

The Air Pollution Menace: A Case Study of Nairobi, Kenya

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Air pollution is as widespread as the air we breathe, and this has had adverse impacts on the unsuspecting citizens living within environmentally dangerous conditions. This research gave an insight into the geoscience/earth science, geography, and more specifically the environmental-health discipline focusing on air pollution by examining the publics' understanding of air pollution and their beliefs as to the causes, effects, and possible solutions to mitigate the silent killer, air pollution. The urban centers face this problem at a higher rate hence the selection of Nairobi, the capital city of Kenya, with a target population of 3,138,369 and a randomly sampled population of 350 people participating in the research. The data collection methods primarily utilized were interviews and closed questionnaires. Data analysis was through the use of mean and percentages. Based on the findings, the perceived causes of air pollution are industrialization, residential congestion, the high rate of vehicle utilization, and unmanaged dumping sites. The majority of the respondents (57.1%) believed that air pollution can lead to global warming and climate change as well as cause health problems. The research concluded that the solution to the air pollution problem lies in the hands of the government and the people through collaboration with the relevant NGOs and the environmentalists. Amongst the recommendations is that the government should expand the knowledge base on the impact of air pollution and give possible ways to avoid polluting the air. If the suggested remedies are employed in Nairobi-Kenya and globally, air pollution, the latest killer lurking within us preying on both the old and young, will be a thing of the past thus having a whole working globe through the achievement of pollution-free planet Earth.

Keywords: Air pollution, prevention, Causes and Effects, Public health.

1. Introduction to the Research

1.1 Background of the Research

With the tremendous increase in population the world has witnessed over the past millennia the environment has suffered the aftermath of the human invasion and destruction. From the cutting down of trees to create space for settling, dumping of wastes in soils and water sources, emission of poisonous gases from large industries, and down to simple activities like smoking cigarettes. The ecosystem has undergone a down-warping; an imbalance that has deprived it of its self-sustainability. Aquatic creatures suffocate from plastic items dumped in oceans, plants die because of toxicities in soils, and desertification and global warming are now targeting all living things.

According to The World Health Organization (WHO) (2018), nine out of ten people breathe contaminated air, which later penetrates the lungs leading to deaths from pulmonary disease, respiratory infection including pneumonia, stroke, and chronic obstructive and heart diseases. Stroke, a health condition resulting from air pollution affecting the brain, causes



more than 1.4 million deaths every year globally (WHO, 2017). The WHO also asserts that 25% of all heart disease deaths emerge from air pollution. It has therefore been identified that air pollution is a leading non-communicable disease causer. Those living in urban centers like Nairobi are at the greatest risk although people view air pollution as a very little cause of alarm in line with health, a perception which is not the case hence calling for a solution. According to Daily Nation (2016), at least 14,300 people die every year from health conditions which can be traced back to air pollution in Kenya; therefore, this study seeks to find answers to reducing or eradicating the deaths.

Air pollution is the contamination of air by emissions that lower the quality of air (WHO, 2016). These contaminations range from car emissions, smoke, poisonous gases from industries among others. The effects of environmental degradation are boldly spelled out, with the water bodies containing dead zones, emissions from lead paints causing deaths, and the effect also dig deep into the pockets of citizens and organizations. It is also notable that 80% of cities do not meet the air pollution standards as dictated by the United Nations (UN) health standards (Capital News, 2017). This, without even looking at other factors, points to the adversity the issue of air pollution is proving. Many states, nations, and cities have tried to curb the issue of air pollution but have realized it is not as easy. The study below focuses on Nairobi, the capital city of Kenya that has of late attempted to introduce a ban on plastic bags in attempts to reduce environmental pollution including air pollution. The question therefore is, how far have they gone in trying to eliminate air pollution?

1.2 Statement of the Problem

With the current increased access to information from the internet, social media, and educational media stations, people should be aware of the causes, effects, and ways to solve the air pollution menace in Kenya, however, that is not the case (Karue et al., 2016). The government has not yet found a suitable solution to this problem which has continued to plague not only Nairobi or Kenya but the whole world (The Conversation, 2017). In light of this, the study sought to establish the publics' understanding of air pollution and their beliefs as to the causes and possible remedies to the problem in Nairobi, Kenya; which will be applicable in the whole world and mostly the developing countries.

1.3 Objectives of the Study

The study sought to:

- a. Establish the causes and effects of air pollution as perceived by the public in Nairobi, Kenya.
- b. Explore the perception of a sub-population on air pollution impact to their health.
- c. Seek suggested measures by the public to mitigate air pollution in Nairobi, Kenya.



1.4 Research Questions

The research questions were:

- a. How aware are residents of Nairobi, Kenya, of the causes and effects of air pollution?
- b. How do the people living within Nairobi, Kenya, perceive air pollution concerning the harm it has done to their bodies?
- c. Which measures should be put in place to reduce or stop air pollution in Nairobi, Kenya?

1.5 Assumptions of the Research

It was assumed that respondents were going to be cooperative and willing to give honest and factual responses.

1.6 Significance of the Study

It is hoped that the research will help environmentalists, policymakers, and relevant NGOs to understand the required policies to be put in place to help solve the air pollution puzzle.

1.7 Scope of the Research

The research focused on Nairobi, Kenya with 350 respondents taking part among them being, residents, environmentalists, and managers of various industries.

1.8 Limitations of the Research

The main challenge to the research was some respondents were not ready to give the information they possessed.

Secondly, some areas of the city of Nairobi were inaccessible due to the cost and means of transport available.

1.9 Delimitations to the Research

To overcome the problem of cost and means of transport available I used a bicycle to reach inaccessible areas and minimize cost.

Secondly, to overcome the challenge on unwilling respondents I promised them that the information they gave would be confidential and their names would not be required, or specific areas of work or residence disclosed.



2 Research and Design Methodology

2.1 Delimitations to the Research

This study adopted a descriptive survey design to investigate the study variables without manipulating any of them. This helped me gather information, summarize, present, and interpret for clarification.

2.2 Location of the Study

The study was conducted in Nairobi City, which is the capital city of Kenya in East Africa. Nairobi was chosen because, being the capital city of Kenya, it fairly represents the whole country since it includes residents drawn from other parts of the country. Therefore, it could offer the view on the same topic of research countrywide. It was also the leading city regarding air pollution compared to other parts of the country and hence there was a need to investigate the causes, effects, and mitigation measures of air pollution in the city.

2.3 Target Population

The target population was all the residents in Nairobi city which formed a target population of 3,166,000 people, according to the 2009 Kenya Population Census, occupying an area of 694.9km².

2.3 Sample Size

A sample of 350 respondents was selected from the study adding up to 0.01% of the people living and working in the study area.

2.4 Sampling Procedure

Sub-counties forming Nairobi County were stratified into the central business district (CBD) and the outskirts; this was to ensure that all subgroups in the population were represented in the sample in proportion to their numbers in the target population. Simple random sampling was then applied where all the sub-counties were written in pieces of paper, folded then put in two separate tins depending on whether a sub-county was in the CBD or the outskirt the tins were then shaken to mix. Random selection of two suburbs and two CBD sub-counties was made. I then wrote notices to the residents and various environmentalists and industry managers requesting that those who would be available during the study duration to notify me through a phone call, text message, or WhatsApp text; and that is how 350 respondents who made 0.01% of the target population were reached.

2.5 Research Instrument

This study used interview schedules and questionnaires to collect data regarding people's beliefs on the causes and effects of air pollution and the perception of possible mitigation measures.



2.6 Reliability of the Research Instruments

The study sought to determine the instruments' reliability to achieve consistent results; hence, a pilot study was carried out in Meru, Kenya which is the fifth largest city in Kenya. Meru was chosen because, just like Nairobi, it draws residents from other parts of the country. A test-retest method was used whereby questionnaires were administered at an interval of two weeks. After this, the data were analyzed using SPSS, which gave a Pearson correlation coefficient of 0.896; hence this establishment enabling to carry on with the study because it meant that the tools had evidence of good test-retest reliability.

2.7 Data Collection Procedure

I explained to the residents of the sampled sub-counties the purpose of the study before administering the research instruments to the available respondents. Questionnaires were administered and collected on the same day. Arrangements were made on when to administer interview schedules and questionnaires after the available respondents contacted me. The issuance of questionnaires and conduction of interviews was from 15th August 2018 to 29th August 2018.

2.8 Data Analysis

I first ensured that all questionnaires were duly completed, and interview schedules were conducted, then the data was coded for compiling and analysis purposes. I employed the use of a descriptive data analysis procedure whereby the data collected were grouped according to objectives to determine their totals, means, and percentages. All data were analyzed using, frequencies, means, and percentages.

3 Data Analysis, Presentation, and Interpretation

3.1 Distribution of Respondents by Gender

It was realized that 43.4% of the respondents were females while 56.6% were males as indicated in table 3.1 below:

Table 3.1

Gender of Respondents

Gender	Frequency(n=350)	Percentage (%)
Female	152	43.4
Male	198	56.6



From the representation, we find that more males than females took part in the research either because males were available during the time of research or the males were flexible and easily adjusted their schedules to take part in the research than their female counterparts. The 2009 Kenya census reports that females in Nairobi make up 50.1% of the population, while males are 49.9% of the total population.

3.2 Causes of Air Pollution

The study sought to understand the main causes of air pollution which the respondents were aware of and the responses received are as recorded in table 3.2.

Table 3.2

Main perceived causes of air pollution

Causes of Air Pollution	Frequency(n=350)	Percentage (%)
Emission from motor vehicles	119	34.0
Emission from industries	95	27.2
Burning of garbage	50	14.3
Construction booms	40	11.4
Poor housing	21	6.0
Cooking with firewood & Kerosene	20	5.7
Cigarette smoking	5	1.4

Most respondents believed that vehicles and industries contributed greatly to air pollution since they emitted harmful gases to the environment as represented by 34.0% and 27.2% respectively. Some also associated burning garbage as a cause of air pollution since after open dumpsites were full, the people always burned the garbage as represented by 14.4%. Some (11.4%) believed that the recent construction boom in Nairobi was responsible for air pollution. Six percent viewed poor housing as the leading cause of air pollution due to lack of proper ventilation hence in-house air pollution, less than six percent (5.7%) of the respondents placed the blame on firewood and kerosene, and the remaining 1.4% said cigarette smoking was the cause.

3.3 Effects of Air Pollution

The study also sought to understand the believed effects of air pollution by the respondents and the data collected is as shown in table 3.3 below.



Table 3.3: The major perceived effect of air pollution by the respondents

The Major Effects of Air Pollution	Frequency(n=350)	Percentage (%)
Causes global warming/climate change	105	30.0
Causes health problems	95	27.1
Corrosion of corrugated iron sheets	80	22.9
Dying of plants hence food shortage	70	20.0

Many respondents (30%) believed that air pollution leads to global warming and climate change which has resulted in some effects such as a change in rainfall. A sizeable percentage of respondents (27.1%), however, related air pollution to health problems facing human beings, showing that they had an awareness of the adverse effect of air pollution (branded as the silent killer) on human health. Less than a quarter (22.9%) of respondents said it was a major cause of corrosion on corrugated iron sheets as evidenced in the city and more specifically the slums. The remaining 20.0% believed the major effect of air pollution was a food shortage as a result of dying plants due to acid rains.

3.4 Perception of the Respondents Concerning Air Pollution to Their Health

It was also the research's intention to know how the respondents perceived the air pollution as harmful to their health on a scale of 1 to 5, from no harm to extreme harm respectively. The responses received were as recorded in table 3.4 below:

Table 3.4: Perception of residents concerning air pollution harm to their health on a scale of 1-5

Scale	Frequency(n=350)	Percentage (%)
1 (No harm)	21	6.0
2 (Little harm)	29	8.3
3 (Harmful)	45	12.9
4 (Very harmful)	104	29.7
5 (Extremely harmful)	151	43.1

Most respondents (43.1%) seemed to be aware that air pollution was harmful to health, rating the harm at five, meaning that they viewed air pollution as extremely harmful. However, they said it was as a result of the urban set up they were in hence assessed information



more conveniently than those in the rural areas. 29.7% of the sample population rated the danger as four, which meant they believe that air pollution is very harmful to their health, while 12.95% rated the danger level as three since they felt that air pollution is just harmful to their health. 8.3% rated the danger at level two, which meant they viewed air pollution having little harm to their health and 6.0% rated the danger level as one which meant they believed they are not affected by air pollution in any way. The responses showed that some of the respondents still did not believe that air pollution could cause any significant harm to their health.

3.5 Solutions to curb the Air Pollution Menace

When the respondents were asked what could be done to solve the air pollution the respondent's answers are as recorded in table 3.5 below:

Table 3.5: A proposed suitable solution to reduce and eradicate air pollution

Possible Solution	Frequency (n=350)	Percentage (%)
Creating awareness on air pollution	115	32.9
Controlling industries' emission	80	22.9
Introducing solar-powered vehicles	70	20.0
Putting up suitable waste disposal methods	35	10.0
Banning the use of firewood and introducing more sustainable forms of energy for use	30	8.5
Improved housing	20	5.7

As shown by table 3.5, creating awareness was felt to be the leading solution to air pollution in the country, and most probably in the world, with about a third of respondents citing this strategy (32.9%). The respondents believed that if more citizens were aware of the harm they cause themselves and the generations to come, then they will cease polluting their environment without any effort from the government or environmental organizations. Some (22.9%) suggested that the industries' emissions should be controlled to reduce the rate of pollution, with 20.0% believing introducing solar-powered cars could solve the problem. Ten percent said proper waste disposal and management techniques could help in providing the answer to the puzzle, 8.5% said increasing petroleum products could help since people could avoid the use of machinery using petroleum hence preventing the harmful emissions to the environment. The remaining 5.7% said improved housing could help since the air circulation in the houses could be improved, hence reducing air pollution.



4 Conclusion and Recommendation

The respondents are aware of the causes and effects of air pollution, and they also clearly demonstrated their concern over adverse effects of air pollution on their health; however, increased awareness, individual involvement, and support from the policymakers, environmentalists, and relevant NGO's could be the gateway to achieving an environmentally friendly country and make the attainment of the 17 sustainable development goals a reality.

The study suggests that because 32.9% of the respondents believe that the leading solution to the air pollution menace is creating awareness on causes, effects and instilling regulations to curb air pollution, the Kenyan government should, therefore, through the UN expand the knowledge base about the impact of air pollution on health to the citizens. In the spirit of raising awareness the health care centers should be encouraged to raise awareness of the health benefits of air pollution reduction; thus, informing the citizens of the causes of air pollution and possible ways to evade them with apparent alternatives set like the introduction of solar-power as suggested by 20.0% respondents, or banning the use of firewood and introducing more sustainable forms of energy for use as suggested by 8.5% respondents.

On the other hand, environmentalists, government, NGOs, and other stakeholders should focus on what is essential in solving the air pollution risks in the country and globally through the development of the appropriate policies to enhance reduction or eradication or control of all the causes of air pollution just as 22.9% of the respondents suggested that the air pollution should be curbed through controlled industrial emissions and 10.0% suggested the adoption of appropriate waste disposal mechanism. These policies should guide industries and residents on waste disposal procedures and impose fines on those who fail to comply.

Because 5.7% of respondents in the study suggested that proper housing was the way out of the air pollution menace, especially in the city's outskirts, the study recommends that the government set up an air quality monitoring center to keep air pollution in check. The government should also ensure it reaches the respondents who felt that air pollution has no harm to their health to check on air quality within their environs.

Because 43.1% of the respondents in the study perceived air pollution containing extreme harm to their health, the study recommends monitoring and reporting health trends and progress towards solving the air pollution menace by the environmentalist, the government, NGOs, and other key stakeholders. The health monitoring will also enable achievement of the seventeen sustainable development goals since failure to curb the air pollution menace will result in diseases and other health complications like stroke. Such problems from air pollution will affect the productivity of individuals and contribute in failing to achieve the sustainable development goals. The study recommends that further research be conducted to determine whether the respondents believed the significant effects of air pollution are valid. If ascertained, then mitigation measures seeking to avoid the harm that comes in hand with climate change, health problems, corrosion of corrugated iron sheets, and food shortage.



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