IMPACT OF PLASTIC WASTE ON OUR PHYSICAL ENVIRONMENT IN BENIN

Ogugwa Confidence BOI

UNIVERSITY OF BENIN
BENIN CITY

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BEING A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF HEALTH SAFETY AND ENVIRONMENTAL EDUCATION FACULTY OF EDUCATION, UNIVERSITY OF BENIN IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF (B.ED) IN ENVIRONMENTAL EDUCATION

MAY, 2024

CERTIFICATION

We, the undersigned, certify that this project was carried out by Boi Ogugwa Confidence in the Department of Health Safety and Environmental Education, Faculty of Education, University of Benin, Benin City

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DEDICATION

This study is dedicated to the Almighty God for His divine mercy, love, wisdom, understanding, strength and provision.

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ABSTRACT

This study investigates impact of plastic waste on our physical environment in Benin. Four (4) research questions were raised to guide the study.

The distribution of the population of this study were the residents of Benin City including customers and retailers distributed across the 3 local government areas which includes, Egor, Ikpoba-Okha and Oredo. The sample size adopted for the study was a total of Three Hundred (300) respondents within the area of the study. That is 100 respondents selected from each local government area that made up Benin City using a stratified random sampling technique. The major instrument used for this study was the questionnaire. The questionnaire was designed and validated by experts in the department of Health, Safety and Environmental Education, Faculty of Education University of Benin. Data were analyzed using descriptive statistical techniques such as tables, frequencies counts, and simple percentages

Findings of the study revealed that plastic wastes an leads to the death of aquatic animals, affect the quality of the soil in the region, inhibiting sustainable agriculture practices, burning plastic releases dangerous substances such as heavy metals and organic pollutants, into the air causing greenhouse effect and Plastic waste, plastic bags and other waste materials crammed drainage channels, thereby hindering free flow of water whenever it rain, It was further revealed that the packaging of table water in cellophane sachets has increased the number of wastes in our residential home, poor waste management practice. It was further recommended that the government must be holistically involved by engaging a wide range of stakeholders in the decision-making to address the menace. It was further recommended that seminars and workshops should be organized to educate people on the opportunities in the recycling sector and encourage like-minded people to establish recycling outfits

CHAPTER ONE
INTRODUCTION

Background to the Study

Waste management is one of Nigeria's greatest challenges. These wastes are in form of polymers and plastics which research has shown that they are difficult to manage. One major factor that leads to poor waste management in Nigeria is due to the higher population density (Kehinde, Ramonu, Babaremu & Justin (2018). Manufacturing plastics and plastic products has increased this year and higher than any other amount recorded in the world. Its production increased in just one year by 13million tons between the year 2015 and 2016 (Joystu & Moharana, 2018). Fifty percent of the plastic products fall within the disposable products category since they are single-use plastic products and packaging materials. It is a common practice to see a large number of waste plastic products not collected in waste bins for further processing, recovery and standard disposal via recycling centres, incinerators or landfills, rather, they are carelessly scattered or discarded into regions that are inaccessible for waste collection and hence terminating the possibility of recovery/recycling. The usual practices include plastic bottles and containers being thrown on the ground, thrust out of vehicles, hipped

around narrow passages or blown away by wind which litter the surroundings and subsequently pollute the immediate ecosystem.

There exist a large number of polymers around us that are taken for granted and are so familiar of which some are generated from human activities. Natural polymers include products of glucose which are cellulose and starch, while rubber and proteins are derived from isoprene and amino acids respectively. Examples of polymers created by man's activities includes polyurethane, Teflon, Lucite, nylon, silicones, Dacron, Orlon, polyethylene, epoxy, polyester, boat resin and vinyl. Without doubt, polymers have had a huge impact on our culture and continue to do so. With the creation of these materials, challenges occurred with their application. Although most are not biodegradable, but they contribute a meaningful amount to the refuge created by man, plus their component raw materials still serve as a huge resource for man's need. Recycling of plastics is a relevant technique of waste reduction, energy and useful raw materials recovery process,

This continuous piling up of plastic waste products is becoming a serious global environmental challenge and threat the ecosystem. Research

shows that about 10 percent by weight of municipal solid waste content are plastics as plastic waste occupies about 90% of the three populous rivers in the world and is known to be responsible for the death of 20–30% of marine life. There are more than seven million tons of additional plastic waste deposits in the earth annually, and by this plastic growth trend, the sea would have more plastics than fishes and over more 97% of the of the bird would have consumed them (Mohara & Maqtari,2014). Plastic wastes are hazardous not just to land animals but also to aquatic life as well and therefore a global challenge Therefore, plastic waste are environmental disasters already occupying the earth, thus a need for acute adoption of plastic management techniques

Most plastic materials are commonly grouped under the term 'Polymers' to describe them as either organic or carbon-rich compounds having a long chain pattern of connected molecules. Plastics are mostly organic polymers of increased molecular mass (Anyanwu &Adefila, 2014). The word plastic was coined from the Greek phrase plasticos that denotes the ability of materials to be shaped or moulded when there is change in temperature.

Plastic waste is a global problem, but with regional variability. Plastic waste has tremendous impact on the health of the ecosystem and humans. The unethical methods of disposal further aggravate the effects with the release of chemicals to the environment through burning or by escape of landfill leachates. The ingestion of plastic by fishes also cause internal ulcerations, disruption in the digestive tract of the fishes, and restrains buoyancy control (Verme, Vinoda, Papireddy & Gowda, 2016). Statistica (2018) indicates that one million waste plastic bottles are churned out every minute across the world while five trillion plastic bags are generated yearly, about 10 million unit every minute. It is also estimated that at least eight million tons of plastic end up in the oceans every year (Darshan and Gururaja, 2017). The empirical prediction that by 2050, world's ocean will have more plastic than fishes portends far-reaching dangers and calls for drastic measures to address the menace urgently. In a statement released by African Development Bank, over 100,000 marine animals are killed by plastics and 83 percent of tap water are found to contain plastics particles (Hanafi, 2018). Plastic pollution is of particular concern in coastal areas of Nigeria. Plastic fragments will persist in the aquatic environment for decades or centuries, due to their high resistance to natural degradation processes.

In Nigeria, less than 12% of plastic waste is recycled. About 80% of plastic waste goes to landfills and dump sites (Babayemi, Ogundiran, Weber & Osibanjo, 2018). Cities choose to dump solid waste in dump yards where waste is either buried or left in place. The common act of dumping is particularly due to the lack of awareness and the need for land to discard an enormous amount of wastes generated from households and surrounding areas.

In Benin metropolis, there is increasing use of plastics is evident in the unsightly heaps of plastic waste that are a recurring sight in major cities. In some areas, these heaps have taken over major roads. The indiscriminate disposal, poor management and the unregulated use of plastic are fuelling a pollution crisis in the area. This has negative environmental and health implications. The non-biodegradable nature of plastics implies that they can stay in the environment for hundreds of years, affecting water bodies, wildlife, aquatic life and arable land. From pollution of water bodies and the resultant threat to aquatic life to flooding issues and its impact on livelihood to land pollution and its effect on aesthetic qualities, the negative impact of plastic wastes transcends all.

Statement of the Problem

In Benin environment, despite the establishment of waste management board, there is still poor disposition plastic waste. Individuals forms the habits of dumping plastic waste from home in the yard either at the front or behind the house, where its eventually gets bunts openly, thereby producing unpleasant smell in the neighbourhood.

Also, plastic waste collection is not regular and carried out in area especially in the markets, thereby leaving the public health in jeopardy. Improper, sited open dumps have defaced several are in Benin environment thereby encouraging spread of spreads of odours and pollution of water sources. Although, there are active plastic waste dump sites in Edo State such as Iguomo, Ikhueniro and Otofure which were aimed in accommodating waste in general and plastic waste in particular being generated in the environment but due to the indiscriminate dumping of waste, even around the dump site which eventually encroached into main road and blocking culverts. This could go a long way to pose threat to the general public health and leads to environmental. Plastic pollution is capable of affecting land, water-ways and oceans as a large percentage of marine and land creature have died due to the fact that plastic waste are non-

biodegradable and can cause hazard to the soil. It can also emits toxic gasses when expose or heated up. This study investigate the impact of plastic waste on our physical environment in Benin

Research Questions

The following research questions were raised to guide the study:

1. What are the environmental impacts of plastic waste in Benin City?
2. What are the factors that contribute to increased dumpsites of plastic waste in Benin City?
3. What are the Perceived health impacts of plastic waste on the inhabitants of Benin City?
4. In what way can plastic waste be prevented in Benin City?

Purpose of the Study

The main purpose of this study is to investigate the impact of plastic waste on our physical environment in Benin. However, the study sought to achieve the following sub-objectives:

1. Determine the environmental impacts of plastic waste in Benin City
2. Ascertain the factors that contribute to increased dumpsites of plastic waste in Benin City

3. Assess the health impacts of plastic waste on the inhabitants of Benin City
4. To ascertain the ways plastic waste can be prevented in Benin City

Significance of the Study

The findings of the study would be of great significance to the government and researcher.

The findings would be relevant to government as it will help to understand the negative impact of plastic waste in our environment and how they can device measures to ameliorate the impacts it could have in our environment

The findings of this study will also be significant to students, the researcher and readers, not only as an addition to knowledge or existing literatures but as a ready-made reference material that could form a basis for further research

Scope and Delimitation of the Study

The study is centred on the impact of plastic waste on our physical environment. However, the study will be delimited to areas in Benin metropolis such as Egor, Oredo and Ikpoba-Okha

Definition of Terms

The following terms are operationally defined as used in the study

Waste: these are unwanted or unusable materials that are discarded after primary use or its worthless defective and of no use

Plastic Waste: they are materials grouped under the term "Polymer" having a long chain of connected molecules

Recycling: these are the process of collecting and processing materials that would otherwise throw away as trash and turning them into new products

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter deals with the review of relevant and related literature on this study. It shall be discussed under the following sub-headings.

- Concept of Waste
- Meaning of Plastic Waste
- Environmental Impacts of Plastic Waste
- Factors that Contribute to Increased Dumpsites of Plastic Waste
- Perceived Health Impacts of Plastic Waste

- Ways Plastic waste can be Prevented
- Summary of Reviewed Literature

Concept of Waste

Most human activities generate waste (Brunner & Rechberger, 2014). Despite that, the production of waste remains a major source of concern as it has always been since pre historic period. In recent times, the rate and quantity of waste generation have been on the increase. As the volume of wastes increases, so also does the variety of the waste increases (Vergara & Tchobanoglous, 2012). Unlike the pre historic period where wastes were merely a source of nuisance that needed to be disposed of. Proper management was not a major issue as the population was small and a vast amount of land was available to the population at that time. In those days, the environment easily absorbed the volume of waste produced without any form of degradation.

A substantial increase in volume of wastes generation began in the sixteenth century when people began to move from rural areas to cities as a result of industrial revolution (Wilson, 2017). This migration of people to cities led to population explosion that in turn led to a surge in the volume

and variety in composition of wastes generated in cities. It was then that materials such as metals and glass began to appear in large quantities in municipal waste stream (Williams, 2015). The large population of people in cities and communities gave rise to indiscriminate littering and open dumps. These dumps in turn formed breeding grounds for rats and other vermin, posing significant risks to public health. The unhealthy waste management practices resulted in several outbreaks of epidemics with high death tolls (Olabode, 2014). Consequently, in the nineteenth century public officials began to dispose waste in a controlled manner in other to safe guard public health.

Waste can be seen as items that people discard or throw away because it has hazardous properties and it is of no value. There are different categories of waste, for example; Solid waste, Animal by-product, Electronic waste, Food waste, Agricultural waste, end of live vehicles and Gas cylinder to mention but a few. All these waste can be recycled in order to reduce pollution such as air, water, land, radioactive and thermal pollution, thereby, making the environment greener and conducive for every living object. In addition, recycling can also generate wealth for individuals, organizations and governments. In this manner, it improves the standard and

well-being of the people living in a particular environment. Recycling is capable of leading to development in a setting because it reduces waste and at the same time generates wealth.

Waste can therefore be defined from different perspective depending on how the owner of such waste perceives it. Normally waste can be described as something that has no value, useless and that want to be discard by the owner. Waste variably refer to lack of use or 'useless remain' (concise oxford Dictionary). From financial point of view, waste is anything that has no financial value either present or the future because there is no demand for such item in the marketplace.

Meaning of Plastic Waste

Plastic waste is a significant environmental concern described as an emerging environmental pollutant (EEP) (Yalwaji, John-Nwagwu & Sogbanmu, 2022) that has the potential to disrupt life on land (SDG15) and life in water (SDG14). Plastics are the name given to a group of polymeric materials made from fossil fuels, including crude oil. In their production, different chemical materials are added to change the strength, texture, and/or cost of producing this ubiquitous source of packaging material. Of all the

different types of plastics produced, Polyethylene terephthalate (PET) and High-density Polyethylene (HDPE) are widely recycled. The other types are trickier and, in some cases, can only be used once, after which they exist in the environment as a non-biodegradable element.

Plastics that are not bio-degraded are either left on land to pollute the soils or find their way into the oceans, where they continue to pollute the water for animals in the oceans. Currently, there are different sizes of plastic pollution found in the soil, water and air. Ranging from nanoplastics to microplastic. Nanoplastics have been observed in the air and could portend significant dangers for humans and animals where they are breathed (Morales, Tomlin & West, 2022). Microplastics are more regularly found in fresh and saltwater bodies, sometimes seeping into drinking water sources like boreholes, especially in developing countries.

One of the biggest challenges with single-use plastics is that they cannot be reused or recycled. This means they continue accumulating and finding their way into waterways, rivers, and oceans. This is corroborated by the fact that in Nigeria, only 12 percent of the total plastic produced and imported is recycled (Yalwaji et al., 2022). The consequence of this

proliferation of poor plastic disposal is that livelihoods can be significantly affected, either by the increased flooding of urban communities due to blocked drainages or the outright health implications for Nigerians living in polluted areas. In some cases, microplastics have been found in drinking water collected from boreholes (Kaufmann, 2022)

Environmental Impacts of Plastic Waste

Plastic waste is a global problem, but with regional variability. Plastic waste has tremendous impact on the health of the ecosystem and humans. The unethical methods of disposal further aggravate the effects with the release of chemicals to the environment through burning or by escape of landfill leachates. The ingestion of plastic by fishes also cause internal ulcerations, disruption in the digestive tract of the fishes, and restrains buoyancy control (Verme, 2016). Some of the major impacts of plastic waste on the environment are discussed below:

Effect on Marine Life

The global oceans are critical to sustaining the Earth‘s natural life support systems. They are regarded as the lungs of our planet, providing most of the oxygen we breathe, they also contribute to the livelihoods, culture and well-being of communities around the world, and play a vital role in the global

economy, providing food and a source of income for millions of people. Yet, with a fast-growing world population, the production of waste continues to increase faster than the efforts towards mitigating its impact on the oceans (Blettler, 2018). Statistical (2018) indicates that one million waste plastic bottles are churned out every minute across the world while five trillion plastic bags are generated yearly, about 10 million unit every minute. It is also estimated that at least eight million tons of plastic end up in the oceans every year (Darshan and Gururaja, 2017).

The empirical prediction that by 2050, world‘s ocean will have more plastic than fishes portends far-reaching dangers and calls for drastic measures to address the menace urgently. In a statement released by African Development Bank, over 100,000 marine animals are killed by plastics and 83 percent of tap water are found to contain plastics particles (Hanafi, 2018). Plastic pollution is of particular concern in coastal areas of Nigeria. Plastic fragments will persist in the aquatic environment for decades or centuries, due to their high resistance to natural degradation processes. This waste gets into the ocean from land-based sources such as storm water discharges, combined sewer overflows, littering, industrial activities, and solid waste disposal and landfills (Blettler, 2018). The most visible and worrying impact

of marine plastic pollution is the suffocation and entanglement of marine species, which includes seabirds, turtles, fishes, mussels, crustaceans and marine mammals.

Also, of concern is accidental ingestion, which can be fatal. Entanglement can produce lacerations and causes infections as a result of abrasive or cutting action of the litter (SFEP (Science for Environment Policy) 2011). It also impairs the animals swimming, search for food and escape from predator. The effect of entanglement is largely underestimated, as most victims are undiscovered as they sink, eaten by predators or transported over long distances altering biodiversity and the equilibrium of native ecosystems The venon and Oliver (2014) reported that some birds and marine species mistake plastic particles waste for potential prey items and select specific plastic shapes and colours, reducing their actual food uptake and causing lethal injury and death following blockage of the intestinal tract. The ingestion of plastic debris is also of concern to small invertebrate organisms with possible health implications for humans who consume seafood as the pollution as resulted in the prevalence of toxic metal in the food chain. The surfaces of floating plastics potentially accumulate toxic pollutant during their long residence time in polluted seawater, serving as a

vector for toxic pollutants that accumulate in marine organisms. Beyond the heroic efforts of beach clean-up volunteers, the challenge of reducing plastic pollution in the ocean requires a coordinated effort from all sectors of the society, including manufacturers, tourism, local authorities and governments, and all other users of coasts and oceans.

Plastics in Landfills

Land-fills have contributed to nearly 20% of Green House Gases (GHG) followed by fossil fuels. (Verma, 2016). In landfills, plastic degrades into its smaller components and leaches into the soil and the water table, ultimately making its way towards the food chain and causing massive health hazards. Leachates from landfills contains metals, such as lead, mercury, cadmium along with pesticides, pharmaceutical wastes, disinfectants, organic compounds and chemicals which contaminates the groundwater. A mixture of toxic substances and decaying organic material from a landfill site can also affect the structure and quality of the soil in the region, inhibiting sustainable agriculture practices, thus exerting a direct impact on biodiversity (Hakeem, 2018). Landfills are also the source of several greenhouse gases amongst which carbon dioxide and methane constitute 90% to 98%, respectively. Methane which is released as a result

of the decomposition of organic matter. These gases, apart from been able to cause landfill fires due to their flammability, could also trap solar radiation, thereby leading to global warming (Hanafi, 2018; Okon, 2018). In Nigeria, less than 12% of plastic waste is recycled. About 80% of plastic waste goes to landfills and dump sites (Babayemi, 2018). Cities choose to dump solid waste in dump yards where waste is either buried or left in place. The common act of dumping is particularly due to the lack of awareness and the need for land to discard an enormous amount of wastes generated from households and surrounding areas.

Waste Burning

Waste burning is a recurrent means to plastic disposal in municipals resulting in smog and poor air quality. The practice has been on the rise owing especially to ignorance, lack of awareness about the consequences, and poor prevalent waste collection infrastructure. The by-products of plastic combustion are airborne particulate emission (soot) and solid residue ash (black carbonaceous colour) which can travel thousands of kilometers, depending on prevailing atmospheric conditions and enter our food chain possess a high potential of causing health and environmental concerns (Hanafi, 2018). Burning plastic and other wastes releases dangerous

substances such as heavy metals, Persistent Organic Pollutants, and other toxins into the air causing greenhouse effect and damage to the ozone layer. Dangerous pollutants like mercury, polychlorinated biphenyls, dioxins and furans which are released during burning accumulates in food crops, animals and fish endangering humans and wildlife. Toxins which are released when plastic waste is burnt with food waste, which can increase risk of heart disease, aggravate respiratory ailments, damages kidney, liver, nervous system, skin, causes cancer and possibly death (UNEP, 2018)

Flood

Flood is an overflow of water that submerges dry lands, carrying materials uncontrollably from one location to another. Arguably, floods wreak havoc seasonally on Nigeria, especially in populated metropolitan cities where plastic bottles, plastic bags and other waste materials crammed drainage channels, thereby hindering free flow of water whenever it rains. Apart from the monumental losses it causes, flood is a potential source of water borne diseases such as cholera, typhoid and dysentery (Agamuthu, 2015).

Factors that Contribute to Increased Dumpsites of Plastic Waste

The packaging of table water in cellophane sachets has helped in ameliorating the water shortage in the country because different

governments have failed to provide safe drinking water for the populace (Edema, 2011), and the use of polythene shopping bags is also facilitating business transactions (Okeke, 2018). At the same time, these single-use products are often disposed of indiscriminately (Olabode, 2014). Thus, they are increasingly important sources of plastic pollution and the associated hazards in Nigeria (Nnaji, 2014). Heaps of littered plastic debris is frequently a common sight throughout Nigerian streets and neighborhoods (Adegboye, 2018).

In a study that examined the plastic waste disposal practices/habits of university students in Uyo, Southern Nigeria, Daniel and Ibok (2013) found that student residential areas contained more quantities of litter than areas inhabited by nonstudents. They argued that this was because of the indiscriminate disposal of plastic waste by students, which was engendered by poor sanitation habits and practices among them (Olabode, 2014). Again, Daniel and Ibok (2013) revealed that plastic waste (12%) was among the highest environmental pollutants after food (38%) and paper (36%). While food and paper are biodegradable, plastic is not (Nnaji, 2014). Therefore, this contributes to the problem of plastic pollution in the area, mainly

because the dumping of waste in nearby bushes is one of the ways in which residents/students manage their waste

Nigerian students' poor waste management practice is contrary to what was found among their counterparts in the Philippines, where both male and female university students ‘‘always practiced waste segregation by classifying their solid wastes such as plastic, paper and vegetables and disposed of them in the appropriate waste bins or containers in their households’’ (Dolipas, Ramos, Alimondo & Madinno, 2013).

Furthermore, there are other apparently culturally specific popular practices in Nigeria, which may aggravate plastic pollution. These include the dumping of refuse along major highways (Ike, Ezeibe, Anijiofor, Daud, 2018) and under bridges (Imam,2008). In most Nigerian cities, the use of open dumpsites is prevalent. For example, Nnaji's (Nnaji,2014 p.53) study, which investigated multiple sites in Nigeria, found that ‘‘50% of residents of Maiduguri in northern Nigeria and Ughelli in southern Nigeria dispose of their waste in open dumps.’’ He further revealed that most of the dumpsites are illegal/unapproved by the government. In fact, out of the 72 dumpsites he investigated in Nsukka, 81% were unapproved. Indeed, many factors

contribute to littering, among them are the unavailability of a supportive infrastructure in the form of litter facilities (waste bin) and the fact that individuals will most likely litter if a site is already littered (Schultz, Bator and Large, 2013) which may be one of the reasons for the prevailing use of illegal open dumpsites in Nigeria

Yet another common, culturally specific practice is the use of plastic waste bags and other containers to store waste in different households, which are then dumped in culverts and drainage channels (gutter) during periods of rainfall. Indeed, poor waste management awareness, resulting in poor dumping habits, is largely responsible for these popular practices. While some of the debris that people dispose of indiscriminately are swept into the oceans, others either litter the streets and neighborhood or result in drainage blockages and flooding (Karshima, 2016). Crucial here is the fact that there is a high level of poor sanitation/ hygiene habits among the Nigerian public. The lack of social will (Asase, Yanful, Mensah, Stanford and Amponsah , 2009) or the heightened lacklustre (I-don-care attitude7 in the local parlance) attitude/behaviour in regard to maintaining a clean environment contributes significantly to indiscriminate waste disposal and may aggravate the plastic pollution problem in Nigeria

Health and Environmental Impact

Improper handling of plastic waste creates negative effect on human health and most affected groups are mostly workers working in the field, who need to be educated on the risk and as well as people living in such area. Plastics waste disposed on land or water become toxic and infectious material that are dangerous to human health. These infectious materials can cause skin and blood infection, eye and respiratory infection as well as different diseases that result from the vector borne disease to name a few (The Ministry of Urban Development Government of India, 2012]).

Ineffective management of municipal waste lead to pollution of water, ground water, and air which is from inefficient burning of wastes, either in open air, or in plants that lack effective treatment facilities from the gaseous effluents (The Ministry of Urban Development Government of India, 2012). Municipal Solid Waste Management System activities is to make proper arrangement of storage, collection, transportation, disposal of waste which is believed to have adverse impact on land, water and air environment, human and environmental health, aesthetics and quality of life. The Environmental and Health Impact Assessment may help in educating on the adverse effects that could occur during these activities and as well provide information on

precautions which could prevent effects from occurring (The Ministry of Urban Development Government of India, 2012).

Summary of Reviewed Literature

The review has been quite revealing and instructive. The review can be summarized as follows;

The review shows that waste can be seen as items that people discard or throw away because it has hazardous properties and it is of no value. There are different categories of waste, for example; Solid waste, Animal by-product, Electronic waste, Food waste, Agricultural waste, end of live vehicles and Gas cylinder to mention but a few. All these waste can be recycled in order to reduce pollution such as air, water, land, radioactive and thermal pollution, thereby, making the environment greener and conducive for every living object.

The review also showed that plastics are the name given to a group of polymeric materials made from fossil fuels, including crude oil. In their production, different chemical materials are added to change the strength, texture, and/or cost of producing this ubiquitous source of packaging material. Plastic waste is a significant environmental concern described as an emerging environmental pollutant.

The review also unveiled that plastic waste is a global problem, but with regional variability. Plastic waste has tremendous impact on the health of the ecosystem and humans. The unethical methods of disposal further aggravate the effects with the release of chemicals to the environment through burning or by escape of landfill leachates. The ingestion of plastic by fishes also causes internal ulcerations, disruption in the digestive tract of the fishes, and restrains buoyancy control.

The summary also revealed factors that contribute to increased dumpsites of plastic waste to be packaging of table water in cellophane sachets has helped in ameliorating the water shortage in the country because different governments have failed to provide safe drinking water for the populace, and the use of polythene shopping bags is also facilitating business transactions

The review revealed that Nigerian students' poor waste management practice is contrary to what was found among their counterparts in the Philippines, where both male and female university students ‘‘always practiced waste segregation by classifying their solid wastes such as plastic, paper and vegetables and disposed of them in the appropriate waste bins or containers in their households’’

CHAPTER THREE

METHODOLOGY

The methodology shows the methods and procedures that were used for data collection and analysis in the study. However, particular attention was given to the followings:

- Design of the Study
- Population of the Study
- Sample and Sampling Techniques
- Research instrument.
- Validity of the Research Instrument
- Reliability of the Research Instrument

- Method of Data Collection.
- Method of Data Analysis

Design of the Study

A descriptive survey research design was adopted for the study. The choice of this design stems from its strength as a useful means for fact finding and an acknowledged means of obtaining social facts and opinions for the purpose of describing and interpreting existing conditions. (Nworgu, 2006). This chosen research design method is appropriate, especially for seeking individuals' opinions, attitudes and perceptions in their natural setting and it enables the researcher to make generalization concerning his population of study.

Population of the Study

The population of this study are the residents of Benin City including customers and retailers distributed across the 3 local government areas which includes, Egor, Ikpoba-Okha and Oredo

Sample and Sampling Technique

The target sample size for this study will be a total number of Three Hundred (300) respondents within the area of the study. That is 100

respondents selected from each local government area that made up Benin City using a stratified random sampling technique.

Research Instrument

The instrument to be used for data collection in the study was a self-constructed questionnaire, tagged "Impact of Plastic Waste on our Physical Environment Questionnaire" (IPWPEQ). It has two Sections (A and B). The Section A deals with the respondents' Bio-Data in terms of age-bracket, sex, marital status, primary and secondary occupations. Section B deals with issues relating to the research questions raised to guide the study. The questionnaire was coded with nominal values assigned to each possible response that were expected from the respondents. Each of the items in Section B was scored on the basis of the modified, Likert four Point Scale coded as: Strongly Agree = 4. Agree = 3 Disagree = 2 Strongly Disagree = 1.

Validity of the Instrument

The research instrument is validated using the expert judgment approach. In this view, copies of the draft instrument were given to my project supervisor and two other lecturers in the Department of Health, Safety and Environmental Education, Faculty of Education, and University

of Benin for items selection and wording. After which their suggestions was taken into consideration before the final copy of the instrument were designed and made use of.

Reliability of the Instrument

To determine the reliability of the instrument, the test-re-test procedure was adopted. In this vein, 30 copies of the instrument were administered on the respondents who were not part of the target population. After a time lag of two weeks the instrument was be re-administered on the same group of respondents. Thereafter, their responses on the two occasions were collected and collated using Pearson Product Moment Correlation Coefficient Statistical notation to determine its reliability index which was given to be 0.75

Methods of Data Collection

The researcher administered the instrument personally to the respondents. She explained and clarifies issues to the respondents. After, responding to the questionnaire by the respondents, it was collected the same day.

Method of Data Analysis

Simple tables, frequency and percentages was adopted in the presentation and analysis of the data generated for the study. These statistical tools were used because they are suitable means of breaking down and analyzing the generated data.

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

This chapter deals with the presentation of the result from the data collected and analyzed. The results were logically interpreted and presented in table as shown hereunder:

Research Question One: What are the environmental impacts of plastic waste in Benin City?

In proffering answers to the above questions, the researcher gathered and analyzed the relevant data in the instrument precisely those of items 1-4 using percentage statistics and the result is as presented below.

Table 4.1: Data on environmental impacts of plastic waste in Benin City

S/N	Variables	SA (%)	A (%)	D (%)	SD (%)
1	Plastic wastes an leads to the death of aquatic animals	150 (50%)	50 (17%)	100 (34)	
2	Plastic wastes when landfill can affect the quality of the soil in the region, inhibiting sustainable agriculture practices	100 (33%)	100 (33%)	100 (34)	
3	Burning plastic releases dangerous substances such as heavy metals and organic pollutants, into the air causing greenhouse effect	100 (33%)	80 (27%)	120 (40)	

4	Plastic waste, plastic bags and other waste materials crammed drainage channels, thereby hindering free flow of water whenever it rains	75 (25%)	200 (67%)	25 (8)

Source: Field Survey, 2024

A critical view of Table 1 above showed that 150 (50%) and 50 (17%) of the respondents Strongly Agreed and Agreed respectively that plastic wastes an leads to the death of aquatic animals. Accordingly, 50 (17%) and 50 (17%) of the respondents Disagreed or Strongly Disagreed on this variable.

In ascertaining whether plastic wastes when landfill can affect the quality of the soil in the region, inhibiting sustainable agriculture practices, it was observed that 100 (33%) and 100(33%) of the respondents Strongly Agreed and Agreed respectively on the variable while 90 (30%) and 10(4%) of them had a different position.

In the same vein, the researcher was also interested in finding out from respondents if they are burning plastic releases dangerous substances such as heavy metals and organic pollutants, into the air causing greenhouse effect and from the responses gathered, 100 (33%) and 80 (27%) Strongly Agreed and Agreed respectively while 60 (20%) and 60 (20%) responded otherwise.

Similarly, it was also found that 75 (25%) and 200 (67%) of the respondents Strongly Agreed and Agreed respectively that plastic waste, plastic bags and other waste materials crammed drainage channels, thereby hindering free flow of water whenever it rains. There was however 25 (8%) respondent that Disagreed or Strongly Disagreed on this variable.

From the analyses of the responses made on this question by all the participants, it is therefore concluded that Plastic wastes an leads to the death of aquatic animals, affect the quality of the soil in the region, inhibiting sustainable agriculture practices, burning plastic releases dangerous substances such as heavy metals and organic pollutants, into the air causing greenhouse effect and Plastic waste, plastic bags and other waste materials crammed drainage channels, thereby hindering free flow of water whenever it rain

Research Question Two

What are the factors that contribute to increased dumpsites of plastic waste in Benin City?

In proffering answers to the above questions, the researcher gathered and analyzed the relevant data in the instrument precisely those of items 5-8 using percentage statistics and the result is as presented below

Table 4.2: Data on what classroom climate and air quality (ventilation) senior secondary school students prefer to learn in Ovia North local government area

S/N	Variables	SA (%)	A (%)	D (%)	SD (%)
5	The packaging of table water in cellophane sachets has increased the number of wastes in our residential home	120 (40%)	100 (33%)	80 (27)	Nil (0)
6	Poor waste management practice by Nigerian students has contributed to increased dumpsite	100 (33%)	100 (33%)	Nil (0)	100 (33)
7	Unavailability of a supportive infrastructure in the form of litter facilities (waste bin)	150 (50%)	100 (33%)	50 (17)	Nil (0)
8	Use of plastic waste bags and other containers to store waste in different households, which are then dumped in culverts and drainage	200 (67%)	82 (27%)	18 (6)	Nil (0)

Source: Field Survey, 2024

A critical view of Table 2 above showed that 120 (40%) and 100 (33%) of the respondents Strongly Agreed and Agreed respectively that the packaging of table water in cellophane sachets has increased the number of wastes in our residential home. Accordingly, none of the respondents Disagreed or Strongly Disagreed on this variable.

In ascertaining whether poor waste management practice by Nigerian students has contributed to increased dumpsite, it was observed that 100 (33%) and 100(33%) of the respondents Strongly Agreed and Agreed respectively on the variable while 100(33%) Disagreed

In the same vein, the researcher was also interested in finding out from respondents if the unavailability of a supportive infrastructure in the form of litter facilities (waste bin) and from the responses gathered, 150 (100%) and 100 (33%) None Strongly Agreed while 50 (17%) Disagreed

Similarly, it was also found that 200 (67%) and 82 (27%) of the respondents Strongly Agreed and Agreed respectively that use of plastic waste bags and other containers to store waste in different households, which are then dumped in culverts and drainage. There was however no respondent that 18 (6%) Disagreed while none Strongly Disagreed on this variable.

From the analyses of the responses made on this question by all the participants, it is therefore concluded that the packaging of table water in cellophane sachets has increased the number of wastes in our residential home, poor waste management practice by Nigerian students has contributed

to increased dumpsite, unavailability of a supportive infrastructure in the form of litter facilities (waste bin) and the use of plastic waste bags and other containers to store waste in different households, which are then dumped in culverts and drainage

Research Question Three: What are the Perceived health impacts of plastic waste on the inhabitants of Benin City?

In proffering answers to the above questions, the researcher gathered and analyzed the relevant data in the instrument precisely those of items 9-12 using percentage statistics and the result is as presented below.

Table 4.3: Data on how the perceived health impacts of plastic waste on the inhabitants of Benin City

S/N	Variables	SA (%)	A (%)	D (%)	SD (%)
9	Plastics waste disposed on land or water become toxic and infectious material that are dangerous to human health	20 (07%)	280 (93%)	Nil (0)	Nil (0)
10	Infectious materials can cause skin and blood infection, eye and respiratory infection	75 (25%)	225 (75%)	Nil (0)	Nil (0)
11	Ineffective management of plastic waste lead to pollution of water, ground water, and air	200 (67%)	100 (33%)	Nil (0)	Nil (0)

12	Plastic waste can affects environmental health, aesthetics and quality of life	90 (30%)	210 (70%)	Nil (0)	Nil (0)

Source: Field Survey, 2024

A cursory look at Table 3 above showed that 20 (07%) and 280 (93%) of the respondents Strongly Agreed and Agreed respectively that plastics waste disposed on land or water become toxic and infectious material that are dangerous to human health. Accordingly, none of the respondents Disagreed or Strongly Disagreed on this variable.

In ascertaining, whether infectious materials can cause skin and blood infection, eye and respiratory infection. It was observed that 75 (37%) and 225 (63%) of the respondents Strongly Agreed and Agreed respectively on the variable while none of them had a different position.

In the same vein, the researcher was also interested in finding out if Ineffective management of plastic waste lead to pollution of water, ground water, and air and from the responses gathered, 200 (67%) and 100 (33%) Strongly Agreed and Agreed respectively while none responded otherwise.

Similarly, it was also found that 90 (30%) and 210(70%) of the respondents Strongly Agreed and Agreed respectively that plastic waste can

affects environmental health, aesthetics and quality of life. There was however no respondent that Disagreed or Strongly Disagreed on this variable

From the analyses of the responses made on this question by all the participants, it is therefore concluded that plastics waste disposed on land or water become toxic and infectious material that are dangerous to human health, that infectious materials can cause skin and blood infection, eye and respiratory infection, ineffective management of plastic waste lead to pollution of water, ground water, and air as well as Plastic waste can affects environmental health, aesthetics and quality of life

Research Question Four

In what way can plastic waste be prevented in Benin City?

In proffering answers to the above questions, the researcher gathered and analyzed the relevant data in the instrument precisely those of items 13-15 using percentage statistics and the result is as presented below

Table 4.4: Data on the way can plastic waste prevented in Benin City

S/N	Variables	SA (%)	A (%)	D (%)	SD (%)

13	Provision of awareness programmes on household management of plastic waste	150 (50%)	150 (50%)	Nil (0)	Nil (0)
14	Creation of more dumpsite for the collection of plastic waste in our environment	100 (67%)	200 (33%)	Nil (0)	Nil (0)
15	Organisation informal waste collectors and recyclers	120 (40%)	180 (60%)	Nil (0)	Nil (0)
16	Promote public-private partnerships to implement infrastructure projects in different stages of plastic waste management such as collection, transport, recycling, composting, waste to energy, etc	75 (25%)	225 (75%)	Nil (0)	Nil (0)

Source: Field Survey, 2022

A critical view of Table 4 above showed that 150 (50%) and 150 (50%) of the respondents Strongly Agreed and Agreed respectively that provision of awareness programmes on household management of plastic waste is one of the ways plastic waste can be prevented. Accordingly, none of the respondents Disagreed or Strongly Disagreed on this variable.

In ascertaining whether creation of more dumpsite for the collection of plastic waste in our environment is one of the ways plastic waste can be prevented, it was observed that 100 (67%) and 200(33%) of the respondents Strongly Agreed and Agreed respectively on the variable while none of them had a different position.

In the same vein, the researcher was also interested in finding out from respondents if organisation informal waste collectors and recyclers and

from the responses gathered, 120 (40%) and 180 (60%) Strongly Agreed and Agreed respectively while none responded otherwise.

Similarly, it was also found that 75 (37%) and 225 (63%) of the respondents Strongly Agreed and Agreed respectively that by promoting public-private partnerships to implement infrastructure projects in different stages of plastic waste management such as collection, transport, recycling, composting, waste to energy, etc. There was however no respondent that Disagreed or Strongly Disagreed on this variable.

From the analyses of the responses made on this question by all the participants, it is therefore concluded that provision of awareness programmes on household management of plastic waste, creation of more dumpsite for the collection of plastic waste in our environment, organisation informal waste collectors and recyclers as well as Promoting public-private partnerships to implement infrastructure projects in different stages of plastic waste management such as collection, transport, recycling, composting, waste to energy, etc are all ways of preventing plastic waste

Discussion of Findings

The result of this study has been quite informative and revealing. Base on the analysis of data or information collected on the opinion of the respondents on the “Impact of Plastic Waste on our Physical Environment in Benin". In the study, four (4) research questions were raised and examined. The first research question revealed that ". In the study, four (4) research questions were raised and examined. The first research question revealed that plastic wastes an leads to the death of aquatic animals, affect the quality of the soil in the region, inhibiting sustainable agriculture practices, burning plastic releases dangerous substances such as heavy metals and organic pollutants, into the air causing greenhouse effect and Plastic waste, plastic bags and other waste materials crammed drainage channels, thereby hindering free flow of water whenever it rain. This findings is in agreement with the study by Verme (2016), who asserts that the ingestion of plastic by fishes also cause internal ulcerations, disruption in the digestive tract of the fishes, and restrains buoyancy control

Findings from research question two revealed that the packaging of table water in cellophane sachets has increased the number of wastes in our residential home, poor waste management practice by Nigerian students has contributed to increased dumpsite, unavailability of a supportive

infrastructure in the form of litter facilities (waste bin) and the use of plastic waste bags and other containers to store waste in different households, which are then dumped in culverts and drainage. This finding corroborate with the study by Daniel and Ibok (2013), were they found out that student residential areas contained more quantities of litter than areas inhabited by nonstudents. They argued that this was because of the indiscriminate disposal of plastic waste by students, which was engendered by poor sanitation habits and practices among them

Findings from research question three also revealed that plastics waste disposed on land or water become toxic and infectious material that are dangerous to human health, that infectious materials can cause skin and blood infection, eye and respiratory infection, ineffective management of plastic waste lead to pollution of water, ground water, and air as well as Plastic waste can affects environmental health, aesthetics and quality of life. This finding agrees of with that of The Ministry of Urban Development Government of India (2012) where they revealed that plastics waste disposed on land or water become toxic and infectious material that are dangerous to human health. These infectious materials can cause skin and

blood infection, eye and respiratory infection as well as different diseases that result from the vector borne disease to name a few

Findings from research question four shows that provision of awareness programmes on household management of plastic waste, creation of more dumpsite for the collection of plastic waste in our environment, organisation informal waste collectors and recyclers as well as promoting public-private partnerships to implement infrastructure projects in different stages of plastic waste management such as collection, transport, recycling, composting, waste to energy, etc are all ways of preventing plastic waste. This finding is in consonance with that of Karshima (2016) who revealed that provision of awareness on household management of plastic waste and creation of more dumpsite for the collection of plastic waste in our environment will help to ensure effective waste management

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter deals with the summary of the study, the conclusions drawn from the analysis of data collected and interpretation of findings and recommendations offered based on findings made.

Summary

The study was carried out to determine "Impact of Plastic Waste on our Physical Environment in Benin. Four (4) research questions were raised to guide the study. These include the following:

1. What are the environmental impacts of plastic waste in Benin City?
2. What are the factors that contribute to increased dumpsites of plastic waste in Benin City?

3. What are the Perceived health impacts of plastic waste on the inhabitants of Benin City?
4. In what way can plastic waste be prevented in Benin City?

The sample size adopted for the study was a total of Three Hundred (300) respondents within the area of the study. That is 100 respondents selected from each local government area that made up Benin City using a stratified random sampling technique. Questionnaire was the major instrument used for data collection. The questionnaire was made up of Section 'A' and 'B'. while Section 'A' contained the demographic information of the respondents, Section 'B' was meant to elicit data on the various research questions raised and other matters considered important to the success of this study. The reliability and validity of the instrument was determined. The validity of the instrument was determined by the project supervisor and other two lecturers from the Department of Health, Safety and Environmental Education, Faculty of Education, and University of Benin for items selection and wording. The reliability of the instrument was determined through test-retest procedure and the value obtained was through Pearson Product Moment Correlation Coefficient reliability index of 0.75. The data collected were

analyzed using descriptive statistics such as: frequency count and simple percentages.

Findings

1. That plastic wastes an leads to the death of aquatic animals, affect the quality of the soil in the region, inhibiting sustainable agriculture practices
2. That burning plastic releases dangerous substances such as heavy metals and organic pollutants, into the air causing greenhouse effect and Plastic waste, plastic bags and other waste materials crammed drainage channels, thereby hindering free flow of water whenever it rain
3. That the packaging of table water in cellophane sachets has increased the number of wastes in our residential home, poor waste management practice by Nigerian students has contributed to increased dumpsite
4. that plastics waste disposed on land or water become toxic and infectious material that are dangerous to human health

5. That the provision of awareness programmes on household management of plastic waste, creation of more dumpsite for the collection of plastic waste in our environment, organisation informal waste collectors and recyclers as well as promoting public-private partnerships to implement infrastructure projects are all ways of preventing plastic waste.

Conclusion

Following the analysis of data collected and findings made, it is therefore concluded that plastic wastes an leads to the death of aquatic animals, affect the quality of the soil in the region, inhibiting sustainable agriculture practices, that the packaging of table water in cellophane sachets has increased the number of wastes in our residential home, poor waste management practice by Nigerian students, that plastics waste disposed on land or water become toxic and infectious material that are dangerous to human health, that infectious materials can cause skin and blood infection, eye and respiratory infection, ineffective management of plastic waste lead to pollution of water, ground water, and air as well as Plastic waste can affects environmental health, aesthetics and quality of life

Recommendations

Based on the conclusion drawn from the findings, the following recommendations are hereby proffered:

1. The government must be holistically involved by engaging a wide range of stakeholders in the decision-making to address the menace. For interested recyclers with capital issues, the government can fund the purchase of machinery and then monitor the operations, or fund a cooperative to support the business. Grants can also be made available through agencies to support land purchase.
2. Tax incentives should also be made available to encourage and attract entrepreneurs into the recycling business.
3. Seminars and workshops should be organized to educate people on the opportunities in the recycling sector and encourage like-minded people to establish recycling outfits, by enlightening the people to recognize that, recycling is not only a source of income but a support

to the ecosystem. Recycling of plastic and other waste would boost the economic status of Nigeria

4. Furthermore, technical assistance should be provided to micro and macro firms exploiting the challenge of plastic pollution. Wide range and intense sensitization should be carried out by government agencies and manufacturers on proper waste disposal methods, raising awareness on the harm caused by the indiscriminate disposal of plastic waste especially in run off and water bodies. Recycling firms should be established in every states of the country funded by the State government in partnership with private organizations e.g Public Private Partnership (PPP) Public-private partnerships and voluntary participation should be encouraged.
5. More importantly, Plastic collection points should be established across the country, as it was identified that plastic collection is a major challenge in recycling. Plastic collection and sorting should be assisted.
6. There must finance more research and development of alternative materials to plastic, involving study on the adoption of indigenous and traditional packaging materials () and the development of bioplastics.

In addition, economic incentives are necessary to encourage the adoption of eco-friendly and alternative materials. Establishment of technological incubation

References

Adeboye, O (2018). Adaptation of Plastic Waste to Energy Development in Lagos: An Overview Assessment. Nigerian Journal of Technology, 35(4), 778. doi:10.4314/njt.v35i4.12

Anyanwu, R. and Adefila, S.A.(2014)., Diversification of the Nigerian economy towards a sustainable growth and economic development, *Int. J. Finance Econ. 3 (2) (2015) 107–114.*

Agamuthu, P., Milow, P., Nurul, A. M., Nurhawa, A. R., Fauziah, S. H., (2015). Impact of Flood on Waste Generation and Composition in Kelantan. *Malaysian Journal of Science 34 (2): 130-140*

Asase, M.; Yanful, E.K.; Mensah, M.; Stanford, J. and Amponsah, S. (2009)Comparison of municipal solid waste management systems in Canada and Ghana: a case study of the cities of London, *Ontario, and Kumasi, Ghana, Waste Manag 29 (10),2779–2786*

Babayemi J. O., Ogundiran M. B., Weber R. and Osibanjo O. (2018). Initial Inventory of Plastics Imports in Nigeria as a Basis for More Sustainable Management Policies. *Journal of Health & Pollution, 8 (18), 20-32*

Blettler C.M., Abrial E., Khan F. R., Sivri N., Espinola L.A., (2018). Freshwater plastic pollution: Recognizing research biases and identifying knowledge gaps, Water Research (2018), doi: 10.1016/j.watres.2018.06.015.

Brunner, P.H., Rechberger, H., 2014. Waste to energy - key element for sustainable waste management. Waste Manag. American Journal of Civil Engineering and Architecture, 5(4), 160-166

Darshan R., and Gururaja S., (2017). Design and Fabrication of Crusher Machine for Plastic Wastes, *International Journal of Mechanical and Production Engineering, 5(10): 55-58*

Dolipas, B.B.;. Ramos, J.L.S and Alimondo,M.S., Madinno, C. (2013). Waste handling practices and values of university student, *Athens J Health 5 (3),213-232*

Hanafi A., (2018). Plastic pollution: Nigeria‘s untapped ‗waste wealth‘ fuels environmental disaster, Punch Newspapers, pp 18-19 [Available from: https://punchng.com/plastic-pollution-nigeriasuntapped-waste-wealth-fuels-environmental-disaster/]

Edema, M. (2011).Pure water syndrome: bacteriological quality of sachet-packed drinking water sold in Nigeria, *Afr J Food Nutr Sci 11 (1), 20-35*

Hakeem I. G., Aderuagba F. and Musa U., (2018). Catalytic Pyrolysis of waste polypropylene using Ahoko Kaolin from Nigeria. Applied Petrochemical research. https://doi.org/10.1007/s13203- 018-0207-8

Joystu, D and Moharana, C. (2018)Plastic pollution: a global problem from a local perspective, *J. Waste Manag. Xenobio 1 (1), 10-21*

Ike, C.; Ezeibe, C.; Anijiofor, S. and Daud, N. (2018). Solid waste management in Nigeria: problems, prospects, and policies, J Solid Waste Technol Manag 44 (2)163–172.

Karshima, S.N. (2016). Public health implications of poor municipal waste management in Nigeria, *Vom J Vet Sci 11 (1), 142-148*

Kaufmann, L. (2022 May 18). Microplastics are rife in drinking water of West Africa's largest city. https://www.bloomberg.com/news/articles/2022-05-18/plasticfragments-pollute-drinking-water-in-west-african-city#xj4y7vzkgLASEPA, (2022, February 12).

Kehinde, O., Babaremu, K.O., Akpanyung, K.V., Remilekun, E., Oyedele S.T., and Oluwafemi, J. (2018). Renewable energy in Nigeria - *a review, Int. J. Mech. Eng. Technol. 9 (10), 1085–1094*

Moharam, R. and Maqtari, M.A.A (2014). The impact of plastic bags on the environment: a field survey of the city of Sana'a and the surrounding areas, Yemen, *Int. J. Eng. Res. Rev. 2 (4), 61–69*

Morales, A.C., Tomlin, J.M and West, C.P.(2022). Atmospheric emission of nanoplastics from sewer pipe repairs.Nat. *Nanotechnology.17, 1171–1177* *https://doi.org/10.1038/s41565-022-01219-9*

Nnaji, C.C. (2014).Status of municipal solid waste generation and disposal in Nigeria, Manag Environ Qual Int J 26 (1) (2014) 5

Olabode, A. (2014). Food, beverage recyclers, Lagos collaborate on plastic waste management, Punch Newspapers, pp 18-19, [Available from: https://punchng.com/food-beverage-recyclers-lagoscollaborate-on-plastic-waste-management/

Daniel, E.E. and Ibok, E. (2013).Solid wastes disposal habits of students in Nigerian universities: a case of University of Uyo, Nigeria, IOSR J Environ Sci Toxicol Food Technol 5 (6), 46–50.

Okeke, C.C.. (2018) Nigeria: govt under pressure to ban plastic bags, 28/3/18. 2018, *Retrieved from:. https://allafrica.com/stories/201803280044.html.*

Schultz, P.W; Bator, R.J.; Large, L.B.; Bruni, C.M. and Tabanico, J.J., (2013). Littering in context: personal and environmental predictors of littering behavior, Environ Behav 45 (1),35–59.

Statistica (2018). Production of plastics worldwide from 1950 to 2017 (in million metric tons). Global plastic production. https://www.statista.com/statistics/282732/global-production-of-plasticssince-1950/

UNEP (2018). Single-Use Plastics: A Roadmap for Sustainability. ISBN: 978-92-807-3705-9. DTI/2179/JP

Verma, R., Vinoda, K. S., Papireddy, M. and Gowda, A.N.S.,(2016). Toxic Pollutants from Plastic Waste- A Review. Procedia Environmental Sciences. 35. 701-708. 10.1016/j.proenv.2016.07.069

Vergara, F. and Tchobanoglous, T. U (2012). Plastic Pollution. Submerge. International Union for Conservation of Nature(IUCN) Global marine and Polar Programme (GMPP).

Venon, F. and Oliver, J. (2014). Plastic Pollution. Submerge. International Union for Conservation of Nature(IUCN) Global marine and Polar Programme (GMPP).

Wilson, D.C., (2007). Development drivers for waste management. Waste Manag. Res. 25 (3), 198–207.

Yalwaji, B., John-Nwagwu, H.O. & Sogbanmu, T.O. (2022). Plastic pollution in the environment in Nigeria: A rapid systematic review of the sources, distribution, research gaps and policy needs, Scientific African, 16. https://doi.org/10.1016/j.sciaf.2022.e01220.

Ministry of Urban Development Government of India (2012). Single-Use Plastics: A Roadmap for Sustainability. ISBN: 978-92-807-3705-9. DTI/2179/JP

UNIVERSITY OF BENIN
FACULTY OF EDUCATION
DEPARTMENT OF HEALTH SAFETY AND ENVIRONMENTAL EDUCATION
IMPACT OF PLASTIC WASTE ON OUR PHYSICAL ENVIRONMENT QUESTIONNAIRE" (IPWPEQ)

Dear Respondent,

This questionnaire is solely for the purpose of a research. The researcher is carrying out a study on: Impact of Plastic Waste on our Physical Environment in Benin

You are therefore requested to kindly help as much as possible to supply the needed information. Your response shall be treated with outmost confidence.

Please read the questions carefully and tick (√) in the box provided that corresponds to the answer of your choice. At the right hand column there are numbers representing how much you rate the statements. Indicate your response to the statements by ticking the appropriate number. Please do not tick 2 numbers for one statement, creation of more awareness about the activities of vigilante Group and provision of equipment's like motor cycle and Van

SECTION A
PERSONAL DATA

1. Sex: Male [ ] Female [ ]
2. Age: 20-30 years [ ] 31-40 years [ ] 41-50 years [ ] 51- 60 years [ ] 61 years and above [ ]
3. Marital Status: Married [ ] Single [ ] Divorced [ ] Widowed [ ]

SECTION B

INSTRUCTION: Kindly tick (√) where necessary using the following Keys

Strongly Agree (SA) = 4
Agree (A) = 3
Disagree (D) = 2
Strongly Disagree (SD) = 1

S/N	ITEMS	SA(4)	A(3)	D(2)	SD(1)
RQ1	**What are the environmental impacts of plastic waste in Benin City?**				
1	Plastic wastes an leads to the death of aquatic animals				
2	Plastic wastes when landfill can affect the quality of the soil in the region, inhibiting sustainable agriculture practices				
3	Burning plastic releases dangerous substances such as heavy metals and organic pollutants, into the air causing greenhouse effect				
4	Plastic waste, plastic bags and other waste materials crammed drainage channels, thereby hindering free flow of water whenever it rains				
RQ2	**What are the factors that contribute to increased dumpsites of plastic waste in Benin City?**				
5	The packaging of table water in cellophane sachets has increased the number of wastes in our residential home				
6	Poor waste management practice by Nigerian students has contributed to increased dumpsite				
7	Unavailability of a supportive infrastructure in the form of litter facilities (waste bin)				
8	Use of plastic waste bags and other containers to store waste in different households, which are then				

	dumped in culverts and drainage				
RQ3	**What are the Perceived health impacts of plastic waste on the inhabitants of Benin City?**				
9	Plastics waste disposed on land or water become toxic and infectious material that are dangerous to human health				
10	Infectious materials can cause skin and blood infection, eye and respiratory infection				
11	Ineffective management of plastic waste lead to pollution of water, ground water, and air				
12	Plastic waste can affects environmental health, aesthetics and quality of life				
RQ4	**In what way can plastic waste be prevented in Benin City?**				
13	Provision of awareness programmes on household management of plastic waste				
14	Creation of more dumpsite for the collection of plastic waste in our environment				
15	Organisation informal waste collectors and recyclers				
16	Promote public-private partnerships to implement infrastructure projects in different stages of plastic waste management such as collection, transport, recycling, composting, waste to energy, etc				