

Awareness and Perceptions of Residents of Port Harcourt on Health Effects of Pollutants from Vehicular Emissions

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Abstract

Original Research Article

Air pollution comes mainly from four main sources namely; vehicular emissions, industrial activities, domestic cooking, and tobacco smoking. The increasing high volume of road traffic and congestion is a fundamental issue in Port Harcourt metropolis. The degradation of air quality arising from these is another serious dimension of the problem. A substantial number of residents (79.5%) were aware of vehicular emissions and their association with air pollution. Respondents linked air pollution in the city to power generating sets (27%), while over 24.5% indicted vehicular emissions to be the major contributor to air pollution after power generating sets. Over 91.7% of respondents believed that pollution from vehicular emissions have serious adverse health effects. They also expressed that vehicular emission is a major environmental health challenge in the metropolis. The study revealed that age, educational level, and occupation influenced both the level of awareness and the perception of health risks related to vehicular emissions at $p < 0.05$.

Keywords: Vehicular Emissions, Air Pollution, Health Impact, Public Knowledge, Environmental Awareness, Port Harcourt, Nigeria, Air Quality, Urban Health, Pollution Awareness.

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1.0 INTRODUCTION

Air is a common gas that consists mainly of nitrogen (78%) and oxygen (21%), with approximately 1% allocated to other constituents. It is viewed as the most vital natural system for sustaining life, primarily due to the presence of oxygen. Every living organism relies on oxygen for respiration, and survival beyond five minutes without it is impossible for any organism. Thus, air is fundamental to human life and the existence of other species. Nevertheless, the effectiveness of air in supporting life is influenced by its quality. [1]. Air

pollution is characterized by the release of various chemicals, particulates, or biological materials into the atmosphere, which can cause discomfort, health problems, or death in humans, while also harming other living entities, including food crops, and negatively impacting the natural environment [2, 3]. The four main sources of air pollution are vehicular emissions, industrial activities, household cooking, and tobacco consumption. The degree of air pollution, however, is largely determined by a nation's technological

capabilities and the effectiveness of its pollution control initiatives [4].

In the past 20 years, Port Harcourt has seen a substantial increase in its population, which has affected the transportation infrastructure of the city. This phenomenon is largely driven by the aspirations of individuals residing in the rural and suburban areas of Rivers State for enhanced quality of life. The proliferation of vehicles has been evident for quite some time, as families migrate from their localities in search of improved prospects [5]. One of the most pressing issues in urban environments is traffic congestion, a direct consequence of rising private car ownership, which poses challenges to both economic stability and urban lifestyles [6].

The rising volume of road traffic and congestion poses a significant challenge in the metropolis. Furthermore, the decline in air quality associated with these conditions presents another serious aspect of the problem [7]. This has necessitated this study, to ascertain the awareness and perception of residents towards vehicular emissions and its effects on health.

2.0 MATERIALS AND METHODS

2.1 Study Area

This study was carried out in Port Harcourt Metropolis, Rivers State, Nigeria. Two local government areas constitute Port Harcourt metropolis; Obio/Akpor and Port Harcourt City Local Government Areas. The climate in Port Harcourt is tropical monsoon, with long, intense rainy seasons and brief dry ones. In the city, only December through February is actually considered to be the dry season. The population of Port Harcourt metropolis stood at 1,006,000 as at 2006 Nigeria population census. When projected to 2024, the population of the city stands at about 1,211,000 using the linear extrapolation formula of $P_n = P_0 + na$, where P_n = Population after n years; P_0 = Base population; a = Annual population increment (i.e., average annual growth rate $\times$ base population).

2.2 Population and Sample

A sample size of 400 residents who live in Port Harcourt metropolis were sampled from 1,211,000 population of the metropolis, using the Taro Yamane formula for calculating sample size (Yamane, 1967). The simple random sampling technique was adopted to select respondents across the metropolis. Adult respondents who have lived in the city for not less than five years were interviewed to ensure that they are sufficiently aware of the challenges of vehicular emissions in the city and its possible effects on health. The sample included participants from different socio-

economic backgrounds, age groups, and educational levels.

2.3 Sampling Techniques

Health data were collected using a structured questionnaire designed to capture information on participants' knowledge of vehicular emissions, their perception of the health effects associated with air pollution, and their awareness of pollution mitigation strategies. The questionnaire was developed based on existing literature and consultations with experts in environmental health. The questionnaire was pre-tested on a small sample of residents to ensure clarity, reliability, and validity. The final version of the questionnaire contained closed and open-ended questions organized into four sections: Demographic characteristics of respondents, Knowledge of air pollution and vehicular emissions and Perceptions of health risks associated with vehicular emissions. Health data were collected using a structured questionnaire designed to capture information on participants' knowledge of vehicular emissions, their perception of the health effects associated with air pollution, and their awareness of pollution mitigation strategies. The questionnaire was developed based on existing literature and consultations with experts in environmental health. The questionnaire was pre-tested on a small sample of residents to ensure clarity, reliability, and validity. The final version of the questionnaire contained closed and open-ended questions organized into four sections: Demographic characteristics of respondents, Knowledge of air pollution and vehicular emissions and Perceptions of health risks associated with vehicular emissions.

2.4 Data Analysis

Data was analysed using descriptive statistics (frequencies, percentages, and means) to summarize the knowledge and perceptions of residents. Chi-square tests were employed to assess associations between demographic variables and knowledge/perception variables. The data were analysed using Statistical Products Solutions and Services (SPSS), version 26.

3.0 RESULTS AND DISCUSSION

3.1 Results

3.1.1 Socio Demographic Characteristics of Respondents

The socio-demographic characteristics of respondents is presented in table 1. Male respondents accounted for 64% of the distribution, while females were 36%. Most respondents were in the 18 – 24 age categories, accounting for 21.2% of the distribution, followed by those aged 25 – 31, accounting for 19% of respondents. Most respondents were single, representing 46.5% of respondents.

Table 1: Socio-Demographic Characteristics of Respondents

Variables	Frequency	%
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Gender		
Male	256	64
Female	144	36
Total	400	100
Age of Respondents		
18 – 24	85	21.2
25 – 31	76	19.0
32 – 38	68	17.0
39 – 44	55	13.8
45 – 51	43	10.8
52 – 59	45	11.2
60 and above	28	7.0
Total	400	100
Marital Status of Respondents		
Single	186	46.5
Married	134	33.5
Divorced / Separated	58	14.5
Widowed	22	5.5
Total	400	100
Educational attainment		
No Formal Education	63	9.2
Primary	10	23.3
Secondary	177	46.0
Tertiary	505	21.5
Total	400	100
Religion		
Christianity	286	71.5
Islam	22	5.5
Traditional African Religion	14	3.5
Others	46	11.5
Uncertain	32	8.0
Total	400	100
Employment Status		
Employed (Including Self Employment)	244	61.0
Unemployed	156	39.0
Total	400	100

3.1.2 Awareness and Knowledge of air pollution and vehicular emissions

Figure 1 presents respondents' awareness of pollution from vehicular emissions and its effect on

health. 79.5% of respondents answered in the affirmative, 16.7% answered that they were not aware, while 3.7% were uncertain.

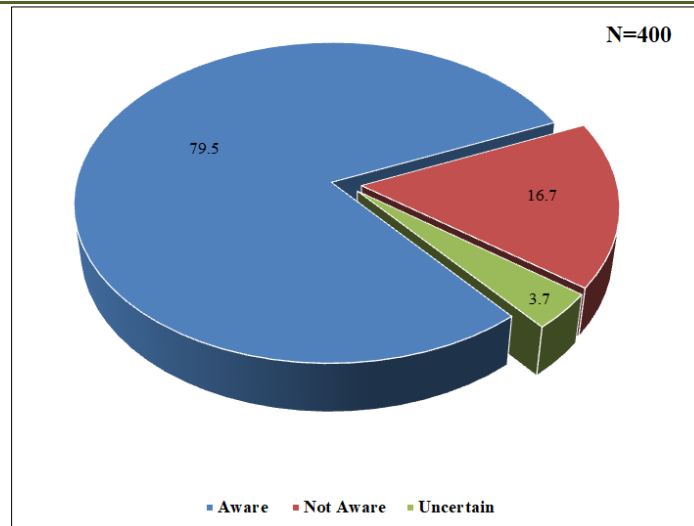


Figure 1: Percentage Distribution of Respondents' Awareness of Vehicular Emissions and its Health effects

3.1.3 Perceptions of Sources of Vehicular Emissions and Associated Health Risks

Respondents were further asked to mention the most common contributor to air pollution in the study area, the modal response was “Power generating sets”, “Vehicular Emissions”, “Industrial Activities”, “Cooking Stove/Gas” and Artisanal Refining”, accounting for 27%, 24.5%, 20.5%, 19% and 9% of the distribution, respectively. Furthermore, respondents were asked if vehicular emissions contribute to negative health effects, 91.7% answered in the affirmative (Table 2). Majority of respondents also believe that vehicular

emissions is a major problem in Port Harcourt metropolis. The most common respiratory health Condition implicated by residents were – Regular Coughing (n=289 Cases), Shortness of Breath (n=233), Recurrent Wheezing (n=159), Phlegm production (n=124), Rhinitis (n=112) and Asthma (n=71). Other conditions mentioned by respondents were Physician diagnosed Congestive Obstructive Pulmonary disease [(COPD) (n=14)] and Physician diagnosed Chronic Bronchitis (n= 5). There was no reported case of lung cancer amongst the respondents (Figure 1).

Table 2: Respondents' Perception of Source of Air Pollution and risks associated with vehicular emissions

Source of Pollution	Frequency	%
Cooking Stove/Firewood/Gas	82	20.5
Generating Sets	108	27.0
Vehicular Emissions	98	24.5
Industrial Activities	76	19.0
Artisanal Refining Activities	36	9.0
Total	400	100
Pollution from Vehicles Have Negative Health Effects		
Yes	367	91.7
No	24	6.0
Uncertain	9	2.25
Total	400	100
Vehicular Emission is a Major Health Challenge in the Metropolis		
Yes	380	95.0
No	17	4.2
Uncertain	3	0.8
Total	400	100

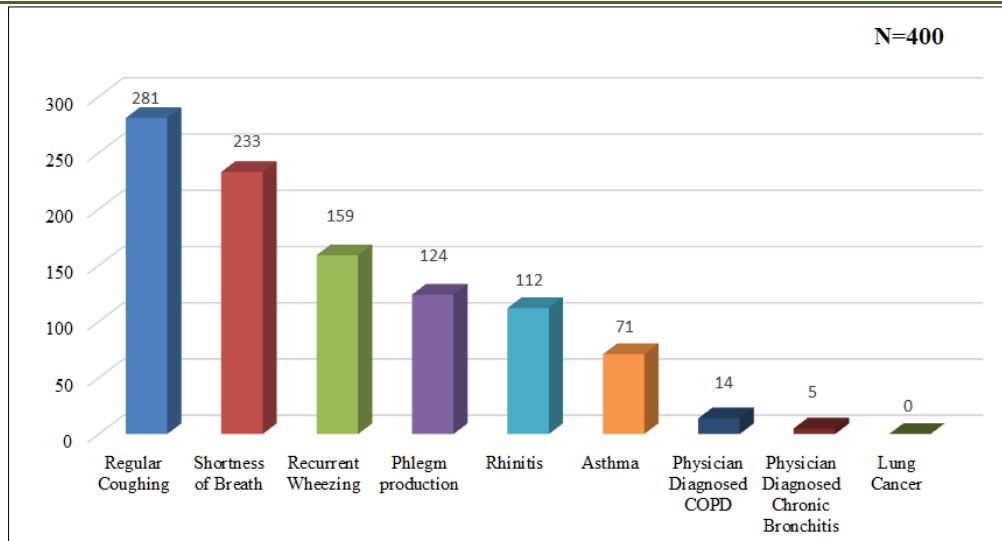


Figure 2: Most Common Respiratory Health Challenges in the Study Area

4.0 DISCUSSION

A considerable percentage of participants (79.5%) demonstrated awareness of the link between vehicular emissions and air pollution. However, this awareness did not imply a detailed comprehension of the specific health hazards these emissions present. Interestingly, 27% of respondents associated air pollution in the city with power generating sets, while over 24.5% pointed to vehicular emissions as the next significant source of air pollution after power generation. Furthermore, more than 91.7% of respondents recognized that vehicular emissions have severe negative health implications, asserting that they constitute a significant environmental health challenge in the metropolis.

Chi-square analysis revealed that age, educational level, and occupation influenced both the level of awareness and the perception of health risks related to vehicular emissions at $p < 0.05$. Respondents who were younger, held higher educational credentials, and worked in formal environments, like civil servants and entrepreneurs, displayed higher awareness and concern for health risks from vehicular emissions. This study reveals a rising consciousness regarding air pollution from vehicular emissions and its health risks, which is in agreement with results from earlier studies in other urban centres across the globe.

The perception among respondents that vehicular emissions are a primary source of respiratory issues may be influenced by the widespread incidence of symptoms such as coughing, wheezing, rhinitis, and other respiratory health concerns.

Numerous studies in other large cities facing high air pollution from vehicular emissions have indicated similar levels of public awareness regarding environmental health risks [8, 9].

5.0 CONCLUSION

This study reveals the need to advance public knowledge about the health risks associated with vehicular emissions in Port Harcourt, especially amongst those with low level education. Although there exists a general awareness of air pollution, it is apparent that there is a pressing need for more concentrated educational efforts regarding the specific health effects of emissions from vehicles.

6.0 RECOMMENDATIONS

This study advocates for the development of comprehensive and targeted educational campaigns aimed at highlighting the hazards of vehicular emissions, with a specific focus on their detrimental effects on the health of residents of Port Harcourt Metropolis.

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