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PROF. PATRICK C. IGBOJINWAEKWU

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EDITORIAL

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Prof. Patrick C. Igbojinwaekwu
Editor-in-Chief

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ROLE OF SCIENCE EDUCATION ON POLLUTION MANAGEMENT PRACTICES IN NIGERIAN URBAN CITIES

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Abstract

A healthy environment is an integral part of human existence and a polluted environment is a treat to every living thing within an environment. Science education (basic science/ physics, chemistry and biology) is expected to champion this course of making the environment healthy for human existence. Hence this study investigated the role of science education on pollution management practices in urban cities of Nigeria. A survey research design was used and five research questions were raised in this study. Interviews and direct observations were made and data's was also collected with the help of photographs. Information's received were interpreted and analyzed. It was found out that there are poor pollution management practices in Nigerian Urban cities. There are also categories of pollution caused by indiscriminate disposal of waste. The danger imposed on indiscriminate disposal of waste which led to constant pollution within the environment was also determined. Some recommendation was made which stated that government and other stakeholders and regulatory agencies should create awareness on the harmful impact of pollution in the environment. Enforcement of law on offenders should be implemented, pollution and practical wasted management practices should be embedded into science education curriculum so as to expose our young once starting from primary and secondary schools the need for a healthy environment.

Keywords: Science Education, Pollution Management, Urban Cities

Introduction

Due to the challenges faced today as a result of bad economy by most Nigeria it becomes very necessary to clamor for a healthy environment at least to have a good life first. A healthy environment is an integral part of human existence and a polluted environment is a treat to every living thing within an environment. Science education which is taught as basic science at junior second school and physics, chemistry and biology at senior secondary schools in Nigeria is expected to champion this course of making the environment healthy for human existence. Hence this study investigated the role of science education on pollution management practices in urban cities in Nigeria.

Science education is meant to play an important role in managing pollution within Nigerian urban cities especially in south eastern zone of Nigeria such as Aba in Abia State, Onitsha and Nnewi in Anambra State, Owerri in Imo State, Enugu in Enugu State and Abakaliki in Ebonyi States urban cities. Science Education is defined as the concept of the teaching and learning of Science subject. According to Agboola and Abe (2017) science education has in the past played a major role towards safeguarding our environment from pollution by acting as a bridge between environmental awareness and actionable waste management practices. While high levels of awareness about pollution exist among residents, a significant gap is yet to be filled between this knowledge and active, sustainable practices like waste disposal practices and recycling methods. Science education plays a crucial role in shaping environmental attitudes and behaviors by fostering an understanding of ecological interconnectedness. Effective science education moves beyond theoretical knowledge

to encourage sustainability through active, inquiry-based learning, leading to increased pro-environmental habits, such as waste reduction and energy conservation, among students.

Goals of Science Pedagogy are to;

Develop Scientific Literacy: Equip students with the ability to understand and evaluate scientific information, enabling them to make informed decisions in their personal and civic lives. Foster Curiosity and Creativity: Encourage students to ask questions, seek answers, and think creatively about solving problems. Enhance Problem-Solving Skills: Teach students to analyze situations, gather evidence, and develop logical solutions. Prepare for Future Challenges: Develop essential skills, such as critical thinking, adaptability, and collaboration, in a rapidly advancing technological world (Agbola, 2025).

Statement of the Problem

The main problem of this study is to determine the role of science education on pollution management practices in Nigerian urban cities. The challenge being faced in our environment as a result of bad pollution management has been an issue of great concern and Science education is meant to play an important role in managing pollution related issues within Nigerian urban cities especially in south eastern zone of Nigeria but unfortunately the environment in these cities still remain highly polluted. Science education has in the past played a major role towards safeguarding our environment from pollution by acting as a bridge between environmental awareness and actionable waste management practices. While high levels of

awareness about pollution exist among residents, a significant gap is yet to be filled between this knowledge and active, sustainable practices like waste disposal practices and recycling methods. Hence this study investigated the role of science education on pollution management practices in urban cities in Nigeria.

Role of Science Education in Pollution Management

1. **Awareness and Attitude Formation:** Science education increases understanding of the consequences of environmental pollution (water, air, and land) and promotes positive attitudes towards pollution control. It enables students and the public to comprehend the scientific basis behind pollution, such as toxic spills and improper waste disposal.

2. **Behavioral Change & Skill Development:** Environmental education (EE) components in science curricula aim to foster behaviors such as waste reduction, recycling, and responsible waste disposal in urban areas.

3. **Capacity Building for Sustainable Solutions:** It empowers youths and citizens to adopt eco-friendly practices, including waste-to-energy conversion, and to engage in community-driven environmental protection.

4. **Developing Technical Expertise:** Tertiary-level science education trains environmental scientists, health officers, and engineers responsible for monitoring and tackling pollution.

Challenges Facing Science Education in Nigeria: In Nigeria and south east zone in particular, science education has faced some challenges. Amongst those challenges are:

1. **Gap Between Knowledge and Practice:** Over 70% of individuals may show awareness of environmental issues, but a significantly smaller percentage translates this knowledge into practical action.
2. **Infrastructure Deficits:** Many schools lack adequate laboratories, modern equipment, and internet facilities for effective hands-on learning.
3. **Teacher-Centered Approaches:** Science instruction is frequently theoretical rather than participatory, limiting the development of problem-solving skills for real-world environmental issues.

4. **Ineffective Curriculum Implementation:** Despite having strong curricular frameworks, the practical implementation of environmental science education in schools is often weak. (This Day Live., 2023)

Recommendations for Enhanced Impact

1. **Making EE Compulsory:** Environmental education should be a mandatory program in the school curriculum across all levels to build a culture of sustainability
2. **Focus on Actionable Learning:** Shifting from theoretical knowledge to "hands-on" training (field trips, practical waste management projects) to ensure knowledge translates into action.

3. **Strengthening Policy and Enforcement:** Combining education with strict regulation and monitoring of industrial and domestic waste disposal.
4. By enhancing the practical, hands-on components of science education, urban centers in Nigeria can better translate environmental awareness into a cleaner, more sustainable environment.

A good environment that is devoid of pollution is what the whole world is looking for and Nigeria environment especially the south eastern urban cities are the main concern of this study (Federal Ministry of Education. 2018). But, the activities of human within these cities have posed serious disruption and treat to the natural ecosystem as well as the entire environment. That is what brought about global warming which both government and private organizations at various levels are struggling to manage. Currently those within these major cities in south east part of Nigeria are not finding life easy just as a result of poor environmental management practices such as indiscriminate dumping of refuse waste of various kinds; bad attitude of those managing the abattoirs within these cities, is also typical example of human activities that caused harm to the ecosystem by indiscriminately dumping the animal wastes within the environment and waterbodies. Njoku, & Agboola, (2021) pointed out that those working at the abattoirs does not only wash their animal meat inside the nearby stream rather they dispose the animal waste directly into those streams as a means of transporting them out of their environment thereby causing serious pollution to the aquatic animals inside those streams and also when those wastes are transported or washed away into other nearby rivers or streams the pollution keeps increasing, thereby posing more danger to both human and other animals within the environment.

The Word Health Organization WHO (2011) as described in Adeyemo, Adeyemi and Awosanya (2025), has warned on the danger involved when animal waste is not adequately managed by competent environment management experts, they classified such kind of waste as amongst the major pollutants within an environment. This is when too much wastes generated from animal farms in an environment has no well-established recycling or management practice available to manage such wastes. Therefore, the indiscriminate disposal of waste over time can affect both the air and water quality if no proper arrangement is made in other to manage such wastes. Such unwanted disposal of animal waste into the environment according to Ezeoha and Ugwuishiwu (2023) is referred to as Non-Point Source (NPS) pollution and when such dissolves in surface water it leads to the reduction of Dissolved Oxygen (DO) and causes harm on aquatic life. It also leads to the water bodies to produce had odor. Is important to dispose animal waste properly to save the environment. Waste management system should be part of the soil and water conservation plan for farmers producing livestock and poultry. The teaching and learning of science education courses should as a matter of urgency incorporate the necessary kinds of waste management practices at both junior and senior secondary school curriculum (National Institutes of Health, 2025). Of course recycling is among the topics in both chemistry and biology hence students who are learning such topics should be well exposed on all the dangers involved when all this city is polluted.

It is no doubt that proper pollution management practices are a major stakeholder in any giving environment and teaching of relevant topics in science education at the secondary school levels has a major role to play towards controlling the rate at which our environment are being polluted indiscriminately. Inadequate pollution

management practice contributed in bringing about diseases and sicknesses such as cholera, malaria and typhoid to the residents of such environment.

Purpose of the Study

The purpose of this study is to:

1. Examine the roles science education has played in pollution management
2. Determine the kind of pollution that exist within the Urban cities of south east Nigeria
3. Find out the kind of pollution management that is being practiced within the south east urban cities of Nigeria
4. Check the way at which the courses of pollution within Nigeria urban cities are monitored
5. Identify the consequence of pollution on the environment and its residents.

Research Questions

The following research questions guided this study:

1. What role is science education playing on pollution management?
2. What kind of pollution exist within the Urban cities of south east Nigeria?
3. What kind of of pollution management that is being practiced within the south east urban cities of Nigeria?
4. Which ways are the courses of pollution within Nigeria urban cities monitored?
5. What is the effect of pollution on residents of the environment?

Methods

Survey research design is adopted in this research. Survey research design as described by Njoku, (2021) is a structured approach to collecting data from a target population by asking questions and analyzing the results, primarily used to identify characteristics, preferences, opinions, or behavior. A survey research design according to Thompson, (2025) is defined as a systematic, quantitative, or mixed-methods approach to collecting primary data from a sample of individuals to describe, compare, or predict attitudes, behaviors, and characteristics of a larger population. It acts as a structured "blue-print" or "plan of action" for formulating research goals, selecting a representative sample, designing instruments (questionnaires/interviews), distributing them via online or traditional channels, and analyzing findings to generate actionable insights (Global Research Council. 2025).

Since this study is to find out the way at which science education has impacted on pollution management practices in Nigerian urban cities, physical/ on-the-sport observation and interview were used for data collection. The study population is comprised of all individuals including teachers and other workers and residents within the immediate environment where the activities of the pollution and its management practices where affected. A sample size of 16 teachers and other workers working in various schools' and organizations within the urban cities and twelve residents including secondary school teachers, the community heads and a resident health practitioner in a nearby health facility within the area made up the sample size. The survey was done through the following:

i. **Observation:** The researcher visited the affected urban cities and observed various ways at which pollution is managed including how wastes are being disposed. All the processes and methods of pollution management practices where observed

ii. **Photograph:** The picture evidence of some polluted environment, was observed as the usual operation of the people and people and others was taken for more information. Data was collected was presented thus:

iii. Direct contact and observations were made through visitation to the science teachers is some schools within the cities of those affected states, the wastes dump sites, the streams where the wastes are discharged, the resident health personnel of the nearby health facility, personnel of a pollution regulatory organizations were visited, residents, interview guide was administered to the persons listed above and the entire residents so as to gather the required information's. Direct observation was carried and photographs taken at the polluted/wastes dump sites for data collection

iv. **Interview Guide:** An interview guide was designed and used to get information from the 31 respondents of the area which is made up of 5 science teachers and 5 science students, 3 personnel of environmental/ pollution control organization, 5 workers of the abattoirs, 3 medical personnel within the affected polluted urban cities, and 10 residents within the affected urban cities.

The data collected in this study where by direct observations and oral interviews. Information's, observations and photographs gathered were analyzed, presented and discussed in tables and pictures forms.

Results

Research Question 1: What role is science education playing on pollution management?

Science education plays a crucial role in pollution management by fostering environmental literacy**,** driving technological innovation**,** and encouraging behavioral changes**.** It enables individuals to understand the scientific principles behind ecological damage, leading to more informed and responsible actions to mitigate pollution.

Responding further to questions 1. Concerning the role science education is playing on pollution management. Science teachers and students from secondary schools in the area presented thus: As professional Science teachers, we are aware of the crucial role quality pollution management practice has by fostering environmental literacy**,** driving technological innovation**,** and encourging behavioral changes**.** It enables individuals to understand the scientific principles behind ecological damage, leading to more informed and responsible actions to mitigate pollution. We have been teaching our students some pollution management practices and in all, recycling is the most recommended for sustainability.

The traditional rulers in one of the cities in the polluted environment who has spent over 30years as a traditional ruler explained that for now the only known method which they are using to dispose anything within their area is through burning. He said that yes teachers in a school in their area has told them the health implication and how burning has been polluting the environment, yet they don’t have any other way

other than burning. He took us to a rice mill and we went specifically to the place they usually dump rice husks. When we got to that rice husks dumping site we observed that burning of rice husks is a daily routine. Infact that area has been totally polluted. As we were approaching the area, we stopped breathing good air rather we were inhaling the smoke from that rice husks burning. Workers at the environmental regulations offices said that of a truth they have been sensitizing the people of the area on how best to manage their waste but the teachers who are supposed to sensitize their children at school are not really doing that, which has made all their growing youths not to see a polluted environment as something wrong, without considering the future health implications.

When we visited the abattoir in one of the cities, some of the workers we met said, they have some traditionalists who come regularly looking for animal hoofs, bones and horns to buy. Then only thing we burn is the hair but the feaces (dung) are gathered over a period of time which will later be sold to farmers who may request for them. From the above responses, it can be deduced that while hoof, bones and horns were sold to others who may request for them, hair was usually burnt. Regrettably, burning of hair as a means of disposing it will continue to course air pollution as earlier pointed out in the waste management practices.

Research Question 2: What kind of pollution exist within the Urban cities of south east Nigeria**?**

Urban cities in South East Nigeria which includes; Onitsha, Aba, Enugu, Nnewi, and Owerri, experience high levels of environmental pollution driven by rapid

urbanization, dense population, industrial activity, and weak waste management infrastructure. The pollution types are primarily air, water, land, and noise.

Table 1. Summary of kind of pollution that exist within the Urban cities of south east Nigeria

Types of Pollution	**Sources of occurrence**
Air Pollution (Particulate Matter and Gaseous Emission):	- **Open Waste Burning, Industrial and Vehicular Emissions, Soot and Artisanal Refining**
	Particulate Matter
Water Pollution and Groundwater Contamination:	**Sewage and Improper Waste Disposal**
	Industrial and Effluent Discharge
	Heavy Metal Pollution
Noise Pollution:	Unregulated vehicular horns
	loud speakers, and heavy reliance on private

	generators create excessive noise levels in commercial hubs and High concentrations of commercial activities.
Solid Waste and Soil Pollution:	**Agricultural Runoff**
	Unmanaged Solid Waste
	Plastic Pollution
Ecological and Physical Degradation:	**Gully Erosion**

Fig1. Water pollution from sewage disposal at Aba, Abia State Nigeria and Oil spillage into water at Ohaji Egbema in Imo State, Nigeria

As we can see from the pictures in fig 1, this water has been polluted completely which made it not to be useful to both human and aquatic animals.

Fig2. Land pollution from animal and industrial waste from abattoirs in Abakaliki, and Onitsha in Ebonyi and Anambra States respectively

Fig.3: A worker at Enugu environmental management office taking refuse to its dumping site using a manual truck thereby polluting the environment more.

Looking at the picture in fig 3, it was observed that the method used by this officer is very wrong. Because as he is moving the refuse from one site to the other, most of them will be dropping on the way thereby causing more environmental and land pollution.

FIG. 4: A highly polluted area in Owerri, Imo State Nigeria as a result of the pollution from a chemical industry waste

Research question 3: What kind of of pollution management that is being practiced within the south east urban cities of Nigeria?

During the course of this study, it was discovered that there were more of negative pollution management practices in the area which includes:

1. **Deposal of waste into water bodies:** When the wastes from production companies and animal killed in the abattoirs are disposed into the river it increases the turbidity of the water content of the river. There is about three major stream in area we visited, we observed that all the wastes generated from the industries and in that abattoirs where all flushed into those rivers, all the wastes from the animals including the dung, the blood and the urine. Also when washing the meat, other animal particles finds its tway into the same river which courses more pollution. Also the harmful chemicals generated from the industries which are deposited into the water bodies also makes the water unhealthy for both human and aquatic animals.

   During the course of this research study, it was found that the pollution management in the urban cities of South-East Nigeria (such as Enugu, Onitsha, and Aba) is largely characterized by a mix of state-led regulatory efforts, emerging mechanized solid waste systems, and heavily reliant, yet increasingly regulated, decentralized waste management. Challenges include high population growth, inadequate infrastructure, and poor compliance, leading to ongoing reliance on open dumping and burning

Key types of pollution management practiced in these urban areas include:

1. Solid Waste Management (SWM)

- **State-Led Collection Agencies:** State agencies like the Enugu State Waste Management Agency (ESWAMA) and Abia State Environmental Protection Agency (ASEPA) manage waste disposal, aiming to transition from purely social service to fee-based services.
- **Mechanized Collection:** Introduction of compactors, street sweepers, and designated dump stands/bins to replace uncoordinated open dumping.
- **Informal Waste Recycling:** A significant, albeit poorly regulated, sector where waste pickers recover recyclables from landfills.
- **Encouraging Waste Sorting:** Growing emphasis on waste segregation at the source (households) to improve recycling and reduce volume at landfills.

2. Air Pollution Control

- **Industrial Emissions Regulation:** Agencies enforce compliance with air quality standards in factories, particularly targeting particulate matter (PM2.5 and PM10).
- **Traffic Emission Management:** Efforts to monitor emissions from vehicles, with a focus on implementing vehicle inspections to curb fumes, especially in high-traffic cities like Onitsha.
- **Alternative Energy Promotion:** Initiatives targeting a reduction in the use of gasoline generators by improving electricity supply, and discouraging the use of fuel wood for domestic cooking.

3. Water and Sewage Management

- **Septic Tank/Soakaway Systems:** Due to the lack of centralized sewage systems in most cities, residential areas rely on septic tanks, which are increasingly subject to regulation on design and, in some areas, mandatory emptying services to prevent groundwater contamination.
- **Drainage Management:** Regular clearing of drainage systems to prevent waterlogging and flooding, which spreads refuse and contaminants.

4. Regulatory and Policy Frameworks

- **State Environmental Protection Laws:** Specific laws, such as the 2024 Enugu State Environmental and Protection Law, mandate stricter penalties for pollution, including waste dumping and illegal dumping.
- **Public Awareness Campaigns:** Local governments use radio and community sensitization to educate residents on proper waste disposal and environmental discipline.

5. Emerging Challenges and Proposed Solutions

- **Open Burning:** Despite efforts to curb it, open-air burning of refuse remains a common, yet discouraged, method of waste reduction.
- **Need for PPP:** There is a high reliance on public-private partnerships (PPP) to handle the high cost of collecting and disposing of municipal solid waste.
- **Sustainability Focus:** Future strategies focus on strengthening institutional frameworks, enhancing monitoring systems (using GIS/satellite technology), and promoting a "waste-to-wealth" (circular economy) approach.

Research question 4: Ways by which the courses of pollution within Nigeria urban cities monitored: Pollution within Nigerian urban cities could be monitored through continuous monitoring of the entire environment and by enforcement of regulatory laws

- **State Environmental Protection Laws:** During the process of this study as we visited Enugu, we were informed about the Enugu State environmental and protection law. Specific laws, such as the 2024 Enugu State Environmental and Protection Law, mandate stricter penalties for pollution, including waste dumping and illegal dumping.
- **Public Awareness Campaigns:** Local governments use radio and community sensitization to educate residents on proper waste disposal and environmental discipline.
- **A formidable taskforce team:** Monitoring pollution in Nigeria's urban cities requires an integrated approach that combines modern technology with ground-level inspections, particularly because existing infrastructure is often insufficient to cover rapidly expanding areas. Effective methods include stationary air quality stations, mobile units, satellite tracking, citizen science initiatives, and the use of low-cost sensors for real-time data collection.

Key Methods for Monitoring Urban Pollution in Nigeria:

- **Stationary Air Quality Monitoring Stations:** Active in cities like Enugu and Awka: This two states have stations that records continuous data on pollutants

such as PM2.5, PM10, sulfur dioxide (SO2), nitrogen oxides (NOx), and ozone (O3).

- **Mobile Monitoring Units:** Due to limited stationary infrastructure, mobile units—often installed on vehicles or trailers—are used to provide real-time air quality data in specific, high-traffic neighborhoods.
- **Satellite-Based Remote Sensing:** Utilizing NASA and European Space Agency data (e.g., TROPOMI Sentinel-5P), satellite sensors are used to track air pollutants across wide urban areas, especially helpful for capturing spatial variations that ground stations miss.
- **Low-Cost Sensors (IoT Technology):** Low-cost, palm-sized sensors are increasingly used to monitor PM2.5 within neighborhoods, providing high-resolution data on local combustion activities (e.g., generators, open burning).
- **Citizen Science Initiatives:** Engaging citizens via mobile apps (e.g., Urban Better Citizens) to carry portable air quality sensors to gather data during daily commutes, which helps identify pollution hotspots in residential areas.
- **Water Quality Sampling:** Regular sampling of surface water, groundwater, and boreholes to analyze contamination from industrial waste, untreated sewage, and plastics, especially in high-density areas like Lagos.
- **Modeling and Spatial Analysis:** Using HYSPLIT models to predict the trajectory and dispersion of pollutants from industrial points and vehicular traffic.

Specific Challenges and Focus Areas

- **The Harmattan Factor:** Monitoring is critical during the dry Harmattan season, when North-East winds bring Saharan dust, significantly increasing particulate matter levels.
- **Traffic and Generators:** High particulate matter (PM2.5) concentrations are linked to vehicular emissions and the widespread use of diesel/petrol generators due to power outages.
- **Data Gaps:** There is a need to expand monitoring to informal settlements and peripheral areas, where industrial and domestic waste burning is often higher than in city centers.

Key Recommendations

- **Increase Automated Stations:** Improve the existing network with more automated stations and mobile units.
- **Real-time Data Dissemination:** Develop integrated data platforms to share real-time air quality data via public dashboards.
- **Stricter Enforcement:** Use data-driven insights to enforce regulations on industries and vehicle emissions.

Research Question 5: The effect of pollution on residents of the environment

During this study the researcher met the teachers in secondary schools in the area, he also visited and interviewed some residents living in the areas including the traditional ruller. The researcher also paid a visit to some industries and factories

within the area to get on the spot feedback of how pollution has impacted on the life's of residents. The researcher also met with some medical personnel working at a health facility within the polluted areas of the city.

When the researcher was interviewing some of the person mentioned above, they all confirmed that indeed their environment is been polluted and the pollution has coursed them a severe health damage such as:

Water borne diseases: Residents and health personnel at Housa quarters ablators in Abakaliki, Ebonyi state, confirmed the presence of water related diseases within their area. Specifically, the medical personnel in a medical facility near the ablators said:

- Truly, there are so many confirmed cases of water borne diseases within the area which was caused as a result of the animal wastes being disposed into the river. Such disease includes; typhoid, cholera and gastro enteritis diarrhea. He said the typhoid and cholera has been on high rate since he has been practicing here. He said in this 2025 only between August and November, which is about 4 months we have about 11 persons that nearly lost their lives as a result of the diseases. From the above, it can be confirmed that truly, these animal wastes what were disposed into the river has great negative effect on the water body as earlier discussed.
- The medical personnel at the area also confirmed that only the flies hovering around the area of the abattoir, when perched on food usually courses health problem to anyone that consumes such food.

- A resident in the area also told the researcher that he has been treating typhoid, malaria and infection for some time now and he also said his neighbor is also facing the same challenge currently. he said he strongly believe that all were part of the problems they are facing as a result of the environment being polluted through wastes being disposed inside the only river they have within the area.

Air Pollution: Industrial and Vehicular Emissions: Widespread use of diesel generators, poorly maintained vehicles, and industrial activities release large amounts of sulfur dioxide), nitrogen dioxide, carbon monoxide and volatile organic compounds (VOCs).

Open Waste Burning: Due to inefficient garbage collection, burning solid waste in the open is a major source of toxic air pollutants in residential areas.

Soot and Artisanal Refining: The region suffers from "double air pollution" from artisanal refineries and illegal burning of seized oil products, releasing dense black soot. Also the only process of disposing hair as unwanted part of the animals is through burning. Burning hair would always bring about heavy smoke especially as inorganic materials such as kerosene was the source of fuel for the burning. Humans and other animals within the area inhales this **s**moke all the time a cow hair is burned. All the residents present confirmed that the only way the get rid of the cow skin when killed is through burning.

Unpleasant odor: Resident in the area complained bitterly on the challenges they are facing from the offensive odor they have been perceiving from the pollution of

their entire environment. One of them said he is getting use to the odor but he confirmed that most times it makes him get sick. One of the residents expressed his dissatisfaction, saying that the worry he is having is not only on the bad odor he has been perceiving but from the wastes they dispose around the area indiscriminately which has posed serious health challenge to all of them living within that area. Although a worker at a water and paint factories in the area confirmed that truly are been disposed indiscriminately and government agency in charge of waste disposal are not doing effectively as expected. He told the research that the time difference between when the wastes dumped at the waste dumping sites are been evacuated by the waste management agency and is much. He said that most times within three days, those in charge of the waste disposal may now show up at all. All the above have pointed to the fact that unpleasant odor oozes from the poorly managed environment is highly unhealthy to the residents within such areas.

Recommendations

Based on the findings of this study the following recommendations were made:

1. Science teachers mostly at secondary school should help in sensitizing the young children under their custody on the importance of keeping the environment off from pollution.
2. The curriculum of both primary and secondary school should incorporate a session where all issues concerning pollution management practices should be taught thoroughly

3. Agencies like the Ministry of Health, Water resources and the ministry of environment should find a way of cleaning up the entire cities within the south east of Nigeria
4. There should be a well-planned continuous sensitization programs by some regulatory government agencies such as health and environment to sensitize the public especially those working in production companies, abattoir houses on the need to practice and know the health implications of staying on a polluted environment.
5. Government should regulate the activities of those in charge of waste management and also build alternative waste dump site and incinerators for waste disposal in Abakaliki, Aba, Nnewi/ Onisha, and Owerri capital city of Imo state, Nigeria.
6. Government should enforce the existing sanitary and health laws regarding hygiene. This will go a long way in controlling those wrong attitudes of pollution of the environment.
7. **Stricter Enforcement:** Use data-driven insights to enforce regulations on industries and vehicle emissions.

Conclusion

Science Education has truly played a major role in exposing individuals on the importance associated with an environment that is devoid of pollution. Yes, science teachers are doing their best towards the sensitization but more is needed to be done to see an end to this challenge. Pollution management practices in the communities

located around those urban cities of, Nigeria has not been fully effective and has not been monitored appropriately. These pollution management practice laws should be enforced and serious measures should be embarked upon by all relevant stakeholders towards putting a total stop to such attitude of polluting the environment unlawfully. Adequate measures should be taken by government such as re-enforcing the environmental protection laws; apprehending offenders of pollution management practices. Churches and other religious organizations should sensitize their members to stay away from such attitude of polluting the environment. When pollution management system is not properly examined, it will surely course environmental hazard.

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