Approaches to Garbage Management and Students' Health Status in Faculty of Science Education, University of Calabar, Cross River State, Nigeria

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Received January, 2025, Accepted February, Published March, 2025

Abstract

This study investigated the two approaches to accurate garbage management and students' health status in Faculty of Science Education, University of Calabar, Cross River State, Nigeria. To achieve the purpose of the study, two null hypotheses were formulated to guide the study. The sample size of the study was three hundred (300) students. The instruments used for data collection was a modified four-point likert scale response option questionnaire. Simple random sampling technique was used to select the sample for the study. All the variables were tested using the Pearson Product Moment Correlation Analysis at 0.05 level of significance and 289 degree of freedom. The results showed that recycling and reuse of garbage have significant relationship with students' health status in Faculty of Education, University of Calabar. It was recommended among others that the university managements should also make sure that the employees responsible for disposing waste are well and promptly paid so that they can carry out their duties effectively. It was further recommended that refuse bins should be mounted at strategic points to collect biodegradable and non-degradable garbage separately for use reuse and recycling.
Keywords: Accurate Garbage Management, Students' Health Status, Recycling of Garbage, Reuse of Garbage

Introduction

Improper garbage handling and disposal have severe environmental and health consequences, including pollution, disease outbreaks, and reduced lifespans for humans and animals. In the Medieval times, epidemics associated with water contaminated with pathogens decimated the population of Europe and even more recently (19th century) cholera disease was a common occurrence and had a direct health impact due to mismanagement of garbage as well and can be observed especially in developing countries (Ajayi, 2016; Eneji, Onnoghen, Edung & Effiong, 2019). Effective garbage management is crucial for maintaining public health, particularly among vulnerable populations such as students (World Health Organization, 2018). Improper waste disposal has been linked to the spread of infectious diseases, including hepatitis B and C, and

Human Immunodeficiency Virus (HIV) (Centers for Disease Control and Prevention, 2020). Furthermore, exposure to waste-related pollutants has been shown to have negative impacts on physical and mental health, including respiratory problems, stress, and anxiety (European Environment Agency, 2019).

Waste or garbage according to Anifowose, Omole and Akingbade (2017), is any substance or material which requires to be disposed of as being broken, worn out, contaminated or otherwise spoilt and as such lost its usefulness. It could be in solid or liquid form and could be in a non-hazardous or hazardous. State of Vermont Agency of Natural Resources Department of Environmental Conservation (2018), described garbage as any tangible and non-free flowing unwanted materials or substances that results from human activities. It is broadly categorized into two classes namely: Biodegradable and Non-biodegradable (Zhang, Huang, Yin & Gong, 2015; Zhang, Ruiz-Menjivar, Luo, Liang & Swisher, 2020)

Biodegradable garbage can easily decompose by natural process ranging from food remnants to leaves from tree, cotton wool, clothes, banana peels, papers etc. While non-biodegradable garbage cannot be broken down or decomposed by natural processes but they can however be recycled or reused, such as bottles, glasses, plastics, cans and wrappers of all kinds, nylon bags, metals, woods, needles and syringes (Wan,Shen & Yu, 2015; Eneji, Eneji, Ngoka & Abang, 2017).

Onnoghen, Eneji, Petters and Peters, (2020) found that as science and technology developed; the management of an ever-increasing volume of garbage became a very organized, specialized and complex activity. The characteristics of garbage material evolved in line with changes in lifestyles and the number of new chemical substances present in the various garbage streams increased dramatically. World Bank Report (2019) stated that population growth and economic development is a major contribution to garbage generation especially in urban areas.

Recycling of garbage and students' health status

Punzalan, (2020) saw recycling of garbage is an act of changing garbage into a new product which can be used for the same or a new purpose. It refers to recovery of useful materials such as glass, paper, plastics, wood, aluminum, steel and metals from the garbage stream so that they may be incorporated into the fabrication of new products. Ferdinand (2017) noted that producing original Malayan products is often more expensive and energy-intensive than using recycled materials. By incorporating recycled materials, the need for raw materials is reduced, conserving natural resources and minimizing waste. For instance, producing aluminum cans from recycled materials is significantly more efficient than manufacturing new ones. This approach not only reduces environmental stress but also helps recover and reuse valuable resources, promoting sustainability (Wan, Shen & Choi, 2017; Wei, Xu, She, Wang, & Zhang, (2021).

Friday (2018) submitted that many activities that people carryout from day to day tends to be harmful to health status of man and environment. The author further explained that greenhouse gases like methane form acidic pollutants, while carbon dioxide traps heat, preventing terrestrial radiation from escaping the Earth's surface. As such, temperatures become high on the surface of the earth, which then causes the death of many organisms including man and withering of crops and its production,(Sumana & Rodrigues, 2021; Sumana & Rodrigues, 2022).

Singh (2014) contributed that climate change has been affected by the recycling of these gases over time. According to Singh, in the year 2005, efforts were made to reduce carbon emissions by recycling carbon dioxide for use in industrial processes like the Solvay process. This approach conserved natural resources, reduced energy consumption and emissions, and minimized the environmental impact of extracting and manufacturing raw materials. Additionally, recycling decreased greenhouse gas emissions, improved public health, and generated economic benefits, including job creation and economic growth.

Wagner (2019), opined that recycling help individuals to save. The author further explained that those recycled goods when sold generate income which enables man to provide some basic

needs to stay healthy (such as food, shelter and clothing). The author added that if a farmer recycles, it negates the needs to find fertilizers that are man-made. By recycling materials that are biodegradable, one can make manure that could be used to grow crops instead of using artificial fertilizers. This natural grown plant is of better health benefit compared to the plants grown with artificial fertilizers. Dan, Imam, Ukpata & Akpa (2023) noted that by recycling industrial garbage, many diseases resulting from contaminated air, top soil and water can also be reduced. The authors added that recycling helps clean the environment and reduced the risk of dirt which causes ill health (Wu & Zhu, 2021; Wu, Zhu & Zhai, 2022).

Walter (2015) reported that during the recycling of clinical garbage, harmful toxins are emitted into the environment. Excessive storage of garbage materials for recycling may cause suffocation in the environment (air space). This is because biodegradable plastics are more expensive to produce and many use plant resources such as molasses, thus creating competition for food supply. The researcher however added that recycling garbage material such as papers, biscuit wraps, plastic etc. helps in boosting the economy of the people and nation, thereby providing adequate fund to stay healthy and live well. Kujoh, Ojong, Effiom & Dan (2020), noted that recycling increases the spread of diseases and health problems, for when the top soil, air and water are polluted as a result of poor garbage management, health problems such as bilharzias, typhoid and cholera are found amongst others, while other conditions are exacerbated.

Reuse of garbage and the students' health status

Xu, Ling, Lu and Shen, (2017) observed that re-use is the action or practice of using something again, whether for its original purpose or to fulfill a different function. Garbage reuse is noted by many as one of the cheapest ways to cut cost of getting new things (John, 2018). Additionally, many construction materials can be used, including concrete, asphalt materials, masonry and reinforcing steel. "Green" plant-based garbage is often recovered and immediately reused for much or fertilizer applications. Many industries also recover various by-products and/or refine and re-generate solvents for reuse. Examples includes copper and nickel recovery from metal

finishing processes, the recovery of oils, fats and plasticizers by solvent extraction from filter media such as activated carbon and clays, and acid recovery by spray roasting, ion-exchange or crystallization (Dutta-Powell, Court & Clark, 2023).

According to World Health Organization (2018), every year there is an estimated amount of sixteen billion (16b) injections administered worldwide, but not all the needles and syringes are not properly disposed "off" afterwards. This makes it easier for reuse by ignorant individuals therefore causing great health implications thereafter. Despite progress in reducing HIV infections and other health problems, the improper reuse of garbage is responsible for approximately 33,800 new HIV infections, 1.7 million hepatitis B infections, and 315,000 hepatitis C infections within a population of 16 million (UNAIDS, 2020).Dan, Imam, Ukpata & Akpa (2023) opined that the reuse of some household waste especially waste or garbage from food, (e.g. groundnut oil used for frying meat over three times) increases the accumulation of fat in the body of the individual reusing it. Further, a range of used food-based oils are being recovered and utilized in "biodiesel" application. Moreover, the authors explained that in the presence of all odds, the reuse of some garbage actually reduces the cost of living of individuals; therefore, making those more relaxed and leaves them in a good state of health (Xu, Li & Chi, 2021; Dutta-Powell, et al., 2023).

Ajayi (2016) opined that the increase in unemployment is as a result of poor demands for some household materials such as plastic bottles, buckets etc. This then increases the difficulty to feed, leading to malnutrition and health related implication. The author also contributed that reuse required cleaning especially in terms of garbage plastic which exposed the reuse to various toxins and harmful agents. Hope (2016) added that some reused items posses' great threat to the health of people for example, the reuse of aluminum sheet in new buildings can lead to the destruction of properties through frequent leakage in the roof. The researcher added to the study by affirming that not all items or garbage materials are best when reused, most garbage materials require other garbage management methods such as recycling, reducing, incineration, landfill (burying) among others, (Valdemar & Guido, 2023; Xolisiwe, Grangxabe & Madonsela, 2023)

Purpose of the study

The purpose of this study is to investigate the approaches to accurate garbage management and students' health status in Faculty of Science Education, University of Calabar, Cross River State, Nigeria. Specifically, the study seeks to investigate whether:

1. Recycling of waste has any relationship with the health status of education student in Faculty of Science Education, University of Calabar.
2. Reuse of waste has any relationship with the health status of education student in Faculty of Science Education, University of Calabar, Cross River State.

Statement of hypotheses

1. There is no significant relationship between recycling of garbage and students' health status in Faculty of Science Education, University of Calabar.
2. There is no significant relationship between reuse of garbage and students' health status in Faculty of Science Education, University of Calabar.

Research design and methods

The study adopted the survey research design. This is because it investigates the phenomena as it exists as at the time of investigation. The population of this study was 745 students in Faculty of Science Education, University of Calabar. A total sample of 300 students randomly selected from five departments in Faculty of Science Education, University of Calabar using simple random sampling technique. The instrument used for data collection was a self-developed questionnaire by the researchers with the help of the coauthors titled "Approaches to Accurate Garbage Management Questionnaire (AAGMQ)". The questionnaire was divided into two sections. Section A was designed to collect the respondent's personal data. Section "B" items with four questions on each variable used in collecting opinions of the respondents from the variable investigated during the study. The questionnaire was design with the modified four point likert scale response of strongly agree (SA), Agree (A), Disagree (D) and strongly Disagree (SD).

Results and discussion

Hypothesis one

There is no significant relationship between recycling of garbage and the students' health status in Faculty of Science Education, University of Calabar, Cross River State. The independent variable is recycling of garbage while the dependent variable is students' health status. The result obtained from the analysis is presented in table 1.

The result from Table 1 shows that the calculated r-value of .62* is greater than that of the critical r-value of 197 at .05 level of significance with 298 degree of freedom. With this result, the null hypothesis was rejected while the alternate hypothesis upheld. Hence, there is a significant relationship between recycling of garbage and students' health status in Faculty of Science Education, University of Calabar, Cross River State.

Table 1: Result of Pearson Product Moment Correlation Analysis of the relationship between recycling of garbage and students' health status in Faculty of Science Education, University of Calabar (N=300)

Variables	Ex Ey	Ex^2 Ey^2	Exy	Cal-r
Recycling of garbage	3692	16088	84126	.62*
Health status	3986	15998		

Significant at .05 level, df =298, Critical r-value = 197

Hypothesis two

There is no significant relationship between reuse of garbage and students' health status in Faculty of Science Education, University of Calabar, Cross River State. The independent variable is reuse of garbage, while the dependent variable is students' health status. The result obtained from the analysis is presented on table 2.

The result obtained from table 2, revealed that the calculated r-value of .58* is higher than that of the critical r-value of 197 at .05 level of significance with 298 degree of freedom. With this result, the null hypothesis was rejected, while the alternate hypothesis was accepted. Hence, there is

a significant relationship between reuse of garbage and students' health status in Faculty of Science Education, University of Calabar, Cross River State.

Table 2: Result of Pearson Products Moment Correlation Analysis of the relationship between re-use of garbage and the health status of students in Faculty of Science Education, University of Calabar. (N=300)

Variables	Ex Ey	Ex^2 Ey^2	Exy	Cal-r
Recycling of garbage	3762	14508		
			89264	.58*
Health status	3710	15660		

Significant at .05 level, df =298, Critical r = 197

Discussion of findings

The first hypothesis states that there is no significant relationship between recycling of garbage and students' health status in Faculty of Science Education, University of Calabar, Cross River State. However, the null hypothesis was rejected because the calculated r-value was found to be greater than the critical r-value. The implication of this result is that there is a significant relationship between recycling of garbage and students' health status in the study area.

The result of this hypothesis is in line with the assertion made by Friday (2018) that daily human activities have detrimental effects on both human health and the environment. The release of greenhouse gases, such as methane and carbon dioxide, contributes to environmental degradation. Methane generates acidic pollutants, while carbon dioxide traps heat, preventing the Earth's surface from releasing radiation. Consequently, rising surface temperatures lead to the demise of numerous organisms, including humans, and result in crop failure and reduced agricultural productivity. Also, in support the result of this hypothesis and its finding, Singh (2014) highlighted the significant impact of recycling greenhouse gases on mitigating climate change. Notably, a 2005 initiative successfully reduced carbon emissions by repurposing recycled carbon dioxide in industrial applications, such as the Solvay process.

Punzalan, (2020); Sumana and Rodrigues, (2021); Sumana and Rodrigues, (2022); Dutta-Powell, et al., (2023) in their respective studies advanced different methods of waste management, they proffered more than six different methods of waste management which have beneficial effects to man and the environment to including, composting, energy recovery, incineration, plastic gasification, reuse, recycling and reduction. Their reasons being that waste management should adopt the waste hierarchy model; this model begin with the reuse or selection of the best waste management options which are most beneficial to man, then to the least method. Organic manure can be produced from biodegradable waste; energy can be recovered from plastic gassifation and some materials can either be reused or modified into other new products. These methods reduce over exploitation of natural resources to begin the whole circle of production of goods.

The result is also in line with the earlier findings of Onnoghen, et al., (2020) whose work suggested that indiscriminate waste dump generate different substances beginning with the release of methane (CH_4) which is that stench that greets one when one approaches a waste dump site. These are also breeding grounds for pathogens and other vector and disease carrying bacterial. Eneji, et al, (2019) in their work on environmental education and waste management behavior also found that in managing waste dump, environmental education can play very significant roles, by creating the needed awareness on the dangers of indiscriminate waste dumps in the university campus. The authors also suggested that the university authority can through proper negotiation with the student union, form a monthly environmental sanitation exercise in the university, where both staff and students resident in the university can participate in cleaning up the school environment including the drainages, streets, surrounding, offices, laboratory and classroom among others.

This innovative approach yielded multiple benefits, including the conservation of natural resources, decreased energy consumption and emissions, and reduced environmental degradation associated with raw material extraction and manufacturing. Furthermore, recycling efforts led to

decreased greenhouse gas emissions, improved public health outcomes, and generated substantial economic benefits, including job creation and economic growth.

The second hypothesis states that there is no significant relationship between reuse of garbage and students' health status in faculty of education, University of Calabar, Cross River State. The null hypothesis was not accepted because the calculated r-value was found to be greater than the critical r-value. This therefore means that there is a significant relationship between reuse of garbage and students' health status in Faculty of Education, University of Calabar, Cross River State.

The finding was supported by the views of World Health Organisation (2018), which averred that the improper disposal and reuse of medical waste, such as needles and syringes, pose significant health risks worldwide. According to the UNAIDS (2020), this practice contributes to approximately 33,800 new HIV infections, 1.7 million hepatitis B infections, and 315,000 hepatitis C infections annually.

Furthermore, in support of this is the findings, Dan et al. (2023) noted that the reuse of household waste, particularly food waste, can have detrimental health effects. The authors explained that reusing cooking oil, for instance, can lead to increased fat accumulation in the body. However, the authors also highlighted the benefits of reusing certain waste materials, such as reducing living costs and promoting relaxation.

Wu and Zhu, (2021); Wei, et al., (2021); Wu, et al., (2022); Valdemar, et al., (2023) and et al., (2023) in their different studies found that indiscriminate waste dump provides breeding grounds for vermin, diseases carrying microorganisms, pathogens. These authors posited that humans have suffered untold hardship and death due to ignorance of the dangers of living and working within a dirty environment. These authors posited that illnesses like cholera, diarrhea, prognosis, dysentery, and most of the seven killer diseases identified by World Health Organizations are caused by dirty living environment.

Zhang, et al., (2020) further posited that the lack of demand for certain household materials, like plastic bottles and buckets, exacerbates unemployment, leading to malnutrition and related health issues. Moreover, the author emphasized the importance of proper cleaning and sanitation when reusing waste materials to avoid exposure to toxins and harmful agents.

Conclusion

The purpose of the study was to investigate and present findings on approaches of accurate garbage management and students health status in Faculty of Science Education, University of Calabar, Cross River State, Nigeria. The findings obtained from analysis of data and testing of hypotheses in the study revealed that there was a significant relationship between recycling and reuse of garbage in the study area. However, the need for this study arises to investigates various approaches to effective waste management and their impact on creating a healthy environment for students, ultimately aiming to identify strategies that promote both environmental sustainability and student well-being around the study area.

Recommendations for policy directions

Based on the findings obtained from analysis of data and testing of hypotheses in the study, it was recommended that:

a) The university managements should also ensure that the employees responsible for disposing waste are well and promptly paid so that they can carry out the duties effectively.
b) The waste management supervising team should move around the school community and enact a law that will be punishable if the indiscriminate disposal continues.
c) Waste bins should be mounted at strategic points so that the walking distance to dispose of waste of waste cannot act as barrier to proper waste disposal attitude
d) The university should mount environmental sanitation activities within the school periods from time to time for bth staff and students to participate in waste management within the school premises.

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