 50.94% of the people responded that air pollution affects child birth in pregnant women [25,29]. The relation between particulate matters in cardiovascular disease increased the cardiovascular death after acute exposure to air pollution [30]. 50.94% of the population who responded was females. Females were more aware that air pollution causes neurodegenerative diseases than males [Fig. 4]. Females were more aware that air pollution affects thinking skills. Females were more aware that air pollution affects the immune system [Fig. 5]. 63.21% of the population responded that

household ambient air pollution causes lower respiratory disorders [31,32]. Mental health is impacted by air pollution [24,33]. Human behavioral response is affected by air pollution. Behavioral changes are anxiety, anger, stress and tension [34,35,36,37,32,38]. Males were more aware that pregnant women inhaling polluted air gave birth prematurely. Males are more aware that air pollution affects motor and mental ability. Females are more aware that household ambient air pollution causes lower respiratory disorder. Males are more aware that air pollution has an impact on lung development. Males were more aware that polycyclic aromatic hydrocarbons decrease neuron communication in the brain. 68.98% of the population responded that air pollution affects motor and mental ability.

The study is limited to a smaller population. In future it should be expanded to a large population as this helps in the awareness of air pollution on children among parents. To reduce air pollution only protocols and acts won't help; we ourselves should have a thought on the effects of air pollution on us and our family and reduce the use of fossil fuels and other pollutants. In the future this study can be done on a large population to create awareness of air pollution among children.

#### 4. CONCLUSION

In this study females were slightly more aware about air pollution than males. If this awareness persists among all the people in the society many harmful effects such as air pollution and other related problems can be solved.

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- Saveetha University.

#### CONSENT

As per international standard, parental written consent has been collected and preserved by the authors.

#### ETHICAL APPROVAL

It is not applicable.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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