Air Pollution and Its Effects on the Environment: A Case Study of Ola-Oluwa Aina Wire Industry, Osogbo, Osun State.

LAWRENCE EMMANUEL TOLULADE[1], RAJI BADIRU[2]
[1, 2] *National Open University of Nigeria, Abuja.*

Abstract- ***The findings review that there is a lot of effect of air pollution on the environment. This research was carried out to assess the effect of air pollution on humans, vegetation, and materials in the environment of Osun State, Nigeria. The researcher collected his information by distributing a total number of hundred (100) questionnaires to the people living in Ayedun L/Out, Osogbo Osun State. The information gathered was analyzed and presented in percentages. From the analysis, the researcher was able to identify some problems people living in that environment are facing that will help the government, individuals, and industries in conjunction with non-governmental organizations (NGOs) to bring solutions to the problem of Air Pollution in Ayedun L/Out, Osogbo Osun State and her Environment.***

Indexed Terms- ***Effect of Air pollution on human, materials, and vegetation in the environment***

I. INTRODUCTION

1.1. BACKGROUND OF STUDY

Air quality is important simply because we cannot avoid breathing in the air around us. The average adult breathes in about 20 cubic meters or 20,000 liters of air a day. The air we breathe is a mixture of gases and small solid and liquid particles. Air pollution is an atmospheric condition in which substances are present at a concentration high enough above their normal ambient levels to produce measurable effects on man, animals, vegetation, materials, etc. It has been a widely recognized problem and becomes a basic problem in today's world.

All over the world today, environmental air pollution is an issue of great concern because of what the environment is to human survival and indeed, the survival of the earth itself. These days, the argument about the greenhouse effect is rife everywhere in the world. "If it is not greenhouse effect", it is a global warning. Both point to the fact that the earth is polluted. Williams (2016) affirms that it is well-recognized that the environment is one of human health. He however paints out that Nigeria suffers from both primary and secondary environmental problems resulting from under development and growth in industrialization. As a result, human Ideas and activities are endangered daily. Because of these threats to social responsibility Environmental pollination is one of Phenomenon that has gained international attention including in Nigeria. News agencies, health Organizations, federal government's ministries of health have passed information about the menace associated with environmental pollution to the masses.

However, a country whose citizens are suffering from a plague of illness, diseases, and afflictions has no place in these qualities that contribute to making any country a great nation. The mismanagement of and nonchalant attitude toward industries' air quality can lead to, environmental degradation and, change in climatic conditions of the country/state (Robinson DL, 2005).

It has been observed that environmental pollution identifies improper, ineffective, and, unhygienic disposal of refuse materials as vectors of environmental pollution. Some studies and research findings have also shown that household turns out a lot of rubbish a year which comprise paper, waste glass, damaged cars, and non-cycling and scrapped cars and their components.

All these represent a source of environmental

pollution involving the littering of roads with refuse, dumping burning of refuse on road. The environment can very well be polluted owing to social misdemeanors or when people fail to observe simple public order such as where not to smoke or where not to burn refuse. Smoking in public has been a subject of argument for a long time now. The most talked about pollution is industrial pollution which is now a global issue. This has generated a lot of discussions and augments in various social states, especially among scientists. While noted that carbon dioxide is what environmental scientists call "a greenhouse gas" (Zhang W, Qian CV, Zeng YX, 2014).

In Osun State, industrial plants, vehicles, power plants, and installations emit gasses that pollute the environment. Such pollution is always prominent in the cities where industrial activities are carried out around the clock. In an environment like this, the air is often polluted. Generally in Osun State, pollution has become a great topic of debate at all levels and especially air pollution because of the enhanced anthropogenic activities such as the burning of fossil fuels, i.e., natural gas, coal, and oil to power industrial processes and automobiles (motor vehicles), etc. This emits a wide variety of air pollutants, particularly carbon monoxide (CO), oxides of nitrogen (NOx), volatile organic compounds (VOCs), and particulate matter (PM).

1.2 STATEMENT OF THE PROBLEM

Air pollution has become an area of major concern in Osun state today. It appears to be a losing battle against the harmful consequences of unguided pollution and the attainment of a clean air environment for all indigenes. The problem of air pollution in Nigeria is due to the absence of public policy. An Appropriate policy and institutional mechanism for the implementation of clean air strategies are critical for sustainable air pollution management. Where the policy is poor or the public is not properly sensitized or there is no proper enforcement of laws and regulations, air pollution shall be a problem or a great challenge. (Panwar N, Kanshik s, Kothari S, 2011)

1.3 OBJECTIVE OF THE STUDY

i. To find out the perceived causes of some intractable air pollution problems in Oshogbo, Osun State.
ii. To proffer possible solutions to the air pollution problem towards sustainability of materials, vegetation, and of the people's health in Oshogbo, Osun state.
iii. To access the effect of air pollution on people, vegetation, materials, and the environment in Oshogbo Osun State.

1.4 RESEARCH QUESTIONS

i. How would you rate the overall air quality in your environment now compared to the last few years?
ii. What do you think are the main causes of air pollution in your environment?

1.5 SCOPE OF THE STUDY

The study will be limited to the management of NESREA in Osun State, The Government of Osun States; Air pollution and its effects on the Environment: A Case study of Ola-Oluwa Aina Wire Industry Nigeria Limited; and the instrument: Air Pollution Problems and its Effects on the Environment Questionnaire (APPEEQ).

II. LITERATURE REVIEW

2.1 THE CONCEPT OF AIR POLLUTION

The present-day atmosphere is quite different from the natural atmosphere that existed before the Industrial Revolution (circa 17601), in terms of chemical composition.

If the natural atmosphere is considered to be "clean", then this means that clean air cannot be found anywhere in today's atmosphere. The chemical composition of the pre-industrial (i.e., before the 18th century), the natural global atmosphere is compared to current compositions.

Atmospheric Chemical Compositions. (From air pollution to climate change by John H. Seinfeld)

Gas	Symbol	Percent by volume (Current Atmosphere)	PPM (Natural Atmosphere)	PPM (Current Atmosphere)
Nitrogen	N_2	78.1		
Nitrogen	N_2	78.1		
Oxygen	O_2	20.9		
Argon	Ar	0.92		
Neon	Ne		18.2	
Helium	He		5.2	
Krypton	Kr		1.14	
Xenon	Xe		0.09	
Carbon dioxide	CO_2		280.0	370.0[3]
Methane	CH_4		0.750	1.77[4]
Nitrous oxide	N_2		0.270	0.318[5]
Water Vapor	H_2O	Variable (0.004 to 4)		

Defining "air pollution" is not simple. One could claim that air pollution started when humans began burning fuels. In other words, all man-made (anthropogenic) emissions into the air can be called air pollution, because they alter the chemical composition of the natural atmosphere. The increase in the global concentrations of greenhouse gases CO_2, CH_4, and N_2O (shown in Table 1), can be called air pollution using this approach, even though the concentrations are not toxic for humans and the ecosystem. One can refine this approach and only consider anthropogenic emissions of harmful chemicals as air pollution. However, this refined approach has some drawbacks. Firstly, one has to define what "harmful" means.

"Harmful" could mean an adverse effect on the health of living things, an adverse effect on anthropogenic or natural non-living structures, or a reduction in the air's visibility. Also, a chemical that does not cause any short-term harmful effects may accumulate in the atmosphere and create a long-term harmful effect. For example, anthropogenic emissions of chlorofluorocarbons (CFCs) were once considered safe because they are inert in the lowest part of the atmosphere called the troposphere. However, once these chemicals enter the stratosphere, ultraviolet radiation can convert them into highly reactive species that can have a devastating effect on stratospheric ozone. Similarly, anthropogenic CO_2 emissions from combustion processes were considered safe because they are not toxic, but the long-term accumulation of CO_2 in the atmosphere may lead to climate change, which could then be harmful to humans and the ecosystem.

Another drawback of this approach is that it does not consider natural emissions as air pollution even though they can be very harmful, such as gases and particles from volcanic eruptions, and smoke from forest fires caused by natural processes (lightning strikes). So besides anthropogenic emissions, it is useful to also consider geogenic emissions and biogenic emissions as contributors to air pollution. Geogenic6 emissions are defined as emissions caused by the non-living world, such as volcanic emissions, sea-salt emissions, and natural fires. Biogenic emissions come from the living world; such as volatile organic compound (VOC) emissions from forests and CH4 emissions from swamps.

Human activity can also influence geogenic and biogenic emissions. For example, human applications of nitrogen fertilizers in agriculture can result in increased biogenic emissions of nitrogen compounds from the soil. Also, humans can affect the biogenic emissions of VOC by cutting down trees or planting trees. Lastly, geogenic emissions of dust from the earth's surface can be altered if the surface is changed by human activity. So taking all of the above into account, we can define an "air pollutant" as any substance emitted into the air from an anthropogenic,

biogenic, or geogenic source, that is either not part of the natural atmosphere or is present in higher concentrations than the natural atmosphere, and may cause a short-term or long-term adverse effect.

2.1.1 CLASSIFICATIONS OF AIR POLLUTANTS

- Total suspended particulate matter (TSP), with additional subcategories of particles smaller than 10 µm in diameter (PM_{10}), and particles smaller than 2.5 µm in diameter ($PM_{2.5}$). PM can exist in solid or liquid form and includes smoke, dust, aerosols, metallic oxides, and pollen. Sources of PM include combustion, factories, construction, demolition, agricultural activities, motor vehicles, and wood burning. Inhalation of enough PM over time increases the risk of chronic respiratory disease.

- Toxic Pollutants: Hazardous air pollutants (HAPS), also called toxic air pollutants or air toxics, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects. The US-EPA is required to control 188 hazardous air pollutants. Examples of toxic air pollutants include benzene, which is found in gasoline; perchloroethylene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by some industries.

- Sulfur oxide (SO): This compound is colorless, but has a suffocating, pungent odor. Oxides of sulfur are emitted largely from man-made sources and are primarily released as sulfur dioxide, which may be oxidized to sulfur trioxide. The latter can combine with water vapor to form sulfuric acid mists that are highly corrosive to building materials, including stone and marble. When precipitated into the water via rainfall, sulfur products increase acidity and can destroy aquatic life.

- Nitrogen oxides (NO and NO_2): NO_2 is a reddish-brown gas with a sharp odor. Oxidation of nitrogen and release of nitrogen oxides into the atmosphere result largely from automobile and electric power plant sources. Some of the oxides of nitrogen are oxidized further to nitrogen dioxide, which strongly absorbs ultraviolet light from the sun, creating nitric oxide and atomic oxygen (O). The latter can form ozone (O_3) in the presence of molecular oxygen (O_2). This highly reactive form of oxygen has been responsible for ozone alerts in Los Angeles.

- Carbon monoxide (CO): The complete combustion of carbon in the presence of oxygen results in the formation of carbon dioxide (CO_2). Carbon monoxide (CO_2) results from the incomplete combustion of carbon and it has been considered almost exclusively a man-made pollutant. It is toxic to humans at concentrations of 100 parts per million when exposure for several hours occurs.

- Ozone (O_3): Tropospheric ("low-level") ozone is a secondary pollutant formed when sunlight causes photochemical reactions involving NO_X and VOCs. Automobiles are the largest source of VOCs necessary for these reactions. Ozone concentrations tend to peak in the afternoon and can cause eye irritation, aggravation of respiratory diseases, and damage to plants and animals.

- Lead (Pb): The largest source of Pb in the atmosphere has been from leaded gasoline combustion, but with the gradual elimination worldwide of lead in gasoline, air Pb levels have decreased considerably. Other airborne sources include the combustion of solid and liquid wastes, coal, and oils, emissions from iron and steel production and lead smelters, and tobacco smoke. Exposure to Pb can affect the blood, kidneys, and nervous, immune, cardiovascular, and reproductive systems.

- Indoor Pollutant: When a building is not properly ventilated, pollutants can accumulate and reach concentrations greater than those typically found outside. This problem has received media attention as "Sick Building Syndrome". Environmental tobacco smoke (ETS) is one of the main contributors to indoor pollution, as are CO,

NO, and SO_2, which can be emitted from furnaces and stoves. Cleaning or remodeling a house is an activity that can contribute to elevated concentrations of harmful chemicals such as VOCs emitted from household cleaners, paint, and varnishes (Kankaria A, Indian J comm. Med. 39 (4), 203, 2014)

2.1.2 Environmental Air Pollution Control

The objective of a manager of an air pollution control system is to ensure that excessive concentrations of air pollutants do not reach a susceptible target. Targets could include people, plants, animals, and materials. In all cases we should be concerned with the most sensitive of each of these groups. Air pollutants could include gases, vapours, aerosols, and, in some cases, bio-hazardous materials. A well-designed system will prevent a target from receiving a harmful concentration of a pollutant. Most air pollution control systems involve a combination of several control techniques, usually a combination of technological controls and administrative controls, and in larger or more complex sources there may be more than one type of technological control. Ideally, the selection of the appropriate controls will be made in the context of the problem to be solved.

2.1.3 Effect of Air Pollution in Nigeria

The pollution problem arises from the confluence of atmospheric contaminants, adverse meteorological conditions, and at times, certain topographical conditions that dispersion of contaminants causing them to accumulate to harmful proportions; (MI Evelyn 2012). Air pollution is addition of harmful substance to the atmosphere resulting in damage to the environment, human health and quality of life, Cooper and Alley (1994).

Air pollution which consists of indoor and outdoor pollutant has been a public concern in Nigeria. The indoor air pollution occurs inside homes, school and offices, as results from product of use in construction material and emission of Nitrogen oxide, and sulphur oxide in air-conditioned houses, gas stove and some volatile organic compounds like Alkanes and furmaldchyde. In cities like Nkalagu, Gboko, Lagos, Kano, Port-Harcourt and Ibadan, across Nigeria, acid rain and ozone pollution create an environmental impact and affect human health unknowingly as a result of cement factories located in these areas. Some outdoor pollution consists of natural contaminants such as pollen, fungispores, smoke, dust particles from forest fires. It contains also naturally occurring carbon monoxide, Hydrogen Sulphide (H2S) and methane from the anaerobic decomposition of organic matter. Therefore three important effects of air pollution in Nigeria are considered as follows, the effects on humans, vegetation, and material.

- Effects on Human Health: The respiratory system is the primary indicator of air pollution effects in humans as carbon dioxide diffuses through the capillary wall into the alveolus while oxygen diffuses out of the alveolus into the blood cell. The difference in partial pressure of each of the gas cause it to move from the higher to lower respiratory tract causing a great cardio-respiratory ailment amongst heavy smokers and people living in industrial areas. Some chronic respiratory diseases like Bronchial-Asthma are aggravated by air pollution, for example, and former workers of Nkalagu cement industry in Ebonyi state.

- The Effect on Vegetation: There are always effects of particulate matter on vegetation. An example is when dry cement-kiln dust appears to cause little damage if deposited on a leaf surface in the presence of moisture imparts damage on the plant tissues at Nkalagu, Ebonyi state in the 70s on yam and maize farms. The specks of dust coating on the leaves inhibited growth and consequently reduced the process of photosynthesis, which resulted in low harvests during those years. Even their goats that ate from the cement kiln dust coating on the plants, suffered some ill effects and died.

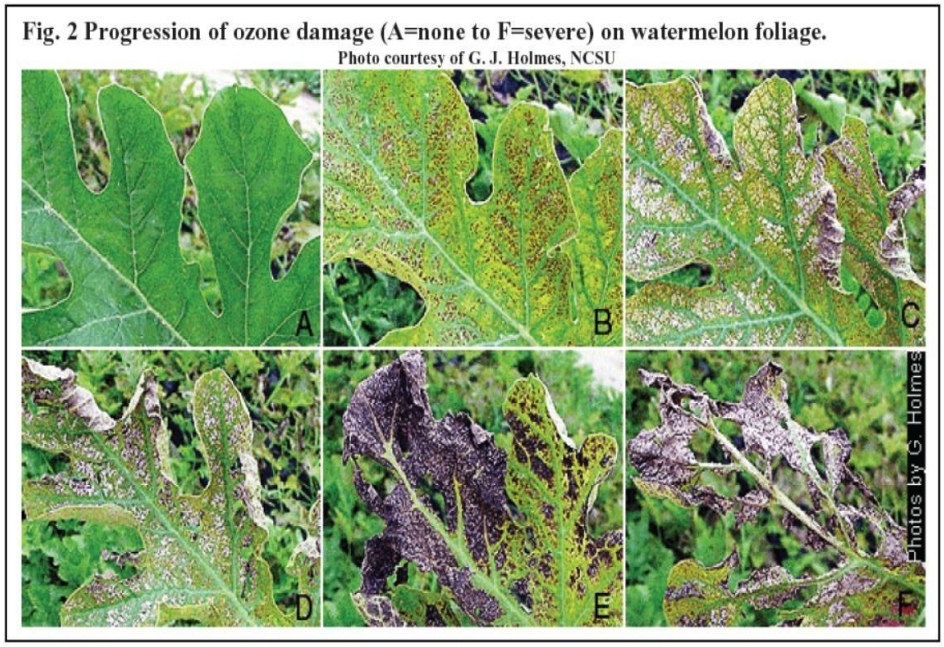

Plate 2.1 Affected Vegetations by Air Pollution (Wikipedia)

- The Effects on Material: Material deterioration occurs when the following factors, moisture, temperature, and sunlight are involved. This mechanism of deterioration has been attributed to air pollution. It also involves five systems, namely abrasion, deposition and removal, direct chemical attack, indirect chemical attack, and electrochemical corrosion. Some solid particles of large enough sizes and traveling at high enough speeds can cause deterioration by abrasion. Liquid and solid particles that settle on exposed surfaces causes' enough-aesthetic deterioration on certain monuments and building. Solubilization and oxidation/reduction reaction occur directly by chemical attack on some materials, an example is the chemical reaction between sulphur dioxides (SO_2), and limestone ($CaCO_3$) in the presence of water to form calcium sulphate ($CaSO_4$) and gypsum ($CaSO_4$.2H2O).

Plate 2.2 Affected Materials (statutes) by Air Pollution (Wikipedia)

2.2 Theoretical Framework

The perspective is associated with the works of Wilkinson and Boulding (1973). The theory is concerned with issues of change and development in contemporary societies, especially as they relate to environmental changes and/or ecologically related trends of population growth and the need to devise and sort out techniques for tackling development problems. The theory states that, as the population of a society increases in size, individual members of the society exert more pressure on scarcely available resources such as land and other natural endowments for survival. They directly or indirectly carry out socio-economic activities that pollute the environment/society, and further cause harm (degradation) to the environment/society. The socio-economic activities, according to these activities of people in agrarian societies of Africa, Latin America, etc, and the commercial and industrial activities of people in Urban-industrialized societies of the western-Europe and North America.

The perspective further argued that development is needed when a society outgrows its resource base and productive system. The perspective, therefore, posits that as the established economic system of a given environment/society is proved inadequate and the productive system becomes more problematic, societies are therefore driven to change their

methods. For instance, as the population of a society outgrows the available resources, especially in agrarian societies, people are forced to migrate to urban centers/cities in search of job opportunities. Some sell their labour, whereas some engage in several other commercial and agricultural investments. The urban and city dwellers establish and carry out industrial activities that equally pollute the society. Wilkinson and Boulding conclude that these activities directly and/or indirectly pollute the environment with their attendant consequences on biodiversity.

2.3 Empirical Review

Certainly, it would be an incomplete work, or perhaps meaningless, if we fail to get ourselves acquainted with the subject matter of discourse -Air pollution and its effect on the environment. A Case study of Ola-Oluwa wire industry Nigeria limited, Osun State. To describe, summarize, evaluate and clarify the related works of other scholars as related to this work and also to establish a fundamental basis for this research.

III. METHODOLOGY

The researcher presents the method, research design, population of the study, study area, sample and sampling techniques, research instruments, the validity and reliability of the instruments used, procedure for Data Collection, and Method for data analysis.

i. Population

The population of this study comprised all staff of Ola-Oluw Aina wire Industry limited, the people living around the company, and the people of Oshogbo Osun State generally. According to the 2006 National population census, Osun State has a population of 3,416,959 million persons, made up of 1,734,149 million males and 1,682,810 million females. This study covers the population of 722,664 residents of the Oshogbo metropolis. This number makes the population of the study but since it will be difficult, if not totally impossible to reach every member of the population, and to ensure manageability and accurate empirical conclusion, a sample was drawn from the population.

ii. Study Area

Ola-Oluwa Aina Wire Industry Nigeria limited situated in Osogbo, Osun state is one of the metals and steel melting company in Osogbo that is still operating till today producing all manners of metals, steel, and wires/cable. After steel rolling company had been shot down, Ola-Oluwa remains the only steel and metals melting company operating in Osogbo. It is about 30 kilometers by road from the city of osogbo to Ola- Oluwa, and it is also 100 kilometers by road from Ola-Oluwa to Ilorin. Ola-Oluwa is between the boundary of Osogbo and Ikirun. And the location is very easy to get. It is about 75 km from Ife, 65 km from Ilesa, 58 km from Iwo, 48 km from Ikire, and 46 km from Ila-Orangun. Osogbo City is boasted of a population of about 156,694 people, based on the 2006 Census; the postal code of the area is 230.

iii. Sampling and Sampling Techniques

The study employed simple random sampling techniques. Random sampling was selected from each of the streets that lead to the company (Ola-Oluwa). Thirty (30) respondents from the people living in the environment were sampled and twenty (20) staff of Ola-Oluwa Aina Wire Industry was sampled as well. In all, fifty (50) respondents were sampled for the study.

iv. Procedure for Data Collection

The researcher sought and obtained permission from respondents before the administration of the instruments. The instruments will be administered on 50 respondents by the researcher with the help of two research assistants. The exercise lasted for two weeks. This required immediate completion of the instruments for retrieval.

v.

vi. Field Survey

Field visits/stakeholder consultations were made to the following areas, Otaefun, Power line area, and Stadium area. During this activity, discussions were held with individuals of these areas and relevant departments (Ola-Oluwa) which include offices and staff of environmental and waste agencies of how often waste is being taken care of in these areas and the efficiency of Government agencies on waste removal in the streets of Oshogbo metropolis, and how air pollution is been handled. Several relevant

questions were addressed to the State Ministries of Environment and waste management authorities so also the NESREA department. Using the specific circumstances of each area visited, the particular technical operations of each area on the project, including related agencies such as NESREA, and environmental protection agency's/authorities were studied, as their capacity to implement the proposed environmental good air quality process and mitigation measures were assessed, and discussions held to determine appropriate recommendations for improvement environmental good air quality and the training of staff of Ola-Oluwa Aina and agencies on making their working environment to be free from environmental air pollution.

3.1 Type of Study

The researcher used descriptive survey method for the study in which questionnaires were carefully administered to the employees of Ola-Oluwa Aina Wire Industry.

3.2 Methods of Data Collection

The methods of data collection for this study were grouped into two. These are primary and secondary data. Both sources of data were extensively used for the purpose of drawing an empirical conclusion for proper analysis of the study to come up with objective findings.

- Primary Data

The primary data for this study were obtained through the distribution of questionnaires and data from direct responses of oral interviews with the staff of Ola- Oluwa Aina Wire Industry, some few staff of NESREA, traders, residents of some selected areas, corporate and other establishments within Oshogbo metropolis. This is to enable the researcher to obtain wider detailed, reliable, and up-to-date information on the topic. The data gathering instruments for this study are the following instruments.

i. Questionnaire Instrument

The questionnaire was prepared and personally administered by the researcher. To accurate information was obtained and to ensure that the questionnaire covers the entire population, its distribution cut across the 100 respondents from the sampled area.

ii. Personal Interview

The researcher also made use of personal interviews to obtain firsthand information on the topic. It is a data-gathering instrument that enables the researcher to have in-depth knowledge of the topic of the research through face-to-face interaction. This instrument was used because it gives an opportunity for in-depth investigation or deeper probing into an issue under study. 100 respondents were interviewed by the researcher on issues that concerns the topic of this research.

iii. Secondary Data

The principal sources of the secondary data for this study were obtained through the review of relevant pieces of literature, the use of materials from textbooks, website pages, and journals, and also going through relevant official administrative documents of NESREA in Osun State.

IV. RESULTS AND DISCUSSION

4.1 Results

Table 4.1 Respondent's Opinion on sources and types of pollution in the studied area

Sources	Pollution type	% Occurrence
Dumpsite	Odour	11
Tyres	Smoke	30
Vehicles	Smoke	25
Industries	Air	34

One sample t-Test Analysis

N	Mean	SD	SEM	t-value	DF(n-1)	Prob> /t/
4	25	10.03	5.02	4.98	3	0.016

Null Hypothesis: Mean=0or<>0

Conclusion: At 0.05level, the population mean is significantly different from the test mean

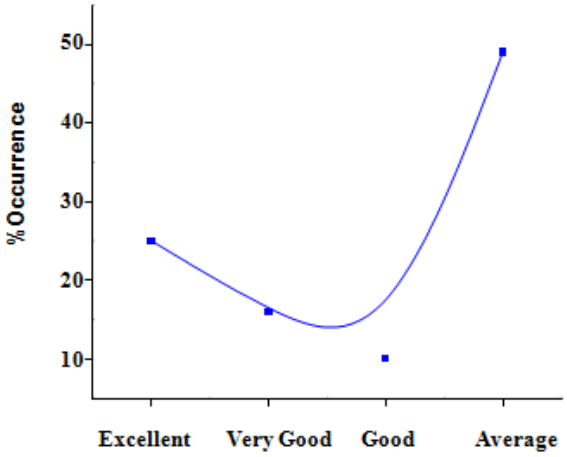

Figure 4.1 Air Quality Assessments

One sample t-Test Analysis

N	Mean	SD	SEM	t-value	DF(n-1)	Prob> /t/
4	25	17.15	8.57	2.92	3	0.062

Null Hypothesis: Mean=0or<>0

Conclusion: At 0.05 level, the population mean is NOT significantly different from the test mean.

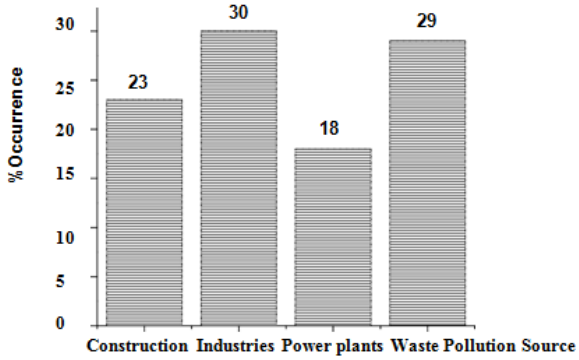

Figure 4.2 Main causes of air pollution in the studied site

One sample t-Test Analysis

N	Mean	SD	SEM	t-value	DF(n-1)	Prob> /t/
4	25	10.80	5.40	4.63	3	0.019

Null Hypothesis: Mean=0or<>0

Conclusion: At 0.05 level, the population mean is significantly different from the test mean

Table 4.2 Respondent's opinion on critical environmental pollution issues

	A	SA	D	SD	UND	Prob > /t/
Fined for polluting the environment	15	35	15	25	10	0.011*
Industries to switch to cleaner processes	15	45	12	18	10	0.035*
Government to promote and encourage a Better environment even if taxes will be increased slightly	15	40	13	22	10	0.020*
Improving the environment is the responsibility of every citizen	22	31	17	20	10	0.004*
Recycling programs to be put in place	23	33	12	22	10	0.009*
Enforcement of Environmental Health Officers by the Government	15	45	10	25	05	0.047*
Environment Impact Assessment to be done	20	40	10	25	05	0.031*

every month on pollution-generating industries						
Reduction in the Number of vehicles and trucks by increasing public transport	20	36	16	20	08	0.011*

(*) indicates that at 0.05 level, the population mean is significantly different from the test mean

4.2 Summary of Findings

The data analyzed in this study was obtained from 100 questionnaires spread across stadium and steel rolling company area of Osogbo. The overall results offer a wide range of conclusions.

The key research question asked to know if the residents of Osogbo and her environment are aware of the implications/effect of air pollution. Findings from the study led to the conclusion that the people who received the questionnaire are residents of Osogbo. From findings, 49 percent of the respondents affirmed that the air quality is now at the average level, which means with time, the air quality will get worse if there is no solution to control it now. 34 percent of the respondent confirmed that the main source of air pollution in the study area is Industry and the pollution type is sulfur dioxide, 40 percent of the respondent confirmed Asthma incidences as a health challenge faced by air pollution causing difficult breathing for people living around the study area, 45 percent of respondents strongly agreed on Industries/factories to switch to cleaner air processes. And this agrees with Centre for Clean Air Policy U.S, which highlighted some sources of air pollution and the major negative effects on humans, animals, and vegetation in the environment at large such as, global warming, climate change, acid rain, ground-level ozone (smog), poor water quality. And their clean air process and policy is that protecting air quality requires technological changes in manufacturing processes and products to capture pollutants and prevent their release into the environment.

Changes in behavior and lifestyle, such as driving less, can also play an important role. Inducing these changes typically requires a combination of new government regulations, incentives, and public education. The right solution or combination of solutions depends on such factors as the types of sources and behaviors that emit the pollution, the availability of cost-effective mitigation options, and the nature and degree of the impacts. I believe this policy process will help to improve the air quality of the study area and its environment if the government will imbibe it.

V. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Air pollution is a serious environmental threat to humans, vegetation, and materials. Air pollution can occur both in outdoors or indoors. Examples of outdoor pollutants include fine particles in the air (from motor vehicles, industrial sources, etc.), ground-level ozone (a primary component of smog), noxious gases, and tobacco smoke. Examples of indoor air pollution include carbon monoxide, household chemicals, building materials, allergens (e.g., cockroaches, animals, dust, etc.), mold, and tobacco smoke.

Among common outdoor air pollutants, fine particulate matter and ground-level ozone are considered the most widespread threats to human health, according to the U.S. Environmental Protection Agency. These research findings confirmed that the major causes of air pollution are Industrial air pollution and the burning of waste materials which as posed health dangers to both humans and animals as a result of hard breathing.

The research findings have made it know clear that the air quality of the past few years now can't be compared with the present air quality because of the increase in numbers of industries and daily human activities, which as posed a large threat to air quality and the effect is speaking on human, vegetations, and materials now.

5.2 Conclusion

The problem of air pollution is not new, although its recognition as a problem is. People regarded a smoking factory chimney in their town as a sign of prosperity in which to take pride. The sweet smell of money, jobs, and taxes was quite tolerable. However, as the population grew and industrial waste multiplied, air pollution reached a place that was no longer acceptable to large numbers of people. This research has closely examined both from the theoretical and practical points of view, the modalities for achieving effective and efficient enforcement of Nigeria's environmental laws.

What is needed to be done to complement the carrot and stick approach is the infusion of public confidence in environmental management through continuous environmental education and training. This will require a change in approach to environmental governance. Government must promote, implement and enforce environmental policies transparently. This calls for accountability and transparency in the environmental law-making process, environmental policing, and environmental prosecution. It will also involve liberalizing public participation in environmental decision-making and accessibility to environmental information and courts to prosecute environmental delinquents in cases.

5.3 Recommendation

Based on the findings of this study and to safeguard, control, and protect air quality and the environment more effectively and respectably, the following major recommendations are made:

- There is a need to improve the legal and political frameworks for environmental protection and management in the country.
- Developing sound policies for effective management of the country's air quality is imperative.
- Policymakers and executing officials need to look beyond capacity building; it must entail building the right political attitude and sense of dedication to ensure the enforcement of clean air policies in Nigeria.
- Emphasis must be on the provision of basic education on environmental protection to the citizens of Nigeria. This is important to sensitize the entity of the populace on the importance of clean air activities.
- Government should employ more field staff for effective monitoring of air pollution and promote programs that encourage good air quality.

5.4 Proposed for Further Study

Based on this research work, I hereby suggest the following for further studies:

a. Air pollution and its Effects It Has on the Global economy.
b. Impact of Poverty on environmental pollution in Nigeria.
c. Air pollution and Climate Change.
d. Impact of building/road construction on air pollution.
e. Environmental pollution and challenges of environmental governance in Nigeria.

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