

**FACTORS RESULTING TO AIR POLLUTION IN HALLS OF RESIDENCE  
AMONG THE RESIDENTS IN UNIVERSITY OF BENIN**

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**A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF HEALTH,  
SAFETY AND ENVIRONMENTAL EDUCATION IN PARTIAL FULFILMENT  
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EDUCATION, OF THE FACULTY OF EDUCATION, UNIVERSITY OF BENIN,  
BENIN CITY, EDO STATE, NIGERIA.**

**OCTOBER, 2025.**

## CERTIFICATION

We, the undersigned, certify that this study was carried out by **Kenneth Ikponmwosa IBIZUGBE** with Matriculation Number **EDU2102575** in the Department of Health, Safety and Environmental Education in partial fulfillment for the award of Bachelor of Science (B.Sc.) in Health education.

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## **DEDICATION**

This work is dedicated to God Almighty who granted me strength and health to carry out this Research Study. Also to my parents who has given me constant support.

## **ACKNOWLEDGEMENTS**

The researcher gives thanks to God Almighty who has been his strength to carry out this study. He is indeed grateful to Him.

He wishes to express his unreserved gratitude to his supervisor Dr. Daniel O. Aideyan for his keen supervision, invaluable advice and without whose effort this work would not have been done; he is indeed grateful. He respectfully appreciates all his lecturers who taught him and nurture his cognitive ability towards Health Education.

He also wishes to express his profound gratitude towards these persons who have been of immense help and support in pursuit of this Degree; To my Parents - Mr. Victor & Mrs. Helen Ibizugbe, my uncles – EPA and Lastborn, my sisters – Esohe and Faith, my friends – Jonathan, Sofela, Skylight, Gadus, Clinton, Papa Faith, Humphery and others.

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## **ABSTRACT**

The study was conducted to find out the Factors resulting to Pollution in halls of Residence among the Recipients in University of Benin. Five research questions were raised and analyzed for the purpose of the study. Two hundred (200) respondents which were randomly selected from five (5) faculties through simple random techniques from the fourteen (14) Faculties in the University of Benin. The data were collected with questionnaire instrument and analyzed.

The result revealed that: Indiscriminate urination is a reason adduced for air pollution by students in halls of residence because of the poor state of hostel facilities in the University of Benin, Indiscriminate dumping of food waste, human waste and other perishables are reasons adduced for air pollution by students in halls of residences. It was also observed that the poor drainage system in the halls of residence is a major cause of air pollution, as most of the drainages are unsafe to use, Irregular supply of water to halls of residence for cleanup and other activities, contributes to air pollution, Overpopulation in the halls of residence, contributes to air population.

Based on the results, it was recommended that: The University management should provide adequate facilities and equipment for the disposal of wastes and Information on how to use toilet equipment and other facilities should be included in the students' handbook so as to educate them on the proper usage, Regular water supply should be provided through the use of the water supply systems such as a borehole, deep well and

so on, adequate and qualified personnel should be recruited to carry out the thorough cleaning of the drainages in the hostels, Accommodation in the halls of residence should be only for those that the bed spaces can accommodate, this would help to reduce overpopulation.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **Background of the Study**

Air pollution is the presence in the atmosphere of chemicals, particulate matter or biological materials in such quantity and for such duration that can cause harm and discomfort to humans and other living organisms (Njoku, 2016; Obanya, 2018). Common air pollutants in the environment include: sulphur dioxide (SO<sub>2</sub>); oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO); volatile organic compounds (VOCs); ozone (O<sub>3</sub>); suspended particulate matter (SPM) also called particulates; and lead (Pb). Air pollutant can be in the form of solid particles, liquid droplets, or gases. In addition, they may be natural or man-made (USEPA, 2006). In recent times, indoor air quality has caught the attention of scientists and the general public because indoor levels of many pollutants are often higher than those typically encountered outside (Jurado, 2014). Indoor air pollution (IAP) would cause significant harmful health effects due to a long time period that people stay indoors (Klinmalee, 2008). Indoor air pollution concentrations depend on a large number of factors such as indoor sources and the emission rates, air exchange rate, the penetration of outdoor pollutants into the indoor environment, and the pollutant sink or removal rate on indoor surfaces (Beak 1997; Klinmalee, 2008).

In the year 2004, outdoor air pollution in urban areas was responsible for almost 1.2 million deaths (2% of all deaths) and 0.6% of the global burden of disease. Transportation-related air pollution, which is a significant contributor to total urban air pollution, increases the risks of cardiopulmonary-related deaths and non-allergic respiratory disease. Some evidence supports an association of transportation-related air pollution with increased risks of lung cancer, myocardial infarction, increased inflammatory response and adverse pregnancy outcomes (e.g., premature birth and low birth weight). Exposure to particulate matter, including metals, has been linked to a range of adverse health outcomes, including modest transient changes in the respiratory tract and impaired pulmonary function, increased risk of symptoms requiring emergency room or hospital treatment, and increased risk of death from cardiovascular and respiratory diseases or lung cancer. Particulate matter is estimated to cause about 8% of deaths from lung cancer, 5% of deaths from cardiopulmonary disease and about 3% of deaths from respiratory infections. Short-term exposures to ozone are linked with effects on pulmonary function and the respiratory system, lung inflammation, increased medication usage, hospitalization, and mortality. Reduced lung function has been associated with long-term ozone exposure. Short-term exposures to nitrogen dioxide, an indicator for a complex mixture of mainly traffic-related chemicals, have been associated with effects on pulmonary function, increased allergic airway inflammation reactions, hospital admissions and mortality. Reduced lung function and an increased probability of

respiratory symptoms are associated with long-term exposure to nitrogen dioxide (WHO, 2010).

The increase in commercial activities in our University environment as well as the functioning of machinery in several business units, and an unquantifiable amount of emissions are now of concern especially from the burning of fossil fuels, poor building designs and poor ventilations. Also, recent developments in construction materials have resulted in the use of more synthetics and composites, which can affect air quality. Radical changes in technology have led to innovations, such as air conditioners, computers and photocopiers that provide greater efficiencies and time savings, but can also affect the quality of indoor air (Franklin, 2007).

University of Benin halls of residence is not left out due to the high population rate in the hostels. The main causes of air pollution in halls of residence are inadequate water supply, inappropriate use of the drainage system, indiscriminate waste disposal, urination, over population. Inadequate water supply: there is insufficient water supply to the toilets in the halls of residence. Students use these restrooms without water to clean it up after use, which results in the release of foul smell.

Poor drainage system: due to the dumping of waste into the drainage it results in blockage of the drainage system in the halls of residence which results in the release of foul smell. This also leads to the breeding of mosquito.

Urination: this occurs when students go about releasing their liquid waste in inappropriate places like on the walk way, the bathing area, and close to the rooms where the students live. All these activities lead to the release of foul smell which makes the environment uncomfortable for the students to live in.

Indiscriminate solid waste dumping: this is one of the causes of air pollution in the halls of residence. This is when waste is not properly disposed, they are littered all over the place which causes the release of foul smell.

Over population: this is one of the main causes of air pollution in the halls of residence. Due to the high ratio of students to the facilities available in the hostels over use is inevitable. Most of the cooking activities are done in the hostel rooms which results in the release of CO<sub>2</sub> which is not good for the consumption of the students. These cooking practices are inefficient, and use fuels and technologies that produce high levels of household air pollution with a range of health-damaging pollutants, including small soot particles that penetrate deep into the lungs. Indoor smoke can be 100 times higher than acceptable levels for fine particles.

### **Statement of the Problem**

The state of university of Benin halls of residence has really deteriorated due to the different activities of the students while the students are the ones still being affected. Unfortunately, if this problem is not looked into it would lead to an unsafe environment

for the students to live in. The University hostels have poor toileting facilities, poor drainages, irregular water supply and are grossly overpopulated. All of the aforementioned defects are issues that the school hostel faces on a regular basis which results to foul smell of the environment and bad air quality. Indiscriminate disposal of waste is a problem recognized by all nations at the 1992 conference on environment and development and regarded as a major barrier in the path towards sustainability. Students output of daily waste depends on their dietary habits, lifestyle and living standard, students often seem to indiscriminately litter their environment, desecrate arbitrarily in unauthorized places e.g. behind rooms, walks ways, etc. To this effect, this study attempts to empirically analyze reasons adduced for air pollution in halls of residence in University of Benin.

### **Purpose of the study**

The purpose of the study is to mitigate the factors resulting to air pollution in halls of residence among the recipients in university of Benin.

### **Research Questions**

The following research questions were raised to guide this study:

1. Is indiscriminate urination a factor resulting to air pollution by students in halls of residence, university of Benin?

2. Is indiscriminate disposal of waste a factor resulting to pollution by students in halls of residence, university of Benin?
3. Is poor drainage system a factor resulting to air pollution by students in halls of residence, university of Benin?
4. Is water supply a factor resulting to air pollution by students in halls of residence, university of Benin?
5. Is over population a factor resulting to air pollution by students in halls of residence, university of Benin?

### **Significance of the Study**

The findings of this study will help the school administration and hall wardens improve policies that will reduce the mentioned causes of air pollution in the halls of residence.

The findings of this study would help the students in on small way to increase their knowledge concerning reasons adduced for air pollution and how to curb them.

### **Scope/Delimitation of the Study**

This research focused on the factors resulting to air pollution in halls of residence in University of Benin. This study examines few of the numerous factors that instigate air population in the halls of residence in the University of Benin.

## **Limitation of the Study**

Time constraint- the researcher will simultaneously engage in this study with other academic work. This consequently will cut down on the time devoted for the research work.

## **Operational Definition of Terms**

The term used in this study are operationally defined below:

**Pollution:** the presence in or introduction into the environment substances which have harmful or poisonous effects.

**Environment:** the surrounding in which a person, animal or plant lives or operate.

**Air pollution:** the release of air pollutant into the air that is detrimental to human and plant health.

## CHAPTER TWO

### REVIEW OF RELATED LITERATURE

This chapter focuses on the review of related literature. And it will be discussed under the following sub-headings:

1. Conceptual Framework
2. Concepts of Air Pollution
3. Environmental Issues in Halls of Residents in Tertiary Institutions
4. Factors Associated with Air Pollution
5. Health Implication of Air Pollution
6. Summary of Reviewed Literature

#### Conceptual Framework

**Environment:** There have been different definitions of the concept of “environment” proffered by different scholars and organized bodies/agencies. However, from whatever angle one perceives the term; „environment“, it simply depicts what surrounds us. To Hagget (1975), cited in Anijah – Obi (2001), environment refers to the “sum total of all conditions that surround man at any point in time on the earth’s surface”. According to Miller (1975), the term “environment” could be perceived as “the aggregate of external conditions that influence the life of an individual or population, specifically the life of man and other living organisms on the earth’s surface”. The Federal Environmental

protection Agency (FEPA) Act of 1990, under section 38 also gave a very lucid definition of environment, thus;

Environment includes water, air, land and all plants and human beings and/or animals living there in and the inter-relationships which exist among these or any of them. From the above definitions, the term “environment” comprises land, air, water and all the physical structures surrounding us. In this paper therefore, the concept “environment” refers to the totality of space, time and socio-cultural settings of man and other living organisms therein.

**Pollution:** the term pollution is a derivation of the word pollute-which means, to make something dirty or no longer pure, especially by adding harmful or unpleasant substances to it. In another development, the committee on pollution of the United States National Research Council (1965) defined pollution as; an undesirable change in physical, chemical or biological characteristics of our air, land and water that may or will harmfully affect human life or that of other desirable species, our industrial processes, living conditions cultural assets that may or will waste or deteriorate our raw material resources.

Pollution according to the above definition is a disorder within an environment and is a by-product of energy conversion and the use of resources. Ekuri and Eze (1999) accordingly, defined pollution as “a contamination, a defilement, mischief, perturbation and reduction in the value of an object or thing”. Relatedly, Jande (2005:4) describes the

term – Pollution” to mean “to make something dirty or no longer pure, especially by adding harmful or unpleasant substances to it”. In this paper therefore, the concept, “Pollution” is used to refer to a situation where waste-materials and/or harmful substances which can deplete, wear/tear away and affect the entire environment and cause disorderliness to all living organisms.

Furthermore, environmentally minded persons are of the opinion that human activities as well as natural disasters on the environment can pollute the environment beyond reasonable doubts. Recorded evidence has also shown that continuous pollution of the environment leads to environmental regression and/or diminution (Anijah Obi, 2001, Gbehe 2004 & Ocheri 2003).

In this paper therefore, environmental pollution is used to mean “an undesirable change in the environment through harmful substances; waste materials and resources, caused by man’s activity or natural disaster which also results to the degradation of the environment with its attendant consequences on biodiversity.

## **Concepts of Air Pollution**

Air pollution is the introduction into the atmosphere of chemicals, particulates, or biological materials that cause discomfort, disease, or death to humans, damage other living organisms such as food crops, or damage the natural environment or built environment.

A substance in the air that can be adverse to humans and the environment is known as an air pollutant. Pollutants can be in the form of solid particles, liquid droplets, or gases. In addition, they may be natural or man-made. Pollutants can be classified as primary or secondary. Usually, primary pollutants are directly produced from a process, such as ash from a volcanic eruption, the carbon monoxide gas from a motor vehicle exhaust or Sulphur dioxide released from factories. Secondary pollutants are not emitted directly.

Rather, they form in the air when primary pollutants react or interact. An important example of a secondary pollutant is ground level ozone – one of the many secondary pollutants that make up photochemical smog. Some pollutants may be both primary and secondary: that is, they are both emitted directly and formed from other primary pollutants.

Major primary pollutants produced by human activity include:

1. Sulphur oxides (SO<sub>x</sub>) - especially Sulphur dioxide, a chemical compound with the formula SO<sub>2</sub>. SO<sub>2</sub> is produced by volcanoes and in various industrial processes. Since coal and petroleum often contain Sulphur compounds, their combustion generates sulfur dioxide. Further oxidation of SO<sub>2</sub>, usually in the presence of a catalyst such as NO<sub>2</sub>, forms H<sub>2</sub>SO<sub>4</sub>, and thus acid rain. This is one of the causes for concern over the environmental impact of the use of these fuels as power sources.
2. Nitrogen oxides (NO<sub>x</sub>) - especially nitrogen dioxide are expelled from high temperature combustion, and are also produced naturally during thunderstorms by electric discharge. Can be seen as the brown haze dome above or plume downwind of cities. Nitrogen dioxide is the chemical compound with the formula NO<sub>2</sub>. It is one of the several nitrogen oxides. This reddish-brown toxic gas has a characteristic sharp, biting odor. NO<sub>2</sub> is one of the most prominent air pollutants.
3. Carbon monoxide (CO) - is a colourless, odourless, non-irritating but very poisonous gas. It is a product by incomplete combustion of fuel such as natural gas, coal or wood. Vehicular exhaust is a major source of carbon monoxide. Volatile organic compounds - VOCs are an important outdoor air pollutant. In this field they are often divided into the separate categories of methane (CH<sub>4</sub>) and nonmethane (NMVOCs). Methane is an extremely efficient greenhouse gas which contributes to enhanced global warming. Other hydrocarbon VOCs are also significant greenhouse gases via

their role in creating ozone and in prolonging the life of methane in the atmosphere, although the effect varies depending on local air quality. Within the NMVOCs, the aromatic compounds benzene, toluene and xylene are suspected carcinogens and may lead to leukemia through prolonged exposure. 1, 3-butadiene is another dangerous compound which is often associated with industrial uses. Particulates, alternatively referred to as particulate matter (PM), atmospheric particulate matter, or fine particles, are tiny particles of solid or liquid suspended in a gas. In contrast, aerosol refers to particles and the gas together. Sources of particulates can be manmade or natural. Some particulates occur naturally, originating from volcanoes, dust storms, forest and grassland fires, living vegetation, and sea spray. Human activities, such as the burning of fossil fuels in vehicles, power plants and various industrial processes also generate significant amounts of aerosols. Averaged over the globe, anthropogenic aerosols—those made by human activities – currently account for about 10 percent of the total amount of aerosols in our atmosphere. Increased levels of fine particles in the air are linked to health hazards such as heart disease, altered lung function and lung cancer.

4. Persistent free radicals connected to airborne fine particles could cause cardiopulmonary disease.
5. Toxic metals, such as lead and mercury, especially their compounds.
6. Chlorofluorocarbons (CFCs) - harmful to the ozone layer emitted from products currently banned from use.

7. Ammonia ( $\text{NH}_3$ ) - emitted from agricultural processes. Ammonia is a compound with the formula  $\text{NH}_3$ . It is normally encountered as a gas with a characteristic pungent odor. Ammonia, either directly or indirectly, is also a building block for the synthesis of many pharmaceuticals. Although in wide use, ammonia is both caustic and hazardous.
8. Odors – such as from garbage, sewage, and industrial processes
9. Radioactive pollutants – produced by nuclear explosions, nuclear events, war explosives, and natural processes such as the radioactive decay of radon.

Secondary pollutants include:

1. Particulates created from gaseous primary pollutants and compounds in photochemical smog. Smog is a kind of air pollution; the word "smog" is a portmanteau of smoke and fog. Classic smog results from large amounts of coal burning in an area caused by a mixture of smoke and Sulphur dioxide. Modern smog does not usually come from coal but from vehicular and industrial emissions that are acted on in the atmosphere by ultraviolet light from the sun to form secondary pollutants that also combine with the primary emissions to form photochemical smog.
2. Ground level ozone ( $\text{O}_3$ ) formed from  $\text{NO}_x$  and VOCs. Ozone ( $\text{O}_3$ ) is a key constituent of the troposphere. It is also an important constituent of certain regions of the stratosphere commonly known as the Ozone layer. Photochemical and chemical reactions involving it drive many of the chemical processes that occur in the

atmosphere by day and by night. At abnormally high concentrations brought about by human activities (largely the combustion of fossil fuel), it is a pollutant, and a constituent of smog.

### ***Causes: Factors Responsible for Air Pollution***

Air pollution can result from both human and natural actions. Natural events that pollute the air include forest fires, volcanic eruptions, wind erosion, pollen dispersal, evaporation of organic compounds and natural radioactivity. Sources of air pollution refer to the various locations, activities or factors which are responsible for the releasing of pollutants into the atmosphere.

Man-made sources mostly related to burning different kinds of fuel.

1. "Stationary Sources" include smoke stacks of power plants, manufacturing facilities (factories) and waste incinerators, as well as furnaces and other types of fuel-burning heating devices. In developing and poor countries, traditional biomass burning is the major source of air pollutants; traditional biomass includes wood, crop waste and dung.
2. "Mobile Sources" include motor vehicles, marine vessels, aircraft and the effect of sound etc.
3. Chemicals, dust and controlled burn practices in agriculture and forestry management. Controlled or prescribed burning is a technique sometimes used in forest management,

farming, prairie restoration or greenhouse gas abatement. Fire is a natural part of both forest and grassland ecology and controlled fire can be a tool for foresters. Controlled burning stimulates the germination of some desirable forest trees, thus renewing the forest.

4. Fumes from paint, hair spray, varnish, aerosol sprays and other solvents.
5. Waste deposition in landfills, which generate methane. Methane is highly flammable and may form explosive mixtures with air.
6. Military, such as nuclear weapons, toxic gases, germ warfare and rocketry. Natural sources
7. Dust from natural sources, usually large areas of land with few or no vegetation.
8. Methane, emitted by the digestion of food by animals, for example cattle.
9. Radon gas from radioactive decay within the Earth's crust. Radon is a colorless, odorless, naturally occurring, radioactive noble gas that is formed from the decay of radium. It is considered to be a health hazard. Radon gas from natural sources can accumulate in buildings, especially in confined areas such as the basement and it is the second most frequent cause of lung cancer, after cigarette smoking.
10. Smoke and carbon monoxide from wildfires.

### **Environmental Issues in Halls of Residents in Tertiary Institutions**

All over the world, poor environmental quality is increasingly recognized as a major threat to social and economic development and even to human survival

(Acheampong, 2010). The impacts of environmental deterioration are severe on developing countries thus hindering and undermining their development (Bello, 2007). The world Health Organization (WHO) (2008) defined environmental sanitation as the control of all those factors in man's physical environment, which exercise or may exercise a deleterious effect on his physical development, health and survival. In the view of Vivienne (2014), environmental sanitation is the practice of collection, reuse and disposal of human excreta and domestic wastes with the overall objective to protect the school health. In an attempt to keep the environment clean, it is the human lives that are paramount. The concept of environmental sanitation entails the control of water supplies, excreta disposal, waste water disposal, refuse disposal, vectors of diseases, housing conditions, food supplies and the safety of the working environment (Acheampong, 2010). Mmom and Mmom (2011) opined that effective environmental sanitation in cities is a function of positive environmental behavior and availability of facilities and services. Thus, Daramola (2015), Olowoporoku (2014) and Afon and Faniran (2013) complimented that availability of adequate environmental sanitation facilities and enabling environmental sanitation policies positively influence the achievement of a healthy living environment.

According to Tecer (2007), environmental deterioration, extinction, or pollution in many vital earth systems such as air, water, soil, forest and biological diversity have required countries to develop policies for protecting and developing the earth and

promoting global cooperation on these issues. Atasoy (2005) stated that environmental problems have become globalized and have reached the stage where they present a threat to life on earth. He further stated that the situation has led to the review of people's relationship with nature, their attitudes and behaviors towards the environment, the duties and responsibilities assumed by the individual towards nature, and the redefinition of ecological culture and environmental awareness.

Mmon and Mmon (2011) commented in environmental sanitation and public health challenges in a rapidly growing city of the third world: the case of domestic waste and diarrhea incidence in Greater Port Harcourt Metropolis, Nigeria, that poor environmental sanitation practices exhibited in the disposal of solid wastes, wastewater and excreta, cleaning of drainage including personal, household and community hygiene significantly contribute to infant and child mortality and in order to achieve proper environmental sanitation practices, good sanitation behavior and availability of facilities and services must work in unison. They also stressed that numerous studies have shown that the incidence of many diseases is reduced when people have access to and make regular use of adequate sanitary installations.

According to Olowoporoku (2017) on his assessment of environmental sanitation situation in Nigeria, environmental sanitation should not be viewed alone from the promulgation of laws for citizens and periodic conduct of exercise only, rather it should be seen as a civic responsibility involving all levels of human activity, sound

environmental sanitation management ensures that appropriate intervention are introduced and implemented to promote behaviour change and the attitude and behaviour of the stakeholders on environmental issues determine its end.

Bello (2007) assessed behavioural responses to environmental sanitation facilities in the core areas of developing countries: case study of Ikorodu, Nigeria and noted that several studies have shown that problems of environmental sanitation are not limited to a particular residential zone, studies showed that such problem occurred in the traditional core areas, urban centers, peri-urban or suburbs and various institutions like schools. He stated that it is evident that provision of adequate environmental sanitation facilities and services could at best be referred to as a means to end.

Uzum and Saglam (2006) studied high school students' environmental attitude: scale development and validation and opined that individuals, who have negative attitude towards the environment, will be insensitive to environmental problems and may adopt behaviors that damage the environment. So the enhancement of the environmental knowledge of students leads to the development of positive attitudes towards the environment.

In the opinion of Vivienne (2014) on the attitudes of students and staff of Asamankese senior high school towards environmental sanitation, an individual who has a positive attitude towards the environment tends to act positively, approaches, show concern, support, and assist the environment but an individual whose attitude is negative

towards the environment tends to be indifferent to it or alternate, criticize or even damage it. Aduku's (2014) assessment of the attitude of SHS students towards environmental sanitation in Ghana revealed that high expectation of school health and environmental sanitation education programme have not always been fulfilled, in many countries, schools are not safe for children due to neglect of the operation and maintenance of facilities. In addition, environmental sanitation education given to students has not always been relevant or effective. He further stated that the effective management of environmental sanitation requires strategies that bring about fundamental change in how students perceive environmental sanitation in the city and service delivery.

Olawale and Olatunji (2014) studied knowledge and attitudes of people on monthly environmental sanitation programme in Osun State, Nigeria and posited that people did not derive any health benefits from monthly environmental sanitation programme because most of the waste disposal left at the road junction and at times people defecated at the uncompleted building as a result of lack of public toilets in core areas such as market place and motor parks which resulted to cholera and dysentery in the community. Adi (2009) revealed in his study on influence of knowledge of environmental sanitation on health practices of senior secondary school students in Taraba State that there was the need for health officials to be visiting secondary schools promoting enlightenment on environmental sanitation among secondary school students.

According to him, students who are directly controlled and enlightened have better disposition in their environmental sanitation and practice. McConville (2008) conducted a research on assessing sustainable approaches to sanitation planning and implementation in West Africa and asserted that improving sanitation is not only about installing technological systems, but also about changing the hygiene and defecation practices of the local population. Anijah, Eneji, Ubom, Dunnamah and Williams (2013) in their research on introducing environmental sanitation education in the primary school curriculum stated that environmental sanitation education as a progressive policy cannot be disputed, for it is only when the majority of the people are physically and philosophical involved that sustained environmental ethnics can be assured. To this end environmental sanitation education should not only focus on basic hygiene and keeping the surroundings clean, but also campaigns against bad toilet habits such as indiscriminate defecation and urination as well as inefficient disposal of waste. It must also in addition concern itself with the major problems of air and water pollution.

### **Factors Associated with Air Pollution**

Air pollution refers to the various locations, activities or factors which are responsible for the releasing of pollutants into the atmosphere. These sources can be classified into two major categories which are: Anthropogenic sources (human activity) mostly related to burning different kinds of fuel:

- "Stationary Sources" include smoke stacks of power plants, manufacturing facilities (factories) and waste incinerators, as well as furnaces and other types of fuel-burning heating devices
- "Mobile Sources" include motor vehicles, marine vessels, aircraft and the effect of sound etc.
- Chemicals, dust and controlled burn practices in agriculture and forestry management. Controlled or prescribed burning is a technique sometimes used in forest management, farming, prairie restoration or greenhouse gas abatement. Fire is a natural part of both forest and grassland ecology and controlled fire can be a tool for foresters. Controlled burning stimulates the germination of some desirable forest trees, thus renewing the forest.
- Fumes from paint, hair spray, varnish, aerosol sprays and other solvents.
- Waste deposition in landfills, which generate methane. Methane is not toxic; however, it is highly flammable and may form explosive mixtures with air. Methane is also an asphyxiant and may displace oxygen in an enclosed space. Asphyxia or suffocation may result if the oxygen concentration is reduced to below 19.5% by displacement.
- Military, such as nuclear weapons, toxic gases, germ warfare and rocketry.

Biomass combustion: Biomass in form of firewood, coal, bamboo trunks and dead leaves are commonly used sources of cooking fuel in the region. Of all these the most frequently used is firewood. This fuel woods are usually logged from nearby bushes and forests or are collected as dead branches within the residential vicinities by the women and sometimes children and are used to generate energy for cooking (Plate 3). The combustion of firewood releases gaseous pollutants and particulate matter. From literature the gaseous pollutants from cooking emissions are carbon monoxide CO, carbon dioxide CO<sub>2</sub>, sulphur dioxide SO<sub>2</sub>, nitrogen dioxide NO<sub>2</sub>, volatile organic compounds VOCs and particulate matter. The particulate matter generated is in the form of carbon black, sooth and fly ash which are major components of smoke and are most often within the 10 µm size range.

The air that we breathe daily is comprised of 21% oxygen and 78% nitrogen, with the remainder consisting of trace amounts of rare gases. Air pollution causes some gases in the atmosphere to exist at higher than normal conditions, and can be seriously harmful to human health. Examples of these includes: nitrogen oxides.

(NO<sub>2</sub>), Sulphur oxides (SO<sub>2</sub>), carbon monoxide (CO), particulate matter (PM), photochemical oxidants (e.g. Ozone) and Lead (Pb), along with a variety of airborne heavy metals and volatile organic compounds (VOCs). In urban areas, automobiles form a significant source of a number of air pollutants, namely, particulates, NO<sub>2</sub>, hydrocarbons, carbon monoxide and lead. These pollutants are produced when fuel is

burnt under less than ideal conditions. Non uniform oxygen supply within the combustion chamber and lower flame temperature leads to incomplete combustion releasing CO, HC and un-burnt particles in the exhaust. (Garret and Newton, 2001). These emissions have been implicated in several respiratory and other diseases as well as in the degradation of the environment, including formation of acid rains implicated in biodiversity loss and defacing of physical structures. (Omar, 2010).

Air pollution can occur as a result of natural conditions, such as ash from volcanic explosions, sand storms, or forest fires. Natural geomorphic terrain, such as low valleys surrounded by mountains, temperature, and wind speed can also exacerbate already polluted surrounding in a region more serious, however, are the anthropogenic, or human, causes of air pollution that are directly linked to energy consumption, industrial emissions and vehicular exhausts in heavily congested urban areas. It is often a combination of both natural factors as well as human activities that lead to highly unhealthy conditions in air quality. ([www.nrdc.org](http://www.nrdc.org)).

Over the recent decades, extensive research on atmospheric particles in urban environments was carried out. Most of the following paper refers to their authors' contribution to air pollution and the effects on human health (Harrison, 1997).

## **Health Implication of Air Pollution**

Air pollution is a significant risk factor for multiple health conditions including respiratory infections, heart disease, and lung cancer, according to the WHO. The health effects caused by air pollution may include difficulty in breathing, wheezing, coughing, asthma and aggravation of existing respiratory and cardiac conditions. These effects can result in increased medication use, increased doctor or emergency room visits, more hospital admissions and premature death. The human health effects of poor air quality are far reaching, but principally affect the body's respiratory system and the cardiovascular system. Individual reactions to air pollutants depend on the type of pollutant a person is exposed to, the degree of exposure, the individual's health status and genetics.

The most common sources of air pollution include particulates, ozone, nitrogen dioxide, and sulfur dioxide. Both indoor and outdoor air pollution have caused approximately 3.3 million deaths worldwide. Children aged less than five years that live in developing countries are the most vulnerable population in terms of total deaths attributable to indoor and outdoor air pollution. The World Health Organization states that 2.4 million people die each year from causes directly attributable to air pollution, with 1.5 million of these deaths attributable to indoor air pollution.

The worst short term civilian pollution crisis in India was the 1984 Bhopal Disaster. Leaked industrial vapours from the Union Carbide factory, belonging to Union Carbide, Inc., U.S.A., killed more than 25,000 people outright and injured anywhere from

150,000 to 600,000. The United Kingdom suffered its worst air pollution event when the December 4 Great Smog of 1952 formed over London. In six days more than 4,000 died, and 8,000 more died within the following months. An accidental leak of anthrax spores from a biological warfare laboratory in the former USSR in 1979 near Sverdlovsk is believed to have been the cause of hundreds of civilian deaths. Around the world, children living in cities with high exposure to air pollutants are at increased risk of developing asthma, pneumonia and other lower respiratory infections. Because children are outdoors more and have higher minute ventilation they are more susceptible to the dangers of air pollution. Risks of low initial birth weight are also heightened in such cities.

The human health effects due to air pollutants include carcinogenicity, pulmonary tuberculosis, cerebrospinal meningitis, pneumonia, whooping cough and measles (Nwachukwu and Ugwuanyi, 2010; Ugwuanyi and Obi, 2002); while the environmental effect is global warming (Bolion, 1991). The health effects which are due to air pollution are called epidemiological diseases. These diseases are well-defined by Nwachukwu and Ugwuanyi (2010), and Ugwuanyi and Obi (2002). Epidemiological studies play an ever important role in environmental health risk assessment. This is because epidemiological information (data) contributes increasingly to policy development, public health decision-making, the establishment of environmental regulations, and research planning (WHO, 2000a). Unlike laboratory experiments, epidemiology provides evidence based on study

of human populations under real world condition. The contribution of epidemiology and air pollution factors to health risk assessment has been widely discussed (WHO, 2000a, 2004, and 2007).

The levels of air pollutants can vary from country to country and from continent to continent (WHO, 2004b). For example, air pollution levels in developed countries have been decreasing dramatically in recent decade, however; in developing countries, air pollution levels are still at relatively high levels (Bingheng and Haidong, 2008). This is because in developed countries, there is advanced air quality management and this is ensured by establishment of air quality laws, ambient air quality standards, continuous monitoring of air quality and development of emission control strategies (Colbeck and Lazaridis, 2010). In developing countries, these laws are not in place, and where they are in place, they are not enforced. Also, lack of technological know-how and lack of environmental education among the citizens are other major reasons many developing countries have not been able to control their air quality.

Nigeria is among the developing countries. Since Nigeria started exploration of its oil and gas, and other natural resources, it has experienced an escalation in its population growth, urbanization, and industrialization, together with great increase in motorization and energy use. As result, a substantial rise has taken place in the type and number of emission sources of various pollutants. However, due to lack of air quality management capabilities, the country is suffering from deterioration of air quality.

The health effects caused by air pollution may include difficulty in breathing, wheezing, coughing and aggravation of existing respiratory and cardiac conditions. These effects can result in increased medication use, increased doctor or emergency room visits, more hospital admissions and premature death.

The human health effects of poor air quality are far reaching, but principally affect the body's respiratory system and the cardiovascular system. Individual reactions to air pollutants depend on the type of pollutant a person is exposed to, the degree of exposure, the individual's health status and genetics (Janice, 2002).

The Following are listed air pollutants and the associated diseases (WHO, 2004; Obi and Ugwuanyi, 2002):

- i. Respiratory: Irritation and decreased pulmonary function.
- ii. Particulate matter: Stress on the heart, bronchial constriction, impairment of lung elasticity and gaseous exchange efficient, silicosis (a form of pneumoconiosis caused by inhalation of dust particles), respiratory tract disease systematic toxicity, and altered immune defense.
- iii. Cement dust: Pulmonary tuberculosis, allergic asthma, pneumonia, heart disease, bronchitis influenza emphysema, and mycosis.
- iv. Carbon dioxide: Reduces the quantity of O<sub>2</sub> transported to tissues, hence can impress extra burden on those suffering from anaemia, chronic lung conditions,

heart and blood vessel diseases, brain damage, impaired perception, eye and nasal irritation, lung damage respiration tract disease.

- v. Lead/asbestos: Causes asbestosis (chronic lung cancer), and mesothelioma (a rare form of cancer). Kidney disease and neurological impairment, primarily affects children.
- vi. Photochemical oxidants (e.g. ozone): Long exposure to it can cause reduced eyesight, fatigue, pneumonia, pulmonary headache, breathing difficulties, chest pain

### **Summary of Reviewed Literature**

Air pollution has been identified as one of the most critical environmental problems confronting our environment. Traffic, industry and gas flaring are the major air pollution sources in the region. Impact on socioeconomic, ecosystems health, properties and climate have been linked with the pollution episodes in the area but which requires substantial scientific and empirical evidence. Multiple factors especially lack of equipment, inadequate skilled personnel and poor policy frame work has militated against effective and qualitative air quality studies in the area. To achieve long term goals for the region in this regard that would lead to the overall benefit of the people in the area, there is need therefore to employ a holistic and integrated approach to air pollution management that will involve all the stakeholders.

Air pollution can be prevented only if individuals and businesses stop using toxic substances that cause air pollution in the first place. This would require the cessation of

all fossil fuel-burning processes, from industrial manufacturing to home use of air conditioners. This is an unlikely scenario at this time. However, we have to make rules which set stringent regulations on industrial and power supply manufacturing and handling. The regulations are to be designed to further reduce harmful emissions into the Earth's atmosphere.

## **CHAPTER THREE**

### **METHODOLOGY OF THE STUDY**

This chapter describes the research methodology that was used in the study under the following sub-headings:

1. Research Design
2. Population of the Study
3. Sample and Sampling Technique
4. Research Instrument
5. Validity of the Instrument
6. Reliability of the Instrument
7. Administration of the Instrument
8. Method of Data Analysis

#### **Research Design**

This study is designed to find out the factors resulting to air pollution in halls of residence among the recipients in university of Benin. A descriptive Survey research method is adopted to enable the researcher carry out systematic investigation and obtain information across population of the study. It is considered the most appropriate in enabling a researcher to study a population by collecting information from the

respondents who are a representative sample of the entire group as they exist in their various communities

### **Population of the Study**

The population of the study comprises all fourteen (14) Faculties with the population of Thirty-Six Thousand Nine Hundred and Seventy-Five (36,975) undergraduate students of the University of Benin (Academic planning, UNIBEN, 2020)

### **Sample and Sampling Technique**

The sample consists of two hundred respondents which would be randomly selected from five (5) faculties through simple random techniques from the fourteen (14) Faculties in the University of Benin.

<b>FACULTY</b>	<b>NUMBER OF STUDENTS</b>	<b>SAMPLE COLLECTED</b>
Education	7369	40
Life sciences	5088	40
Social sciences	3036	40
Art	5710	40
Law	989	40

## **Research Instrument**

The research instrument is a questionnaire designed by the researcher entitled “the factors resulting to air pollution in halls of residence among the recipients in university of Benin “Questionnaire”. It is divided into two sections: Section A and B. Section A contains particulars of the respondents (demographic data) such as name of Faculty, level, age, gender, while Section B contains twenty items. The questions contained in the questionnaire revolves round the research questions raised in the chapter one of this study and the response obtained from the respondent will help to validate the research questions. The questionnaire is a modified likert-type scale with four options of strongly agrees, agree, strongly disagree and disagree

## **Validity of the Instrument**

In order to ascertain the validity of the instrument, the questionnaire designed by the researcher would be given to the supervisor and two lecturers in the Department of Health, Safety and Environmental Education (HSE) to scrutinize and for necessary corrections to ensure content as well as face validity. Corrections made on the draft would be incorporated in the final draft.

## **Reliability of the Instrument**

The reliability of the instrument is established using split-half technique. The data would be correlated using Spearman Brown’s Correction Formulae. The reliability

coefficient is expected to be found at 0.75. This indicates that the instrument would be adequate for the study.

### **Method of Data Collection**

The questionnaire would be administered personally by the researcher to the respondent that was randomly selected from the sample students. The respondent would be assured of confidentiality and urged to answer the questions honestly in the best of their knowledge. Instructions would be given to the respondent on how to fill the questionnaire and the questionnaire would be collected the same day to avoid incident of loss.

### **Method of Data Analysis**

The data collected is properly organized and tabulated. The responses is statistically analysed by the use of simple percentage.

## CHAPTER FOUR

### PRESENTATION OF RESULT AND DISCUSSION OF FINDINGS

The purpose of this chapter is to report, illustrate and discuss the result of the research. It involves the presentation and analysis of the data generated in the course of the research. This analysis was made using frequency count and simple percentage. The presentation and analysis were also made in line with the research questions raised in chapter one. The results of this finding are also discussed.

#### SECTION A:

##### Demographic Data for the Students

**Table 1: Distribution of Respondents by faculty**

<b>Faculty</b>	<b>Frequency</b>	<b>Percent</b>
Law	40	20
Education	40	20
Art	40	20
Physical science	40	20
Life science	40	20
<b>Total</b>	<b>200</b>	<b>100%</b>

*Source: Researcher's fieldwork, 2021*

**Table 2: Distribution of Respondents by Gender**

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<b>Gender</b>	<b>Frequency</b>	<b>Percent</b>
Male	96	48
Female	104	52
<b>Total</b>	<b>200</b>	<b>100%</b>

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*Source: Researcher's fieldwork, 2021*

**Table 3: Distribution of Respondents by level**

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<b>Level</b>	<b>Frequency</b>	<b>Percent</b>
100 level	18	9
200 level	22	11
300 level	31	15.5
400 level	96	48
500 level	33	16.5
<b>Total</b>	<b>200</b>	<b>100%</b>

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*Source: Researcher's fieldwork, 2021*

**Table 4: Distribution of Respondent by Age**

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<b>Age</b>	<b>Frequency</b>	<b>Percent</b>
15 – 18	15	7.5
19 – 21	93	46.5
22 – 24	62	31
25 above	30	15
<b>Total</b>	<b>200</b>	<b>100</b>

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*Source: Researcher's fieldwork, 2021*

## SECTION B:

Answering of Research Questions

**Research Question 1:** Is indiscriminate urination a factor responsible for air pollution by students in halls of residence?

**Table 5:** indiscriminate urination a factor responsible for air pollution by students in halls of residence

S/N	ITEM	SA	A	SD	D	Total
1.	There are no good toilet facilities in the school hostel for me to urinate	156 (78%)	10 (5%)	34 (17%)	0 (0%)	200
2.	Open defecation and urination is a major contribution to air pollution	125 (62.5%)	15 (7.5%)	50 (25%)	10 (5%)	200
3.	The smell from urine is dangerous to human health	163 (81.5%)	22 (11%)	11 (5.5%)	4 (2%)	200
4.	If there were clean toileting facilities in the hostel, the air pollution would be reduced.	105 (52.5%)	62 (31%)	23 (11.5%)	10 (5%)	200

*Researcher fieldwork, 2021*

Table 1 above shows responses for indiscriminate urination a factor responsible for air pollution by students in halls of residence. 156(78%) and 10(5%) of the respondents strongly agreed and agreed respectively that There are no good toilet facilities in the school hostel for them to urinate, 34(17%) and 0(0%) strongly disagree and disagree respectively. Also 125(62.5%) and 15(7.5%) strongly agreed and agreed with the statement that Open defecation and urination is a major contribution to air pollution, but 50 respondents representing (25%) and 10(5%) strongly disagreed and disagreed respectively. Seeking opinion of the respondents on the smell from urine is dangerous to human health, 163 of the respondents representing 81.5% strongly agreed, 22 respondents representing 11% agreed, 11(5.5%) and 4(2%) strongly disagreed and disagreed respectively.

Lastly, 105 respondents representing 52.5% and 62(31%) believe that if there were clean toileting facilities in the hostel, the air pollution would be reduced, 23(11.5%) strongly disagree, while 10(5%) disagreed.

The study therefore concludes that indiscriminate urination a factor responsible for air pollution by students in halls of residence because of the poor state of hostel facilities in the university of Benin.

**Research Question 2:** Is indiscriminate disposal of waste a factor responsible for air pollution by students in halls of residence?

**Table 6:** indiscriminate disposal of waste a factor responsible for air pollution by students in halls of residence

S/N	ITEM	SA	A	SD	D	Total
1.	Indiscriminate disposal of waste causes air pollution	159 (79.5%)	26 (13%)	7 (3.5%)	8 (4%)	200
2.	Food waste are not properly disposed in my hostel	100 (50%)	44 (22%)	20 (10%)	36 (18%)	200
3.	Waste collectors are not regular in the school hostel	113 (56.5%)	16 (8%)	41 (20.5%)	30 (15%)	200
4.	There are no proper means of waste disposal in the halls of residence	103 (51.5%)	9 (3.5%)	59 (29.5%)	29 (14.5%)	200

*Researcher fieldwork, 2021*

The above Table 6 shows indiscriminate disposal of waste a reason adduced for air pollution by students in halls of residence. This view was reflected in the responses of 159(79.5%) and 26(13%) strongly agreed and agreed respectively that Indiscriminate disposal of waste causes air pollution, 7 of the respondents representing 3.5% and 8(4%) strongly disagree and disagree respectively. Similarly, 100 respondents representing 50% and 44(22%) agreed that food waste are not properly disposed in my hostel, while 20(10%) strongly disagree, while 36(18%) disagreed. The respondents agreed with the statement that waste collectors are not regular in the school hostels. This was evidenced by the respondents' opinion which showed that 113(56.5%) strongly agreed and 16(8%) agreed respectively while only 41 of the respondent representing (20.5%) and 30 representing (15%) strongly disagree and disagree respectively.

Finally, the respondents agreed that There are no proper means of waste disposal in the halls of residence, with 103 of the respondents representing (51.5%) strongly agreed, 9(4.5%) agreed, while 59 of the respondents representing (29.5%) strongly disagreed and 29(14.5%) disagreed.

In the second objective, based on the result in table 6, the study therefore concludes that indiscriminate dumping of food waste, human waste and other perishables are reasons adduced for air pollution by students in halls of residences.

**Research Question 3:** Is poor drainage system a factor responsible for air pollution?

**Table 7:** poor drainage system factor responsible for air pollution.

S/N	ITEM	SA	A	SD	D	Total
1.	The drainage system in the hostel is poor and unsafe to use	114 (57%)	25 (12.5%)	30 (15%)	31 (15.5%)	200
2.	The drainage system in the hostel is good and safe to use	70 (35%)	12 (6%)	100 (50%)	18 (9%)	200
3.	The smell for the hostel drainage system is the cause of air pollution in the hostel	143 (71.5%)	31 (15.5%)	19 (9.5%)	7 (3.5%)	200
4.	The drainage system is not properly maintained, hence the smell that causes the air pollution	155 (77.5%)	32 (16%)	10 (5%)	3 (1.5%)	200

*Researcher fieldwork, 2021*

The above Table 7 shows responses for poor drainage system a reason adduced for air pollution. This view was reflected in the responses of 114(57%) and 25(12.5%) strongly agree and agree respectively to the statement, that the drainage system in the hostels are poor and unsafe to use. 30 of the respondents representing 15% and 31(15.5%) strongly disagreed and disagreed respectively. On the other hand, 100 respondents representing 50% and 18(9%) revealed that the drainage system in the hostel is good and safe to use, while 70(45%) strongly agree, while 12(6%) agree. The respondents agreed with the statement that the smell for the hostel drainage system is the cause of air pollution in the hostel. This was evidenced by the respondents' opinion which showed that 143 of the respondent representing (71.5%) and 31 representing (15.5%) strongly agree and agree respectively, while 19(9.5%) strongly disagreed and 7(3.5%) disagreed respectively.

Finally, the respondents agreed that the drainage system is not properly maintained, hence the smell that causes the air pollution, with 155 of the respondents representing (77.5%) strongly agreed, 32(16%) agreed, while 10 of the respondents representing (5%) strongly disagreed and 3(1.5%) disagreed.

In the third objective, the study seeks to find if poor drainage system a factor responsible for air pollution. Based on the result in table 7, the study therefore concludes that the poor drainage system in the halls of residence is a major cause of air pollution, as most of the drainages are unsafe to use.

**Research Question 4:** Is water supply a factor responsible for air pollution by students in halls of residence?

**Table 8:** water supply a factor responsible for air pollution by students in halls of residence

S/N	ITEM	SA	A	SD	D	Total
1.	The water supply in the halls of residence is irregular	101 (50.5%)	11 (5.5%)	62 (31%)	26 (13%)	200
2.	The hostel is always polluted at night because students do not have access to water to use.	133 (66.5%)	10 (5%)	18 (9%)	39 (19.5%)	200
3.	The school water supply does not encourage an environment free of air pollution.	90 (45%)	31 (15.5%)	46 (23%)	33 (16.5%)	200
4.	Water supply does not contribute to air pollution in the halls of residence	29 (14.5%)	24 (12%)	118 (59%)	29 (14.5%)	200

*Researcher fieldwork, 2021*

Table 8 shows response for water supply a reason adduced for air pollution by students in halls of residence. It reveals that 101(50.5%) and 11(5.5%) strongly agreed and agreed respectively to the statement that, the water supply in the halls of residence is irregular. 62 of the respondents representing 31% and 26(13%) strongly disagreed and disagreed respectively. In the same vein, 133 respondents representing 66.5% and 10(5%) revealed that the hostel is always polluted at night because students do not have access to water to use. 18(9%) strongly disagree, while 39(19.5%) disagreed. The respondents agreed with the statement that the school water supply does not encourage an environment free of air pollution. This was evidenced by the respondents' opinion which showed that 90 of the respondent representing (45%) and 31 representing (15.5%) strongly agreed and agreed respectively, while 46(23%) strongly disagreed and 33(16.5%) disagreed respectively.

Finally, the respondents disagreed that water supply does not contribute to air pollution in the halls of residence, with 118 of the respondents representing (59%) strongly disagreed, 29(14.5%) disagreed, while 29 of the respondents representing (14.5%) strongly agreed and 24(12%) agreed.

In the fourth objective, the study seeks to find out the constraints to using instructional materials in schools. Based on the result in table 8, the study therefore concludes that irregular supply of water to halls of residence for cleanup and other activities, contributes to air pollution.

**Research Question 5: Is over population a factor responsible for air pollution by students in halls of residence?**

**Table 9:** overpopulation as a factor responsible for air pollution by students in halls of residence

S/N	ITEM	SA	A	SD	D	Total
1	The halls of residence is generally overpopulated	127 <b>(63.5%)</b>	45 <b>(22.5%)</b>	15 <b>(7.5%)</b>	3 <b>(1.5%)</b>	200
2	Air pollution is bound to occur when an environment is densely overpopulated	122 <b>(61%)</b>	44 <b>(22%)</b>	20 <b>(10%)</b>	14 <b>(7%)</b>	200
3	The air quality in the halls of residence is poor because they are overpopulated	154 <b>(77%)</b>	20 <b>(10%)</b>	16 <b>(8%)</b>	10 <b>(5%)</b>	200
4	Overpopulation does not contribute to air pollution in the halls of residence.	33 <b>(16.5%)</b>	11 <b>(5.5%)</b>	131 <b>(60.5%)</b>	25 <b>(12.5%)</b>	200

*Researcher fieldwork, 2021*

The above Table 9 shows overpopulation as a reason adduced for air pollution by students in halls of residence. This view was reflected in the responses of 127(63.5%) and 45(22.5%) strongly agreed and agreed respectively that the halls of residence is generally overpopulated, 15 of the respondents representing 7.5% and 3(1.5%) strongly disagree and disagree respectively. Similarly, 122 respondents representing 61% and 44(22%) agreed that air pollution is bound to occur when an environment is densely overpopulated, while 20(10%) strongly disagree, while 14(7%) disagreed. The respondents agreed with the statement that the air quality in the halls of residence is poor because they are overpopulated. This was evidenced by the respondents' opinion which showed that 154(77%) strongly agreed and 20(10%) agreed respectively while 16 of the respondent representing (8%) and 10 representing (5%) strongly disagree and disagree respectively.

Finally, the respondents disagreed that overpopulation does not contribute to air population in the halls of residence, with 131 of the respondents representing (60.5%) strongly agreed, 25(12.5%) agreed, while 33 of the respondents representing (16.5%) strongly disagreed and 11(5.5%) disagreed.

In the fifth objective, based on the result in table 9, the study therefore concluded that the population in the halls of residence, contributes to air population.

## **Discussions of Findings**

The result of this study has been quite, informative and revealing. Based on the analysis of data or information collected from the opinion of the respondents on: **The Factors Responsible for Air Pollution in Halls of Residence among the Recipients in University of Benin.**

The analysis of research question one reveals that indiscriminate urination a factor responsible for air pollution by students in halls of residence because of the poor state of hostel facilities in the university of Benin. The study also revealed that the major causes of poor sanitation practices among students are poor toilet and bathroom facilities, insufficient toilet and waste disposal facilities, shortage of water supply and lastly, poor drainage system. Irregular water supply, and lack of waste disposal facilities.

The results of research question two shows that indiscriminate dumping of food waste, human waste and other perishables are factors responsible for air pollution by students in halls of residences. Poor environmental sanitation practices exhibited by students in the disposal of solid wastes, wastewater and excreta, cleaning of drainage including personal, household and community hygiene significantly contribute to sickness and air pollution and in order to achieve proper environmental sanitation practices, good sanitation behavior and availability of facilities and services must work in unison. They also stressed that numerous studies have shown that the incidence of many

diseases is reduced when people have access to and make regular use of adequate sanitary installations.

The results of research question three shows that the poor drainage system in the halls of residence is a major cause of air pollution, as most of the drainages are unsafe to use. Air pollution is not limited to the water pollution and improper disposal of wastes. When students dispose of chemical and physical wastes in ways that directly affect the air supply, it is often results to air pollution.

The finding from Research question four shows that irregular supply of water to halls of residence for cleanup and other activities, contributes to air pollution. Finally, research question five revealed that the overpopulation in the halls of residence, contributes to air population.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of the study as well as the conclusion drawn. It also outlined the recommendations proffered in view of the findings made with suggestion for further research.

#### **Summary of the Study**

The study was conducted to find out the factor resulting to Air Pollution in halls of Residence among the Recipients in University of Benin. Two hundred respondents which would be randomly selected from 5 faculties through simple random techniques from the fourteen (14) Faculties in the University of Benin.

The summary can be seen as highlighted that:

1. Indiscriminate urination a factor responsible for air pollution by students in halls of residence because of the poor state of hostel facilities in the University of Benin.
2. Indiscriminate dumping of food waste, human waste and other perishables are factors responsible for air pollution by students in halls of residences.
3. It was also observed the poor drainage system in the halls of residence is a major cause of air pollution, as most of the drainages are unsafe to use.
4. Irregular supply of water to halls of residence for cleanup and other activities, contributes to air pollution.
5. Overpopulation in the halls of residence, contributes to air population.

## **Conclusion**

Based on the result of the study, it can be concluded among others that the factors responsible for air pollution in halls of residence is as a result of poor sanitation practices among undergraduate students of University of Benin in their halls of residents and that inadequate water supply, poor toilet facilities, insufficient toilet, bathroom and waste disposal facilities and poor drainage system are the major causes of air pollution in the hostel environment.

## **Recommendations**

In view of the above, the following recommendations are therefore put forward:

1. The University management should provide adequate facilities and equipment for the disposal of wastes and Information on how to use toilet equipment and other facilities should be included in the students' handbook so as to educate them on the proper usage
2. Regular water supply should be provided through the use of the water supply systems such as a borehole, deep well and so on.
3. Adequate and qualified personnel should be recruited to carry out the thorough cleaning of the drainages in the hostels.
4. Accommodation in the halls of residence should be only for those that the bed spaces can accommodate, this would help to reduce overpopulation.

### **Suggestions for Further Study**

This study investigated the factors resulting to Air Pollution In halls Of Residence among the Recipients in University Of Benin, using 200 respondents. The future researcher may repeat this study by using larger population such as more than one university.

## REFERENCES

- Acheampong, P. T. (2010). Environmental Sanitation in the Kumasi Metropolitan Area. A Master of Science
- Adi, J.J. (2009). Influence of Knowledge of Environmental Sanitation on Health Practices on Senior Secondary School Students in Taraba State. A Thesis Submitted in Partial Fulfillment of the Requirement for the Award of Degree of Masters of Education in the Department of Physical and Health Education, Faculty of Education, Ahmed Bello University Zaria, pp. 80-96. Assessed at <http://acedemia.com>, 19/10/2017
- Aduku, J.M. (2014). An Assessment of the Attitude of SHS Students towards Environmental Sanitation in Ghana: A Case of Some Selected SHSs within the Greater Accra Region. Pp. 18-21. Assessed at <http://s3.amazonaws.com>, 19/10/2017.
- Anija, O., K.C. Gbehe, and E.A. Ocheri, 2001. Environmental risk factors and health outcomes in selected communities of the Niger Delta Area, Nigeria. *Perspect. Public Health*. 129(4): 183-191.
- Anijah O (2010). Environmental risk factors and hospital based cancers in two Nigerian cities. *J. Public Heal. Epidemiology.*, 2(8): 216-223,
- Anijah-Obi Franca., Eneji Chris-Valentine Ogar., Ubom Bassey A. E., Dunnamah, A.Y., and William, J.J. (2013). Introducing Environmental Sanitation Education in the Primary School Curriculums. *International Research Journal* 4(3): 227-230.
- Atasoy, E. (2005). Education for Environment: A Study for Primary Students Environmental Attitude and Environmental Knowledge. (Unpublished) Doctoral Dissertation. Bursa: Uludağ University, Turkey, pp. 105-122.
- Bachelor of Science Dissertation submitted to the Department of Urban and Regional Planning Obafemi Awolowo University Ile-Ife, Nigeria, pp. 1-15.
- Bello, H. (2007). Environmental Sanitation Practices in the Core of Ikorodu, Lagos state. (Unpublished)
- Bingheng C, Haidong K (2008). Air pollution and population health: A global challenge. *Environ. Health Prev. Med.* 13:94-101.

- Bolion WD (1991). *The Green House Effects, Climate Change and Constraints*. John Wiley and Sons, New-York, USA, pp. 97-130.
- Colbeck I, Lazaridis M (2010). *Aerosol and Environmental Pollution*. *Biomed. Life Sci.* 97:117-131.
- Daramola, O. P. (2015). *Environmental Sanitation Practices in Residential Areas of Ibadan Metropolis*. A Thesis Submitted in Partial Fulfillment of the Requirement for the Award of Doctor of Philosophy Degree in the Department of Urban and Regional Planning, Faculty of Environmental Design and Management, Obafemi Awolowo University, Ile-Ife, Nigeria, pp 20-35. Assessed at <http://researchgate.com>, 20/10/2017.
- Ekuri, E.A and S. Eze, 1999. Land-based sources of pollution in the Niger Delta, Nigeria. *Ambio J. Hum. Env.*, 31(5): 442-445.
- Eng Degree Thesis, Department of Chemical Engineering, Federal University of Technology, Minna, Nigeria, pp: 4.
- Federal Environmental Protection Agency, 1990. *National Policy on the Environment*. The Presidency, Abuja, Nigeria.
- Franklin, P.J. (2007). Indoor Air Quality and Respiratory Health of Children. *Pediatric Respiratory Reviews*, 8(4): 281-2866.
- Garret, S.M., and Newton, S.D. (2001). A Study on Environmental Sanitation, and Personal Hygiene among the Slum Area in Solapur city, Maharashtra. *Advances in Applied Science Research*, 5(2):98-101.
- Jande, G.P., 2005. *Modeling of air pollution in industrial cities: Case study of Lagos, Nigeria*, B.
- Janice, L., 2002. *Indigenous Plants to the Rescue Environmental Remediation in Nigerian oil Regions*. *Science in Africa*, Retrieved October 3, 2011
- Jurado, S.R., Bankoff, A.D and Sanchez A. (2014). Indoor air quality in Brazilian Universities. *International Journal of Environmental Research and Public Health*, 11:7081-7093.
- Klinmalee, A., Srimongkol, K., and Kim Oanh, N.T. (2009). Indoor air pollution levels in public buildings in Thailand and exposure assessment. *Environ Monit Assess*, 156: 581–594.

- Master of Philosophy in the Department of Social Studies, Faculty of Social Science Education, University of Education, Winneba, pp. 2-55. Assessed at <http://IJEE.com>, 15/10/2017.
- McConville, J.R. (2008). Assessing Sustainable Approaches to Sanitation Planning and Implementation in West Africa. Licentiate Thesis, Department of Land and Water Resources Engineering, Royal Institute of Technology (KTH), Stockholm, Sweden, pp. 17-20.
- Miller, J.O., 1975. Safety Loss and Pollution Control in Chemical Process Industries. Jodigs and Associates, Minna, Nigeria, pp: 89-93.
- Mmom, P. C., and Mmom, C. F. (2011). Environmental sanitation and public health challenges in a rapidly growing city of the Third World: The case of domestic waste and diarrhea incidence in Greater Port Harcourt Metropolis, Nigeria. *Asian Journal of Medical Sciences*, 3(3):115-120.
- Nwachukwu AN, Ugwuanyi JU (2010). Air pollution and its possible health effects on rural dwellers in Rivers State, Nigeria. *Afr. J. Phys.* 3:217-240.
- Olawale, J.O., and Olatunji, I.A. (2014). Knowledge and Attitudes of People on Monthly Environmental Sanitation Programme in Osun State, Nigeria. *Journal of Science and Science Education, Ondo*, 4(1): pp. 137 – 143.
- Olowoporoku, O.A. (2017). A Recipe for Disaster: An Assessment of Environmental Sanitation Situation in Nigeria. *MAYFEB Journal of Environmental Science*, 1(1):1-5.
- Omar, J. (2010). Environmental Sustainability: A Definition for Environmental Professional. *Journal of Environmental Sustainability*, 1(1):5-8
- Tecer, S. (2007). Education for Environmental: A Study on the Level of Determination of the Primary Students' Environmental Behaviour, Knowledge, Consciousness and Active Participation in Balikesir City. (Unpublished) Master Thesis. Zonguldak, Turkey: Zonguldak Karaelmas University, pp. 5-25.
- Thesis Submitted to the Department of Planning, Kwame Nkrumah University of Science and Technology, pp. 1-5. Assessed at <http://acedemia.com>, 19/10/2017.
- Ugwuanyi JU, Obi FC (2002). A survey of Health Effects of Air Pollution on Peasant Farmers in Benue State, Nigeria. *Int. J. environ. Stud.* Vol. 59. Gordon and Breach Sci. Publishers, U.K.P.

- United States Agency for International Development (USAID) (1990). Strategies for linking water and sanitation programs to child survival. Washington, D.C., USAID, Sep. 62p.
- United States Environmental Protection Agency USEPA (2006). Air Pollutants. Accessed on 20th April, 2018. Retrieved from <http://www.epa.gov/ebtpages/airpollutants>
- Uyigüe, E. and M. Agho., 2007. Coping with Climate Change and Environmental Degradation in the Niger-Delta of South Nigeria. Community Research and Development Centre (CREDC), Benin.
- Uzun, N., and Sağlam, S. (2006). Development and validation of an environmental attitudes scale for high school students. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 30, pp. 240-250.
- Vivienne, A.D.S. (2014). The Attitude of Students and Staff of Asamankese Senior High School Towards Environmental Sanitation. A Thesis submitted in partial fulfillment of the requirement for the Award of
- WHO (2000a). Evaluation and use of epidemiological evidence for environmental health risk assessment. World Health Organization, Regional Office for Europe, Copenhagen 2000 (e68940). <http://www.euro.who.int/document/e68940.pdf>
- WHO (2004a). Health aspects of air pollution. Results from WHO project “Systematic review of health aspects of air pollution in Europe”. World Health Organization Regional Office for Europe 2004. <http://www.euro.who.int/document/E83080.pdf>
- WHO (2004b). Comparative quantification of health risks: global and regional burden of diseases attributable to selected major risk factors. World Health Organization 2004.
- WHO (2007). Global estimates of burden of diseases caused by the environmental and occupational health risks. [http://www.who.int/quantifying\\_ehimpacts/global/urbair/en/index.html](http://www.who.int/quantifying_ehimpacts/global/urbair/en/index.html)
- WHO (2010). The WHO European Centre for Environment and Health, Bonn Office. WHO guidelines for indoor air quality: Selected pollutants. ISBN 978 92 890 0213 4.
- World Health Organization, (WHO) (2008). *Global Water Supply and Sanitation Assessment 2000 Report*. World Health Organization, Geneva.

## APPENDIX

DEPARTMENT OF HEALTH, SAFETY AND ENVIRONMENTAL EDUCATION  
(HSE)  
FACULTY OF EDUCATION,  
UNIVERSITY OF BENIN, BENIN CITY.

QUESTIONNAIRE ON THE FACORS RESULTING TO AIR POLLUTION IN  
HALLS OF RESIDENCE AMONG THE RECIPIENTS IN UNIVERSITY OF  
BENIN

Dear Respondents,

My name is **Kenneth Ikponmwosa IBIZUGBE** a final year students of Health, Safety and Environmental Education (HSE).

This questionnaire is designed for academic purposes. It is structured to find out students' perception on the importance of plastic waste recycling as a way of preserving the environment, a case study of the University of Benin.

Your responses which are needed for research purposes only will be treated with high level of confidentiality. Thank you.

### Section A

**Instructions:** Please tick (✓) where applicable.

6. Name of Faculty: \_\_\_\_\_

7. Gender: Male ( ) Female ( )

8. Age: 15 – 18 ( ) 19 – 21 ( ) 22 – 24 ( ) 25 above ( )

9. level: 100level ( ) 200level ( ) 300level ( ) 400level( ) 500level( )

## Section B

**RQ1: Is indiscriminate urination a reason adduced for air pollution by students in halls of residence?**

S/N	ITEMS	SA	A	SD	D
1.	There are no good toilet facilities in the school hostel for me to urinate				
2.	Open defecation and urination is a major contribution to air pollution				
3.	The smell from urine is dangerous to human health				
4.	If there were clean toileting facilities in the hostel, the air pollution would be reduced.				

**RQ2: Is indiscriminate disposal of waste a reason adduced for air pollution by students in halls of residence?**

5.	Indiscriminate disposal of waste causes air pollution.				
6.	Food waste are not properly disposed in my hostel.				
7.	Waste collectors are not regular in the school hostel.				
8.	There are no proper means of waste disposal in the halls of residence.				

**RQ3: Is poor drainage system a reason adduced for air pollution?**

9.	The drainage system in the hostel is poor and unsafe to use.				
10.	The drainage system in the hostel is good and safe to use.				
11.	The smell for the hostel drainage system is the cause of air pollution in the hostel.				
12.	The drainage system is not properly maintained, hence the smell that causes the air pollution.				

**RQ4: Is water supply a reason adduced for air pollution by students in halls of residence?**

13.	The water supply in the halls of residence is irregular.				
14.	The hostel is always polluted at night because students do not have access to water to use.				
15.	The school water supply does not encourage an environment free of air pollution.				
16.	Water does not contribute to air pollution in the halls of residence.				

**RQ5: Is over population a reason adduced for air pollution by students in halls of residence?**

17.	The halls of residence is generally overpopulated.				
18.	Air pollution is bound to occur when an environment is densely overpopulated.				
19.	The air quality in the halls of residence is poor because they are overpopulated.				
20.	Overpopulation does not contribute to air population in the halls of residence.				