

MAKERERE



UNIVERSITY

**AN ASSESSMENT OF FACTORS AFFECTING WASTE MANAGEMENT PRACTICES
AT A GIVEN SECONDARY SCHOOL IN KAMPALA CENTRAL DIVISION**

BY

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DECLARATION

I declare that this report has been developed by my own ideas and it has never been submitted to this or any other institution of Higher Learning for any award of Degree of Bachelor's Education Science.

Signature.....

ANYINE TOM


Date.....^{3rd} Jan, 2023.....

Dedication

This report is dedicated to my Uncle - Levi Kwarisima for the support rendered to me and brother Paul Bwebare for the moral support

APPROVAL

This report has been written under the support of the university supervisor and it is ready for the examination

Signature  date 03/01/2023

Dr EDWARD KANSIIME

University supervisor

Acknowledgement

I thank God for having enabled to reach at the end of this level in academics. Great thanks go to my supervisor for his effort to supervise this study through guidance and advice. Extra – ordinary thanks go to Miss Ketra Aijuka and Apophia Nsimire for their morale support and social support. The Lord God be your way!

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Acronyms / Abbreviations

CVI:	Content Validity Index
GIS:	Geographical Information System
HHs:	Households'
HU:	Hawassa University
KCCA:	Kampala Capital City Authority
MoH:	Ministry of Health
MSW:	Municipal Solid Waste
NEMA:	National Environment Management Authority
SDGs:	Sustainable Developmental Goals
SPSS:	Scientific Package for the Social Sciences

SOPs:	Social Distancing and other Standard Operative Procedures
ST:	Shalimar Town
SWM:	Solid Waste Management
TPB:	Theory of Planned Behavior
USA:	United States of America
WHO:	World Health Organizations

Abstract

Solid waste management and their practices have become one of the main narratives in attempt to have clean and safe environment. In Uganda, emphasis has been put on policy and implementation by various institutions. In schools, information about waste management practices is limited. From this background, this study had to assess factors affecting waste management practices. The study was guided by three specific objectives which included to: establish the relationship between the social-economic characteristics of the learners and waste management practices; examine the process of waste generation and collection; and assess the transportation methods and waste management disposal applied at the school. This study was conducted following the Theory of Planned Behaviour using descriptive case study of research design on 222 sample size. Purposive and stratified random sampling techniques were used alongside interview guide and survey questionnaire whose Cronbach's Alpha was 0.918. Content analysis was used for qualitative data while Chi-square tool, ANOVA and multiple regression for quantitative data so as to determine significant relationship. The findings reveal negative and positive relationship between variables. Only knowledge of awful effect of waste and dumping practice had a significant relationship where $p\text{-value} = .038 < 0.05$. Study also show that canteen food leftovers and students' polythene papers were significant process of waste generation at $p\text{-value} 0.000 < 0.05$. Students, school workers and

municipal workers were also significant transport carriers at p-value $0.000 < 0.05$. It is also indicated that use of dustbins and dumping to designated places were significant processes at 0.000 and $0.019 < 0.05$ respectively. The study concludes that schools have significant waste management practices which needs the government to incorporate into the policies for all schools.

CHAPTER ONE

INTRODUCTION

1.1 Background

The study assessed factors affecting waste management practices at given secondary school in Kampala Central Division. Like any other communities with human being, students at this school generate wastes. However, information about waste management processes in such secondary schools is not documented despite of the increased threats to health within the City. This section therefore presents historical, theoretical, conceptual and contextual background to this study. It also presents the problem statement, objectives and significance.

1.1.1 Historical

Historically, human development has been intrinsically linked with the management of solid wastes due to public and environmental health (Kinobe et al., 2015). The practice of waste management has a long and evolutionary history across communities and societies which can be traced since the ancient days. By the 4th Century AD, the Greeks had already documented multiple challenges of aligning waste removal with the growing population in growing cities like Athens (Koutsoyiannis et al., 2008). The main challenges were lack of space and sanitation problems in which people could hardly adhere too. Waste management practices were rudimentary in the ancient days with trash just being collected and transported to pits outside communities of people (Ampofo, 2020a). It was not until the booming of urban populations that garbage was viewed a threat to human health and environment. Cities and communities that lived together began to grow rapidly to accommodate the growing population, and conditions began to worsen for these cramped communities. The plagues that affected Europe between the 14th and 16th centuries were often perpetrated by vermin thrived in unsanitary urban conditions that were common during this time. Early waste-management practices developed during this period to combat the spread of disease but the political and social problems of the time did not see great strides in waste management practices management system (Abdu et al., 2019).

Until the 18th century, there was no proper and management practices applied by the then communities. The beginning of the century witnessed municipal collection of garbage in some world urban and populated communities, but the methods were still fairly crude. During the

Industrial Revolution, Europe and the United States were experiencing rapid development that created greater amounts of waste. Waste started to become a concern and the “*Age of Sanitation*” began. Communities started waste collection and disposal to help to maintain public health.

In the latter part of the 19th Century and 20th Century, technological advances included the use of garbage cans and creation of incinerators and sanitary landfills; the latter replaced the practice of open dumping and has become a common practice in the developed world (Yooda et al., 2014). Waste systems took on a more organized approach to waste management, and technology, industry, and new policies and regulations imposed on waste helped to dramatically improve the waste management industry (Singh et al., 2014). With the Clean Air Act in the United States in 1970, many early incinerators without air pollution controls were shut down and replaced by modern waste-to-energy plants. In recent years, the solid waste industry has employed other technologies, such as recycling and composting to combat ever-growing wastes.

Whereas the modern waste-management industry in developed world has come far, the situation among communities in developing world and Uganda in particular is still wanting. Whilst recycling and other advances in waste management continue to grow and change with the needs of the community in developed nations, communities in developing nations are still believing in rudimentary methods with their associated ills (Aryampa et al., 2019). Today, waste management practice conditions in developing world are quite dire; that the study on such practices in schools can inform the government about dangers upon which students live with.

1.1.2 Theoretical

The study was informed by the Theory of Planned Behavior (TPB) to assess factors affecting waste management practices at given Secondary School in Kampala Central Division. It was used since its tenant is attitudinal or intention to perform given behaviors considers consequences to humans and environment (Scalco et al., 2017). These intentions are assumed to be influenced by motivational factors which are reflected in individual or group behavior. Within the school environment, motivational factors compel students to act in a certain direction and such factors were assessed as well as presented in chapter four to this study.

1.1.3 Conceptual

The study focused on factors as independent variables and waste management practices as dependent variable. The term ‘waste’ is used in this study as unwanted or unusable materials that come from numerous sources from industry and agriculture sectors as well as businesses and households. For the purposes of this study, wastes are generated by students who study from the school through buy items like food - packs and drinks from a canteen, sweeping class or compound, wastes, from laboratories, kitchen and dining hall, water (after-washing), unuseful materials such as papers, containers, woods and plastics. Some students come with foods from home in polyethene papers which they later dump within the school compound. The school wastes also include liquid in form of solid and hazardous or non-hazardous depending on its location and concentration. Most school with ordinary and advanced levels have laboratories from where science practices for subjects like Biology, Chemistry, Physics and Agriculture are carried from. Some of the specimen and used water partly forms the waste. Such wastes have significant nuisance or adverse impact on social, economic, financial, environmental and academics of the learners whilst at school.

The factors therefore were certain measures or processes that have been put in place by a school collect wastes. Some of the factors have been put in schools for the good cause but ending into generating the wastes. Presence of classrooms calls for routine sweeping and this ends by accumulating the wastes. Slashing the compounds is yet another activity that is done in good faith and betterment or maintaining conducive compound for school environment. Slashed grass partly forms the wastes. School have been called to distribute dustbins – containers to enable the learners to collect wastes. This study used the term management practices to refer to daily activities which students or the school workers (teaching & non-teaching staff) do during generation and collection of wastes. Transportation and disposing are among other activities under management practices.

1.1.3 Contextual

The given school which started in 1990 in Kampala Central Division was the context to this study. The school is a day – school and found within central areas of Kampala Capital City where the location requests modern facilities if wastes are to be well managed. It is a public school, located in City Center; in an environment surrounded by human informal private and formal government

offices. The propinquities of school facilities with town buildings make it easier for students and teachers to identify any littering paper or materials within the school environment that constitute municipal waste. Besides, the school is located within residential areas which makes it possible for the rich people living in the centers, working in nearby office drive their daughters and sons in the morning to school and return with them in the evening from work. Some of these children are driven to schools with packed food and drinks so that after eating students find it possible to accumulate wastes. Despite this, there is limited information how waste is generated and collected in such schools that are found in the city centers. There is also lack of clear knowledge about separating hard and simple waste, municipal and electronic wastes that are normally accumulated during their stay at school.

1.2 Statement of the problem

The increased demand for education services and use of school facilities have always been associated with generation of wastes (Ampofo, 2020a). In Uganda, the Waste Management Policy was passed in 2011 but there is limited information about waste management system and regulatory framework for schools (The Legal Framework for Waste Management in Uganda, 2019). This has attracted unregulated management practices such as burning, dumping and disposing wastes to unrecognized places as being generated from school canteens, kitchen, students' dormitories, compound and laboratories. Like other schools with facilities for education services, this certain school provides services to students from senior one to senior six on a day program rather than the boarding. As contextually indicated, the school has limited information about waste collection facilities in relation to accumulation, collection, transportation and disposal process. A ware that waste generated by students have dire effects to environment, human and have been associated to global warming, the pause of knowledge about waste management practices in such schools leaves various unanswered questions (Kinobe et al., 2015). Even though the government and its agencies like the National Environment Management Authority (NEMA) has increased effort against waste, its practices in secondary schools are still not properly done and this increases magnitude within secondary schools in urban areas or cities. This puts the lives of students and school communities at stake to various diseases, which effect government's health facilities and efforts. This study therefore investigated waste management practices at this

secondary School in order to increase awareness and proper waste generation, collection, transportation and disposal in schools.

1.3 General objective

To assess the factors affecting waste management practices at a given School in Kampala Central Division. This narrative attracted this study basing on health of students, environmental degradation, and effort to include the youth on board towards attaining Sustainable Developmental Goals (SDGs).

1.3.1 Specific objective

- i. To establish the relationship between the social-economic characteristics of the learners and waste management practices.
- ii. To examine the process of waste generation and collection at a given secondary school in Kampala Central Division.
- iii. To assess the transportation methods and waste management disposal applied by the given secondary School in Kampala Central Division.

1.4 Research questions

- i. What is the relationship between the social-economic characteristics of the learners and waste management practices?
- ii. What is the process of waste generation and collection at given secondary school in Central Division of Kampala Capital City?
- iii. What are the transportation methods and waste management disposal applied by the given secondary school?

1.5 Justification

Whereas there are previous studies on solid waste management in Uganda, there is limited information on secondary schools yet schools have young generation living in their environment where waste is being generated (Ssemugabo et al., 2020). Many authors have pointed out how expensive to manage wastes, but no study has investigated process of generation / accumulation and collection; transportation and disposal in secondary schools. Yet, in the school environment, such variables to waste are inevitable. The investigated problem would help to give ideal solutions to policy makers on waste handling in schools, especially in the city so as to get a solution for

desirable environment at schools. The study also justifies the extent to which the youth have been eager to be included in such diverse activity that puts human lives directly or indirectly into dangerous situations.

1.6 Significance

The study generates more information to the already existing body of knowledge, enlighten the policy makers, local leaders and local people of the gaps existing in schools in relation to waste management practices. This has more attractive narrative that the government and other stakeholders would get involved in planning and organizing schools like this certain secondary School

These findings can help in drafting appropriate policies for waste management and practices in secondary schools so that they are part of the large systemic for waste collection. Schools need to be empowered with tools that would make learners aware of the dangers of poor waste management practices, particularly to public health, so that both authority and citizens would join efforts to solve the problem of waste management.

1.7 Scope of study

Geographical

The study was carried from a certain secondary School in Kampala Central Division. It has been established within City Centre which makes unique by attracting students to study during the day without any boarding section. Despite being day, wastes are generated and collected. Its day nature and positioning in the City Centre makes attractive to assess its waste management practices.

Content

Factors affecting waste management practices in secondary schools is the main concern to this study. The main focus included process of generation and collection; transporting and disposing which this study assumes to be essential in order to have health environment. The choice to the content scope has been the location and circumstances under the schools has been established.

Time

The actual period for conducting the study will be November, 2022.

CHAPTER TWO

REVIEW OF LITERATURE

2.0 Introduction

This section presents literature basing on topic of the study. It starts with theoretical review; it then gives review following the socio-economic background, the process of waste generation and collection; transportation and waste management.

2.1 Theoretical review

The Theory of Planned Behaviour (TPB) was advanced by Ajzen (1991) to provide a framework for systematical investigations of the factors which influence behavioural and choices. It has been widely used to investigate behaviours, such as leisure choice, driving violations, shoplifting and dishonest actions. This study used it to underpin the extent to which various factors within the socio-economic background relate to generation and collection of waste. How the behavior of the students relate to generation process and waste management is also reviewed as well as researched upon.

The theory, which was developed from the earlier Theory of Reasoned Action, assumes that people have a rational basis for their behaviour, in that they consider the implications of their actions. The TPB hypothesizes that the immediate determinant of behaviour is the individual's intention to perform or not to perform that behaviour. Intentions are, in turn, influenced by three factors and these are; Attitude that compel an individual's favourable or unfavorable evaluation of performing the behaviour. Secondly, there is subjective norm in which an individual's perception of social pressure to perform or not to perform the behaviour. The last being perceived control, which is the individual's perception of their ability to perform a behavior (Ref. Figure 2.1). External factors have been discussed on the model of TPB with the main emphasis to personality, past experience and demographic characteristics. These influence behaviour, but indirectly, and they are mediated through the components of the model.

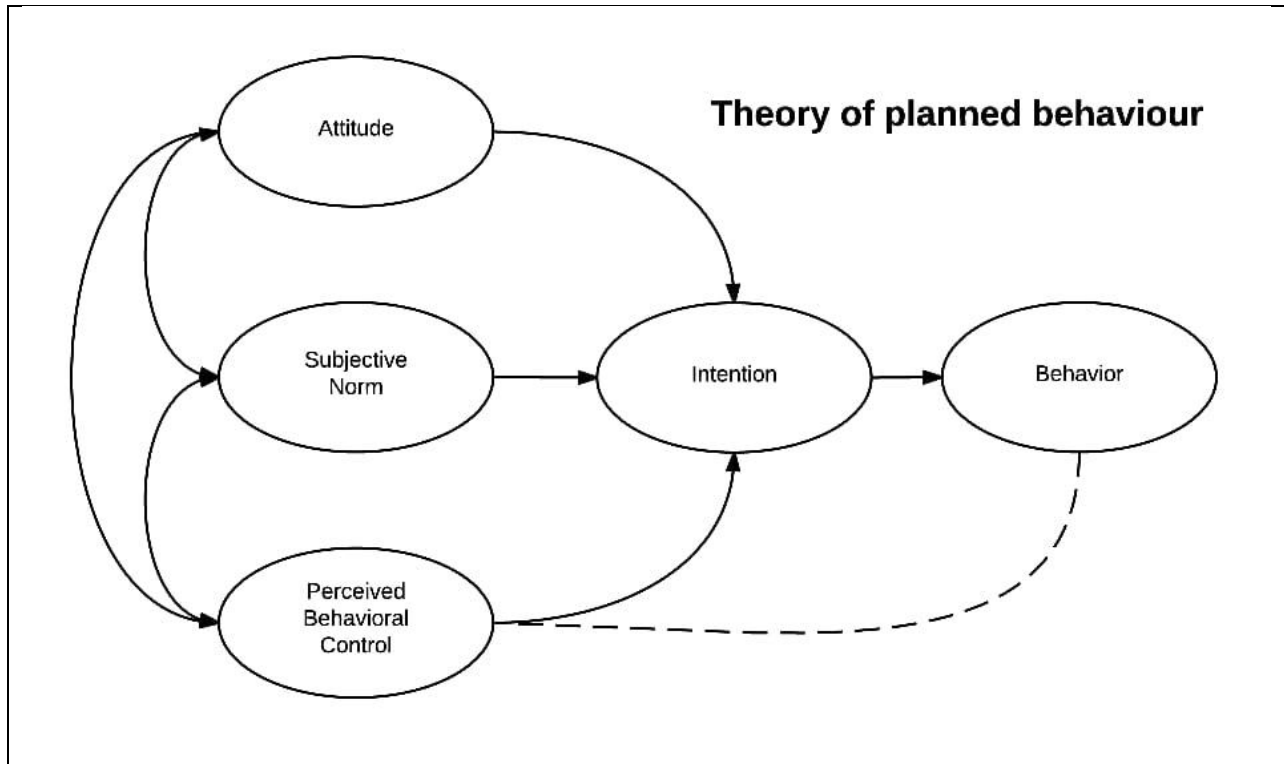


Figure 2.1: Illustration of the Theory of Planned Behaviour

Source: Modified from Ajzen, 1991

2.1.1 Implication of the theory to the study

One of the assumptions of TPB is that people have a rational basis for their behaviour, while considering implications of their actions. Basing on this assumption, this study unveil that schools have norms or regulations governing students towards management of waste accumulated and disposal during their studding. The study also indicates that students in schools are influenced by cognitive and physical factors to engage in waste management process and practices. Among the cognitive factors is the feeling or psychological that their failure to collect wastes in a place would result into dire situation that is associated with diseases. Such cognitive thinking is translated into behaviors and action basing on sex of students, their location – background, level of education, parents – social economic background; that influence levels of involvement in collection and management of waste while at schools.

The theory hypothesizes an individual as the central character in behavioral change or action into management practices of wastes. It indicates that despite the norms or regulations within the

school, it is upon the intention of an individual student or students to engage into waste management practices. These intentions are justified into behaviors or action to accumulate, collect and dispose waste from the school. In fact, this secondary School is found within the City Centre, attracting sons and daughters from rich families. Most of these students have never involved in management of wastes in their homes despite being most groups that accumulate the wastes. The theory therefore shows that intentions from student as they come from the rich families are important towards waste management at school. Some of these intentions grow to into negative or positive attitude towards waste management and practices. Such individual factors have been found important in this study as indicated by results in chapter four.

One of the essential attributes this study found at th School in theoretical narrative is the view that it is a day school. Students enter into the school during the day and leaves in the evening. This serves to justify the subjective norm in which an individual's perception of social pressure to perform or not to perform the behavior or involving in waste management at the school. This subjective norm is based on the nature of student the school admits and aware that they would hardly involve in management practices once the school has a boarding section.

The last component which would have been perceived is the control as indicated by the theory. The school administrators found it hard to regulate such students into action of cleaning the school and the dormitory at large. Thus, the narrative of day schooling.

2.2 The social-economic characteristics and waste management practices

From the theory, it is presented that waste management involves various ends like behavior and norms or policies governing the people involved. It within this perspective that this study used the literature on the socio-economic characteristics to identify gaps that would be bridged by this study. These socio-economic characteristics determine attitude, perceptions, and behaviors to involve into not only waste management practice but to many activities in life (Indrianti, 2016).

In Guinea Conakry, the nation had been marred into an indiscriminate disposal of waste which had resulted into environmental pollution and degradation. It was however found that the nation needed safe management and disposal that would start from the household waste management up to communities within the capital city of Guinea (Conakry). This made Mamady (2016) conducting

a study to identify socio-economic and demographic factors associated with practice, knowledge, and safety behavior of waste management at the household or family level. The study established that no education background, income, and female individuals were independently associated with indiscriminate waste disposal. It was however found that unplanned residential area was one of the factors associated with indiscriminate waste disposal that would at the end affect the environment. The findings of the study also show that community residents had poor knowledge and unsafe behavior in relation to waste management. It was recommended that promotion of environmental information and public education alongside implementation of community action programs on disease prevention and health promotion would enhance environmental friendliness and safety of the community as people engage in waste management.

Wangatia (2014) conducted yet another study in Kenya to determine levels of income generated from Solid Waste Management (SWM) practices; assess the contribution of income to participating households' (HHs) socio-economics and make policy recommendations to exploit existing potential in SWM practices. The study was conducted from 121 HHs from five phases of Dandora urban area. Respondents were selected through systematic sampling by phase, in which the relationships between SWM practices and household socioeconomic factors were established through descriptive analysis and correlations. The findings showed SWM practices had positive influence on socio-economic lives of participants. Mean monthly income from SWM practices (Collection and Disposal, Recycling, and Minimization) were KShs 15941.28/=, KShs 16170.45/= and KShs 9467.50/= per household respectively. Total income of KShs 102,481,259/= per month from SWM Practices for the 6800HHs under study, contributed 82.47% of the total HH socioeconomic expenditure which included but not limited to education, food, health and housing expenses. These expenses constituted 55%, 21%, 18%, and 5% of total income respectively implying that HHs had other sources of income to supplement income from SWM practices. Correlation between total income and total expenses revealed a weak but positive correlation ($r=0.389$, at $p=0.01$) that was significant. The researcher recommends separation of waste at household level for easier collection, disposal and recycling; regular waste collection to avoid creation of mini-dumps in residential areas; and support for research and popularization of adoption of appropriate and low cost SWM technologies locally available to reduce handling cost of recyclable waste. Due to pollution of water supplied to HHs by leachate water from waste dumps, a separate cell was recommended to provide sanitary landfill for the ashes of incinerated

hazardous wastes and composting of solid waste at household level especially by those farming to generate organic manure for organic farming.

Raghu and Rodrigues (2020) conducted a study from Municipal School in India to establish linkages between solid waste management and psychological models. This would inform statutory bodies that wish to design an effective solid waste management system. The study also examined the existing literature on behavioral approaches applied to study of solid waste. Through a systematic literature review approach, their study identified, analyzed, and synthesized available literature across various geographical regions. Based on analysis of 80 articles, the study found that high-income countries (61%) are over-represented in existing literature, in which the USA (44%) has contributed the most. Most articles targeted recycling behavior (59%) by applying individual behavior theories (90%), in which the theory of planned behavior was widely tested (46%). In addition, 65% of the articles conducted model testing and 51% conducted empirical studies, revealing a dearth of evaluation studies in the literature. Cluster analyses revealed that psychological factors, comprising 34 variables, were extensively used, allowing future researchers to explore relevant variables from inter-disciplinary domains by adopting a pragmatic paradigm approach. In summary, this review identified four research gaps, recommended paths for future research, and concluded by highlighting the need of investigating social elements to tackle solid waste issues. The research gaps identified highlight the scope for future studies in under-explored areas and in implementation of pro-environmental models to build a clean and green environment.

In Pakistan, Kamran et al. (2015) carried out a study on effects of seasonal variation and socio-economic status on generation and composition of municipal solid waste (MSW) in Shalimar Town (ST). The total amount of MSW generated in ST is estimated to be 927 tons per day per year. The average per capita rate of MSW collected in ST is 0.69 kg per day in all four seasons. The findings revealed no significant difference in overall waste generation. However, statistical analyses show the significant difference for food waste, paper and plastic ($p < 0.01$) among socio-economic groups and seasons. The results also show that the lowest income group produces 0.39 kg per capita per day during winter months which is the minimum of MSW generated as compared to high (1.1 kg per capita per day) and middle (0.56 kg per capita per day) income groups in the same season. It was concluded that the low-income group produces the minimum of waste in each of the four seasons. In terms of breakdown of the MSW, organic waste is in the highest percentage

(81%) followed by paper (5%), plastic (6%), glass (2%) and others (5%). Food waste was 84% of the entire generated MSW as well as having very low heating value of 5,642 J per g. Elemental and proximate analyses of mixed food waste had carbon 48.72%, nitrogen 2.41%, hydrogen 6.37%, sulphur 0.29 and oxygen 40.15% respectively.

In Ghana, Yoda et al. (2014) investigated domestic waste practices, waste disposal, and perceptions about waste and health in an urban community. The study utilized a mixed-method approach under a cross-sectional design using survey questionnaire and in-depth interview on a total of 364 household heads. Results revealed that 93.1% of households disposed of food debris as waste and 77.8% disposed of plastic materials as waste. The study also showed that 61.0% of the households disposed of their waste at community bins or had waste picked up at their homes by private contractors. The remaining 39.0% disposed of their waste in gutters, streets, holes and nearby bushes. Of those who paid for the services of private contractors, 62.9% were not satisfied with the services because of their cost and irregular collection. About 83% of the respondents were aware that improper waste management contributes to disease causation; most of the respondents thought that improper waste management could lead to malaria and diarrhoea. There was a general perception that children should be responsible for transporting waste from the households to dumping sites. This calls for proper education of public, provision of more communal trash bins, and collection of waste by private contractors could help prevent exposing the public in municipalities to diseases

2.3 The process of waste generation and collection

The solid waste generated in the city, especially city schools is largely composed of organic matter from discarded food residues (Abdu et al., 2019). The sources include; household or kitchen waste for the case of schools moreover, only about 10% of households in the city are served by KCCA, assisted by other private garbage collection firms, waste from markets is mainly raw vegetable matter, food, refuse and some scrap metal and other inorganic materials. Commercial waste is mainly generated from offices, retail shops, warehouses, hotels and hostels (Kinobe et al., 2015).

Nyakaana (2016) stated that industrial waste generation is mainly composed of packaging material, food wastes, metal, plastics, textiles and fuel ash. Street waste is generated from street sweeping and consists of sand, litter, and drain cleanings, animal fecal material and actual dead animals.

Construction and demolition wastes include lumber, pipes, bricks, masonry and other construction materials from cleared building sites. Abandoned vehicles, as well as special waste generated from hospitals, slaughter houses and cesspool waste are problems of special importance. In composition, plastics account for 1.6% with the highest being 73.8% for vegetable matter with the rest being tree cuttings, glass, metals and paper.

According to Aryampa et al. (2019), Waste Generation in the East African Community Cities can be compared and projected between the cities of Kampala, Nairobi and Dar es Salaam in which Kampala generate the least amount of waste, while Dar es Salaam generated the highest amount of waste; five times the waste generated in Kampala. Projections of annual waste generation in the three cities, based on population projections, showed that waste is likely to increase by approximately 60% by 2030 in Kampala and Nairobi and by 74% in Dar es Salaam as indicated in Line Graph 1.1; with the per capita waste generation of 0.843, 1.145 and 1.938 kg/ capita/ day for Kampala, Nairobi and Dar es Salaam.

In Europe, Saseanu et al. (2019) carried out a study about impact of education and residential environment on long-term waste management behavior in the context of sustainability in schools. The main challenge was to reduce waste permanently in schools which has been perceived as a concern for all countries of the world, given the need to ensure sustainable development. In this context, the research aimed to highlight impact of education and demographic factors by residence areas on long-term behavior of the amount of waste generated in 29 European countries during 2013–2017. The study was based on statistical and econometric modeling aimed at identifying, testing and analyzing the existence of long-term correlation between amount of waste generated per-capita recorded in each country and four factors of influence considered significant for waste reduction: Pupils and students by education level and classroom teachers and academic staff by education level, representing exogenous variables which quantify the educational outcomes, as well as the population by degree of urbanization (cities, rural areas), as demographic factors. As a result of an analysis based on correlation and regression method, a co-integration relationship between the analyzed variables was identified. Considering the amount of waste as an important component of the environmental pressure, the obtained results show the significant long-term effect that education and the demographic factor can have on its long-lasting behavior, as well as the ways through which these factors could act to strengthen sustainable development in schools,

cities and rural areas. However, a study by Saseanu et al. (2019) did not explain the process of waste generation and collection in such schools which this study is intended to address.

In Nigeria, Jeminiwa et al. (2017) examined the waste disposal management awareness among selected secondary school teachers in Ibadan. In the area, waste had been realized as a result of human activities and unavoidable, yet everyone needed to have proper understanding of waste management issues. Teachers were taken important factors which could spread environmental education, skills, values and solutions to coming generation. Environmental education and awareness among selected secondary school teachers in Ibadan were established. The research examines the waste management technique, awareness on availabilities of environmental laws and challenges facing Ibadan schools in effort to reach at the standards needed. A total number of three hundred copies of questionnaires were administered within some secondary school teachers in three local government areas. Simple random sampling technique was used for the selection of sample. The harvested data for this research were analyzed using descriptive statistics. The study revealed that monthly environmental sanitation programme and environmental laws exist according to the response from teachers would be the best factors compel student to comprehend to proper management.

Another study which explored secondary school students' understanding and practices of waste management in Ogun State, Nigeria was conducted by Ifegbesan (2010). Like the paucity of knowledge about waste management in Uganda, schools in Nigeria had few studies that had captured waste management problems in educational institutions, particularly the views of students. Using a structured, self-administered questionnaire, 650 students were surveyed from six secondary schools in two of the four educational zones of Ogun State. Data collected were subjected to percentage, mean, standard deviation, t-test and chi-square statistical analyses. Findings revealed that secondary school students from the sampled zones were aware of waste problems on their school compounds, but possessed poor waste management practices. The study showed that propensity for waste management practices differ by sex, class and age of students. Significant relationships were observed between students' sex, age and class and their level of awareness, knowledge and practices of waste management.

Helelo et al. (2019) assessed the solid waste management (SWM) practices in four campuses of Hawassa University (HU), Ethiopia, with the aim of identifying the major sources, composition and quantity of solid wastes and solid waste management (SWM) practices. Key informant interview and visual assessment were carried out to identify the major sources, sampling sites, measurement points and management practices. The wastes were segregated and categorized into classes and measured for seven consecutive days in each campus. Result showed that about 35,364.2 Kg of food leftover and more than 10,541.4 kg of paper, plastic, grass and leaves, medical waste, and some other mixed solid waste were generated every week. From the total waste more than 92 % was recyclable and 81.5% was organic. The food leftover was managed by selling to ranchers, giving it to poor-of-the poor, and the remaining was managed through dumping. The clinical wastes, papers and some other wastes were burned and only limited solid waste was recycled. Generally, the SWM practice in HU was reactive to the problems and a more proactive solution were required. For instance, conversion of organic waste to biogas could reduce the cafeterias, cooking firewood spending, greenhouse gas emission and other socio-economic and environmental impacts associated with SWM problem. Recycling of paper waste by selling to pulp and paper factory could also be a feasible and win-win strategy for the university and the environment as the experience gained from Adama Science and Technology University.

In yet another study from Nigeria, Coker et al. (2016) assessed waste management practices at a private institution of higher learning in Nigeria in attempt to characterize the nature, components and quality of waste generated. Variations in quality, quantity and composition of waste can be linked to various factors such as cultural, economic, social and financial status of inhabitants of the particular space. These distinct factors determine the best waste management practice to adopt. Using the key-informant interview and personal field observations, the waste generation rate, pattern and characterization was made. Results showed that between 0.3 and 0.4 kg/capita/day was generated daily by the students in their respective halls of residence, with population ranging from 762 – 848 students in each of the halls. All the solid wastes generated were collected using appropriate waste collection bags and mobile bin positioned at strategic corners of the university premises. The waste materials after collection were segregated into plastics, bottles, nylon and organic materials by scavengers. After these non-bi-degradable were sold in the secondary market, an estimated total sum of 639,900 naira (2908.6USD) could be realized daily. At this rate a total

sum of 230 million Naira (1,045,454.5 USD) is realizable yearly as wealth from waste. It was concluded that if all the organic waste streams from kitchens, cafeteria and animal houses were utilized for bioenergy and organic fertilizer, the wealth to be generated would be phenomenal.

2.3.1 Collection of wastes

Uganda like many other developing countries is facing rapid urbanization of 5.1% per annum which has increased overcrowding and development of slums that are inadequately provided with waste management facilities. Within the slums, schools are established to provide education services and these schools become partly sources of waste generation. The waste collected is currently one of the most essential lacking services in slum areas and its low coverage has caused public outcry. Some of these schools are established in areas that are inaccessible, unaffordable, where the service is expensive to pay, and poor sanitation. The generation of waste management is influenced by school size, education level and surrounding environment.

In Kampala District, dumping and burning are the common form of collection of wastes. There are three types of dumping collection sites, common in Kampala Capital City where different types of solid waste generated are dumped. These include official temporary storage sites that have been demarcated as KCCA waste collection dump sites. Originally these were temporary storage sites where KCCA skips were located, but after the introduction of the compactor trucks, these sites were removed. These sites are normally at the market areas, public parks, public organizations, and roadsides.

Secondly, there are unofficial temporary storage sites that are not demarcated by KCCA but are being used by people for dumping waste such that wastes would be collected by KCCA. They have been mainly along unrecognized places like roadways, open spaces, and drainage channels. A daily schedule for this type of temporary storage sites is provided by KCCA along with the legal sites, although most times, the waste from temporary storage sites is not effectively collected.

Illegal dump sites have been existing in Kampala as places where people dump waste and the waste is not collected by KCCA. The waste is left to rot, creating a nuisance to the surrounding community, and some of it is burned by a concerned person

2.4 The transportation methods and waste management disposal

Transportation is one of the main aspects that influences the waste management process and disposal. Waste transportation is a waste management operational activity that starts from the last garbage collection location. The problem of transporting solid waste is due to the low frequency of transportation, the length of the waste transportation route, the inappropriate capacity of the transport vehicle, and the length of time for the transportation of solid waste (Coker et al., 2016). This has an impact on the amount of waste transported and the level of waste services. The level of waste transportation is influenced by several factors like vehicles of transporting garbage, the amount of trash that will be transported and the operational costs of garbage handling (De, 2015). Currently, solid waste is still a global problem that must be solved. Waste problems generally occur in urban areas and other communities with many people.

Haerani and Budi (2019) realized that waste transportation is part of complex waste management which made them review the modeling of solid waste transportation routes using geographical information system (GIS). This study established that waste transportation is highly influenced by growth or accumulation of waste. To simplify the implementation of garbage transportation, a waste transportation model was needed from the last collection to disposable destination. Various wastes transportation models have been developed to explain the process of transporting garbage. The garbage transport model is basically designed to simplify the transportation system so that the behavior of several components in the system can be known to the people till disposable point. One of the models that can be used in the garbage transportation system is GIS, which is a spatial and computerized waste-based modeling. In the era 4.0, the modeling of waste transportation using GIS was needed so that all the transportation components are trapped well. In Uganda, Kinobe et al. (2015) indicated that optimizing waste transportation and disposal involves high costs. In their study, Geographic Information System (GIS) tools were used to optimize travel distances, trips and collection time, which would lead to maximizing total waste collection, yielding large savings and keeping the environment clean. The study suggested the best waste collection routes, and determined a suitable vehicle fleet and capacity to be used by Kampala Capital City Authority (KCCA), which is the body responsible for waste management in Kampala. The use of the GIS tools led to the reduction in the total number of trips and travel distances, which decreased fuel

consumption and vehicle emissions. However, the model was not adopted outsourced private operators that collect and dispose solid wastes due to high costs.

Ampofo (2020b) conducted a study on waste disposal management practices in selected senior high schools within Wa Municipality, Upper West Region of Ghana. The background to the study was the fact that waste had become a concern to stakeholders responsible for its management. The study adopted a mixed method explanatory sequential approach with both qualitative and quantitative data collection and analyzed. The tools used to capture required data includes; questionnaires, interview schedules and observation. The study respondents were students, teachers and school management of selected Senior High Schools within the Wa Municipality of the Upper West Region of Ghana. The study respondents were one hundred and twenty-two (122) respondents comprising 45 students, 45 teachers, 30 school management officials, 1 education officer and 1 waste management officer. The study found that different kind of solid wastes are generated in Senior High Schools within the Wa Municipality. The commonest types of solid waste generated in these schools were food waste, rubbish, and ashes. Again, it was found out that waste was disposed in open spaces in Senior High Schools within the Wa Municipality. The study further revealed that, students, teachers and school management were worried about the waste disposal situation. It also emerged from the study that there were no proper waste dump sites in Senior High Schools. The study also found out that waste was being thrown away without separation in senior high schools within Wa Municipality. Based on the findings of the study, the need to provide adequate dustbins in Senior High Schools within Wa Municipality was necessary. At least, waste should be collected once in every week in Senior High Schools within the Wa Municipality; transported to a recognized place for further treatment. Or else, if not constant cleaning, there was likelihood for outbreak of communicable diseases such as cholera and typhoid.

Kuffour (2020) conducted a study for the possible approaches to improve waste management in senior high schools in the Ashanti region of Ghana. The main aim was to determine the composition and generation rate of solid waste in the selected senior high schools. An extensive field investigation was used for quantification and analysis of the composition of solid waste in fifteen senior high schools. Averagely, waste generated were organic (70.91%), rubbers and plastics (11.24%), metals (5.64%), textiles (4.67%), other waste (2.77%), glass/ceramics (2.64%) and papers (2.13%). The per capita per day generation rate ranged from 0.02 to 0.13 kg/cap/day

with an average of 0.056 kg/cap/day. The population of the schools and generation rate per capita per day of the schools had a negative correlation coefficient (-0.05). More than 90% of the waste generated in the schools could be dealt with through waste reduction, recycling, and composting. Transportation means was by use of vehicles or lorries for a far distance where recycling and composting would take place. It was recognized that a greater percentage of the waste generated in the selected senior high schools was organic and therefore composting should be encouraged, even among students rather than transporting such waste to recycling points.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This section presents methods that were applied during data collection. It starts with research design, population and sample size; sampling procedure, methods of data collection, and analysis.

3.1 Research design

A descriptive case study of research design which adopt mixed methods (qualitative and quantitative) was used for this study (Avuglah & Underwood, 2019). This was applied with the view that it adds new information to the already existing phenomenon – waste management practices. The choice to this design also stems from its ability to offer equal opportunity to researchers to study a phenomenon within defined area and to develop deep comprehension relating to content. According to Lapoule et al. (2018), a case study is an exploration of bounded system over a period of time through a detailed in-depth data collection that involve multiple sources. It is context specific, and an in-depth investigative survey of a single phenomenon (Flyvbjerg, 2014). To Elman et. al. (2016), a case study design focuses intensively on a single case as a representative of a larger group of cases. Eisenhardt et al. (2018) explain further that a single-case study can help to qualitatively and quantitatively describe an existing phenomenon. It was upon such perspectives that this study selected a single case study where qualitative and quantitative approaches were applied.

The study adopted a mix method approach that would complement one another during research study and analysis of the findings. Ruigrok (2016) noted that it would be better for the case studies to embrace one approach for effective investigation of the phenomenon. But to Elman et al. (2016), the application of mix approach depends on context and intent of the study, a selected approach or approaches (qualitative & quantitative) would be appropriate.

3.1.1 Study area and population

The study was conducted from a given secondary school which is found in Kampala Central Division with the total population of 500 day – students with 230 are girls and 270 are boys. Students come from home daily by foot or being driven by parents into the premises of the school

to access education services. Some of these students carry packed food or money to access food from the school canteen which is also privately owned. Waste within the school premises is always accumulated by students sweeping the classes, food and drinks taken during break and lunch hours.

3.1.2 Sample size and its determination

A sample size of 222 was use and this was determined using the formula by Israel (1992) at 95% confidence level and a precision of 0.05 given as presented hereunder.

Whereby; n = Sample size, N = Total pollution; e = error tolerance at 0.05. The sample size for girls and boy is presented in Table 3.1

Table 3.1: Illustrative gendered sample size

Sex	Total population	Sample size
Males	270	119
Females	230	103
Total	500	222

3.2 Sampling techniques

The study applied purposive and stratified random sampling techniques. Purposively, sampling was used to select the key informants from the given secondary School who were the teachers. These were selected and interviewed since they were part of the large group that involve in implementing polices about waste management practices at the school. Besides, the sampling technique was used with the view that it directs an investigator to rightful choice of participants. A total of 12 teachers were selected as the key informants for the qualitative data.

Stratified random sampling technique was used to select the general participants who were arranged into the strata of girl and boy day-students of the given secondary School. A questionnaire survey was used and these 222 in total to collect quantitative information.

3.3 Data collection tools or instruments

Primary data were collected from participants using questionnaire survey and interview guide. Questionnaire survey was used since it enables participant to collect data within a short period of time, while an interview guide applied to allow participants give narrative about the phenomenon. Survey questionnaire were designed to enable students give precise, short, and predetermined answers. Questions have been designed in form of open-ended and closed nature to allow interface of main investigator / researcher with students. The closed nature questions were meant to limit students to specific answers (Kwon et al., 2022). These tools were designed following the Likert scale (strongly agree, agree, not sure, disagree and strongly disagree).

Interview guide were also structured and semi-structured questions to allow the key informants to express their view about waste management practices at given secondary school. Whenever interview with a key informant would end, the investigator would sit in an isolated place to transcribe what had been said in the face-to-face interview so as to avoid forgetting. Their information later supplemented what was quantitatively collected as presented in chapter four.

3.5 Data Quality Control

3.5.1 Validity

Validity is the extent under which instruments or tools measure what they intend too. In order to establish validity, pre-testing of the tools was done before actual days of field study. After pre-testing, validity was established by giving instruments to judges (individual persons experienced in research) in order identify relevant and non-relevant questions so as to amend them. Selected 20 questions were pre-tested and 19 tools were relevant. In order to calculate Content Validity Index (CVI) that would enable to validify the instruments, the following formula was applied.

Upon the formula above, the CVI was 0.95 which was above 0.7, as a standard measure to validify the instruments (Amin, 2005). This made the investigators to declare the tools relevant to be used to collect needed data.

3.5.2 Reliability

Reliability is dependability of instruments at any time when the instruments used. This was reached by test using Cronbach alpha through the use of Scientific Package for the Social Sciences (SPSS)

version 26 (Bazelier et al., 2015). Results have been presented into Table 3.2

Table 3.2: Illustration of reliability of instruments

Cronbach's Alpha	N of Items
.918	20

The fact that 0.918 was calculated value for reliability, investigator had to declare the instruments strong to be administered in the field.

3.7 Data management and analysis

After collecting data, it was organized, corded and entered into SPSS, version 26 for analysis.

3.7.1 Quantitative analysis

Quantitative analysis was done using SPSS, version 26. First, the descriptive summary background of preservice teachers in frequency and percentage tables. The Chi-square tool, ANOVA and multiple regression were used to determine the relationship and significance as well.

3.7.1 Qualitative analysis

Data received from the key informants would be arranged in accordance to research objectives. This would enable easier analysis content analysis and direct transcribed narrative as presented in chapter four.

3.8 Ethical considerations

Before the interviews would be carried out, participants would first declare their consent and willingness to participate in the study voluntarily. This would occur after a thorough introduction by the researcher to carry out a study for academic purposes. Confidentiality or anonymity was maintained since none of the participants were required to mention their names. Participants were informed about the free and voluntary nature of their involvement. Therefore, they could not expect any form of payments or rewards in exchange of their information. Social Distancing and other Standard Operative Procedures (SOPs) like use of face-masks, as recommended by World Health Organizations (WHO) and Ministry of Health (MoH) Uganda were applied in the due course of the study.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF FINDINGS

4.0 Introduction

This section presents the findings of the study. It starts with the response rate, background variables and presents the findings basing on thematic approaches to the study. Each theme ends with analysis of the findings.

4.1 Response rate

The study used 222 questionnaires which were prepared to the participants. However, the responses rate has been presented in Table 4.1.

Table 4.1: Return from the survey

Categories	Number	Percentage %
Total number of questionnaires returned	210	94%
Total number of questionnaire unreturned	12	6%
Total number of questionnaires distributed	222	100

Table 4.1 shows that results in this section were responses from 94% which have been organized thematically. Only 6% of the responses were not included. Researchers noted that response rate that is about 30% from the survey is good enough to reach at generalization of findings (Vasileiou *et al.*, 2018; Ercikan & Roth, 2014). The fact that the investigator had 94% of participants' responses, he had to compile this dissertation since it was above what is recommended in literature.

4.1.1 Social – economic background

These were collected from participants initial information ranging from age of the participants, family background up knowledge about dangers of wastes in school. Results are presented in Table 4.2.

Table 4.2: Socio-economic background of respondents

Variables	Responses (<i>Fr</i> = 210)		
	Categories	Frequency	Percent
Age bracket – years	12 - 15 Years	33	15.7%
	16 - 20 Years	156	74.3%
	21 - 25 Years	17	8.1%
	25 and above	4	1.9%
Gender of respondent	Male	115	54.8%
	Female	95	45.2%
Level of education	Ordinary Level	117	55.7%
	Advanced Level	93	44.3%
Religious affiliation	Christianity	169	80.5%
	Islam	41	19.5%
Origin by Location	Rural	33	15.7%
	Urban	177	84.3%
Position in class	Always the best	60	28.6%
	Middle positions	145	69.0%
	Weak positions	5	2.4%
Family background	Poor – Family	12	5.7%
	Middle	154	73.3%
	Rich	44	21.0%
Parents' education description	Literate	136	64.8%
	Semi-illiterate	59	28.1%
	Illiterate	15	7.1%
Attitude towards waste collection	Positive	140	66.7%
	Negative	66	31.4%
	Indifferent	4	1.9%
Knowledge of awful effect of waste	Aware	167	79.5%
	Not-aware	43	20.5%

Results indicate that male respondents were many (54.8%) were many as compared to females (45.2%). Of these; 74.3% were between the age 16 – 20, while 15.7% were between the age 12 – 15. The rest of respondents were 8.1% (between 21 - 25) and 1.9% were above the age of 25. Sex and age group distribution were due to context – secondary school where the study was conducted from. It was also due to the school context that only students from ordinary level (55.7%) and advanced level (44.3%) were interviewed. Participants were Christians (80.5%) and 19.5% Muslims.

The fact that the study was conducted from the urban center, majority (84.3%) of students had urban origin, while rural students were only 15.7%. While interviewing the key informants, it was

mentioned that students with urban origin has negative attitude towards involving in waste management practices. At least one of the key informants noted that “*they only mention having either house boys or girls responsible for waste management at home*” (One of the key informants; 10th Movement, 2022).

The study established that many students get middle positions (69.0%) and 28.6% could be always be the best while 2.4% in weak positions. This form of response was due to participants options to find their positions. The key informants noted that unlike in the past when weak and poor performers in class would be involved in deviant behaviors and associated with strikes, position one scores in class has no relationship with involvement or not involvement into waste management practices.

This study established that most students come from middle income families (73.3%), while 21.0% came from the rich families and only 5.7% from the poor families. The key informants noted that despite such differences, waste management is highly a responsibility of the school while engaging students to participants. One of the key informants noted that despite being lazy to involve in waste management practices, students have positive attitude against the wastes. This information corresponds with 66.7% of the participants who had positive attitude towards waste collection from the school. Lastly. This study established that 79.5% of the students interviewed were aware about awful effects of wastes in case not collected, transported and deposited to the designated area.

4.2 Relationship between socio-economic characteristics and waste management practices

The first objective to this study was to establish the relationship between the social-economic characteristics of the learners and waste management practices. The findings presented started with the relationship between socio-economic characteristic and dumping of the used items.

4.2.1 Relationship between social-economic characteristics and dumping of unused items

Dumping is an action through which an individual or a group practice intentionally or unintentionally. While there are individual persons who would dump unused material in the compound or any places, dumping must have a designated and known place where items are dumped for easier collection and transportation. The relationship between dumping and social-economic background is presented in Table 4.3.

Table 4.3: Relationship for socio-economic characteristics and dumping of unused items

Model	Coefficients ^a			t	Sig.
	Unstandardized		Standardized		
	B	Std. Error	Coefficients		
1 (Constant)	3.399	.910		3.737	.000
Age Bracket (Years)	-.019	.168	-.009	-.114	.909
Gender of respondents	-.198	.162	-.086	-1.224	.222
Education	-.011	.185	-.005	-.059	.953
Religious affiliation	-.007	.206	-.002	-.035	.972
Origin by location	.141	.227	.044	.621	.536
Position in class	-.312	.181	-.133	-1.731	.085
Family background	-.270	.186	-.115	-1.451	.148
Parents education	.056	.139	.030	.405	.686
Attitude towards waste collection	.032	.149	.016	.211	.833
Knowledge of awful effect of waste	-.431	.207	-.156	-2.087	.038

a. Dependent Variable: Dumping unused items

The study indicates that there is positive and negative relationship between social -economic background and dumping of wastes in school. The negative relationship is presented in the following variables as follows; age (B= -.009; p =.909), gender of respondents (B= -.086; p=.222), education levels (B = -.005; p=.953), religious affiliation (B= -.002; p = .972), position in class (B= -.133; P = .085), family background (B = -.115; p = .148), and knowledge of awful effect which is significant at B = -.156; p =.038 < 0.05.

On the other hand, the findings of the study show that origin by location (B = .044; p=.536), parents' education (B = .030; p =.686), and attitude towards waste collection (B = .016; p =.833) had a positive relationship with dumping of unused items during their stay at the school.

Analysis of the relationship

The relationship between socio-economic characteristics and dumping of the unused items was analyzed using ANOVA and results are presented in Table 4.4

Table 4.4: Analysis of relationship with dumping unused items

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.796	10	1.580	1.193	.298 ^b
	Residual	263.561	199	1.324		
	Total	279.357	209			

a. Dependent Variable: Dumping unused items

b. Predictors: (Constant), Knowledge of awful effect of waste, Level of Education, Gender of the Respondents, Origin by Location, Parents education description, Religious Affiliation, Position in Class, Attitude towards waste collection, Family Background, Age Bracket (Years)

Table 4.4 presents sum of squares, degree of freedom (df), mean square, Factor (F) and Sig. Using the predictor results as $.298^b < 0.05$, it is indicated that there is a general positive relationship between socio-economic factors and dumping of unused materials. However, the general relationship is not significant.

4.2.2 Relationship between socio-economic characteristics and throwing items like papers

The study also assessed the relationship between socio-economic characteristics and throwing of items like papers within the school premises. Results from the run data have been presented in Table 4.5

Table 4.5: Relationship between socio-economic characteristics and throwing items

		Coefficients ^a				
Model		Unstandardized		Standardized	t	Sig.
		Coefficients		Coefficients		
		B	Std. Error	Beta		
1	(Constant)	1.444	.838		1.723	.086
	Age bracket (Years)	.044	.155	.023	.286	.776
	Gender of respondents	-.115	.149	-.054	-.769	.443
	Education	-.116	.170	-.055	-.681	.497
	Religious affiliation	.135	.190	.050	.707	.480
	Origin by location	.150	.209	.052	.716	.475
	Position in class	.071	.166	.033	.430	.668
	Family background	-.186	.171	-.087	-1.084	.280
	Parents' education	.222	.128	.131	1.735	.084
	Attitude towards waste collection	-.012	.138	-.007	-.089	.929
	Knowledge of awful effect of waste	-.118	.190	-.047	-.618	.537

a. Dependent Variable: throwing used items like papers

Run results to establish the relationship indicate a positive and negative relationship with thrown items like papers. On the positive relationship, five socio-economic background were positive. They include age (B=.023; p=.776), religious affiliation (B=.050; p=.480), origin by location (B=.052; p=.475), position in class (B=.033; p=.668), and parents' education (B= .131; p=.084).

Socio-economic variables with negative relationship include gender of respondents (B= -.054; p=.443), education (B=-.055; P=.497), family background (B=-.087; p=.280), and attitude towards waste collection (B=-.007; p=.929).

Analysis of the relationships

Analysis to determine the state of the general relation with throwing the used item was run and the results have been presented in Table 4.6.

Table 4.6: Analysis of relationship with throwing used items like papers

ANOVA ^a						
	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.706	10	1.071	.952	.487 ^b
	Residual	223.751	199	1.124		
	Total	234.457	209			

a. Dependent Variable: Throwing used items like papers

b. Predictors: (Constant), Knowledge of awful effect of waste, Level of Education, Gender of the Respondents, Origin by Location, Parents education description, Religious Affiliation, Position in Class, Attitude towards waste collection, Family Background, Age Bracket (Years)

Table 4.6 contains results for the sum of squares, df, mean square, factors, and significance (p-value). Basing on p-value $.487^b < 0.05$, it can be inferred that the relationship was positive.

4.3 Process of waste generation and collection

The study established some of the processes of waste generation and collection. These have been presented into two: the process of waste generation and collection.

empty

4.3.1 Process of waste generation

Three process of waste generation were identified which included leftovers from canteen, student polyethene papers and unused papers as presented in Table 4.7

Table 4.7: Process of waste generation

		Responses (Fr = 210)					Chi-Square	Sig.
		Strongly generate	Moderately generate	Weakly generate	Generate little	No generation		
Canteen	food	65	51	29	32	33	22.857 ^a	.000
leftovers		31.0%	24.3%	13.8%	15.2%	15.7%		
Students'	-	102	42	32	22	12	119.048 ^a	.000
polythene papers		48.6%	20.0%	15.2%	10.5%	5.7%		
Students - unused		102	51	24	20	13	7.857 ^a	.097
papers		48.6%	24.3%	11.4%	9.5%	6.2%		

Results in Table 4.7 indicate that food leftovers from the canteen form one of the processes towards generation of wastes with the a highly significant p-value $0.000 < 0.05$. The generation by canteen comes when students buy food or drinks and eat or drink it from either canteen or any other part of the compound. The remains are either left within such places or canteen. The school has charged canteen workers to collect leftovers into one designated place for easy transportation and disposal. It is indicated that 31.0% agreed that canteen – leftovers strongly generate wastes and 24.3% moderately agreed. This information was supplemented by the key informants who noted that in all communities and societies living in towns, there must be a source of waste generation that need to be regulated. Otherwise, the environment must be too dirty.

The study also established that 48.6% of the participants agreed that students' polyethene papers strongly generate wastes at school; while 20.0% noted that they moderately generate whilst 15.2% weakly generates. The key informants noted that these are papers from various sources like students' homes, canteen or on their way as they come into the school. The study established that most papers are used to cover both cooked and dried foods from their homes and shops, while others from the canteen. Suffix, the school does not allow some food from home but students had to use possible means to bring such.

Students' unused papers also generate wastes. These according to the key informants are papers or items that get lost from students mistakenly and picked within the school premises by cleaners

or workers. Results in the Table indicate that 48.6% of the participants strongly agreed that that they generate wastes; while 24.3% agreed and 11.4% responded with weakly generate.

4.3.2 Process of collection

Under the process of collection, it was found that wastes are collected from items and foods from the kitchen where food is prepared for some of the day students, leftovers from the home and canteen as well. Responses to these variables have been presented in Table 4.8

Table 4.8: Illustration for the waste collection

	Responses (Fr = 210)					Chi-Square	Sig.
	Daily	After a week	After two weeks	After a month	Never used it		
Left-overs from kitchen foods	182 86.7%	15 7.1%	2 1.0%		11 5.2%	427.600 ^a	.000
Left-overs from foods got from home	131 62.4%	31 14.8%	3 1.4%	8 3.8%	37 17.65	255.810 ^b	.000
Left-overs from canteen items	142 67.6%	42 20.0%	3 1.4%	3 1.45	20 9.6%	322.048 ^b	.000

Results in Table 4.8 indicate that 86.7% of the participants agreed that there was collection of waste daily from kitchens' food, while 7.1% mentioned after a week. This was highly significant with $0.000 < 0.05$. On leftovers from, it was found that 62.4% mentioned daily and 14.8 mentioned after a week. This also had a highly significant p-value = $0.000 < 0.000$. Lately, it is indicated in Table 4.8 that 67.6% agreed with the view that there was daily collection of waste from left-overs of canteen items; and 20.0% mentioned after a week.

4.4 Transportation methods and waste management disposal

This study also assessed transportation methods and waste management disposal applied in the due course in the school.

4.4.1 Transportation of wastes from the school

This study found four transportation methods used at school. These include carriages by the school workers, carriages by the students and carriage by municipal workers to the dumping place. Responses to the variables are presented in Table 4.9

Table 4.9: Transportation of wastes from the school

	Responses (Fr = 210)					Chi-Square	Sig.
	Once in a day	2-4 times a day	5- 9 times a day	More than 10 times	None		
Students' carriage to the dumping place	112 53.3%	51 24.3%	16 7.6%	20 9.5%	11 5.3%	169.095 ^a	.000
School workers carry wastes to dumping place	92 43.8%	61 29.1%	19 9.0%	21 10.0%	17 8.1%	106.095 ^a	.000
Municipal workers carry wastes to dumping disposal ground	63 30.0%	28 13.3%	11 5.2%	17 8.2%	91 43.3%	110.095 ^a	.000

This study established that all the variables interrogated were highly significant with p-value = $0.000 < 0.05$. Accordingly, 53.3% mentioned that students carry waste to the dumping place once in a day, 24.3% mentioned 2 – 4 times a day; 7.6% mentioned 5 – 9 times and more than 9.5% more than 10 times. On the carriage by school workers to the dumping place, 43.8% mentioned once a day; 24.3% mentioned 2 – 4 times a day; 9.0% mentioned only 5 – 9 times a day and 10.0% mentioned more than 10 times a day. Lastly, the study established 30.0% mentioned that municipal workers carry wastes to the dumping ground once a day; 13.3% mentioned 2 – 4 times a day; 5.2% mentioned 5-9 times a day whilst 8.2% mentioned more than 10 times.

4.4.2 Waste management disposal applied

Three variables interrogated under waste management of the disposal that were applied at the school include use of distributed dustbins, dumping at the designated places and burning of wastes by either workers or students. The findings have been presented in Table 4.10

Table 4.10: The waste management disposal applied

	Responses (Fr = 210)				Chi-Square	Sig.
	Frequently		Irregular			
Use of distributed dustbins	189 90.0%		21 10.0%		134.400 ^a	.000
Dumping at designated places at school	122 58.1%		88 41.9%		5.505 ^a	.019
Burning by workers / students	116 55.2%		94 44.8%		2.305 ^a	.129

Results indicated in Table 4.10 shows that the use of distributed dustbin and dumping at the designated places were significant waste management disposal applied. The two variables had

0.000 and $0.19 < 0.05$ respectively. Yet, $p\text{-value} = 0.129 > 0.05$ was burning at the school by workers or students. This means that the three disposal management practices have been used and the two are significantly used.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This section presents the discussion of the findings which has been done with the literature as reviewed in section two. It starts with a brief summary of the study, it then gives the discussions in line with thematic approach of the findings, it then ends with conclusions and recommendations. The discussion is presented to establish the similarities and differences between the findings to this study with the already existing studies. It also identifies gaps that one can initiate another study, were not bridged by this study.

5.1 Summary

This study shows that waste management practice is dependent on the Theory of Planned Behaviour (TPB) with the main emphasis on norms, attitudes and controls. The main focus of norms and control is to shape the attitude of students into intentions which are translated into behavior. Once the behaviours are driven by the norms, it becomes easier to manage waste and practice various methods to accumulate / generate, collect, transport and dispose waste. In fact, this study reveals that both positive and negative relationship between management practices like dumping and throwing of wastes into different places with the socio-economic characteristics. The study also reveals significant process of generating wastes, collection and disposal as discussed herein.

5.1.1 Relationship between social-economic characteristics and waste management practices

The findings of this study show there is relationship with socio-economic characteristics and management practices, with specific responses to dumping and throwing. These socio-demographic characteristics include sex or gender, age group, education religious affiliation, knowledge of the awful effects of wastes, attitude towards waste collection, parents' education among others. Therefore, the findings to this study are similar to what Mamady (2016) presents from Guinea-Conakry where variables like education background of the participants, incomes of the families, and female individuals are presented independently associated with indiscriminate waste disposal in the nation. This study however does not present the extent to which whether the existence of schools in the middle of the city are planned by the government. Or, the extent to

which their nature of plan establishment affects waste generation practices. One of the uniqueness of both studies is the ability to identify that knowledge of awful effects of the waste is associated with management of waste practices. However, this study does not go extra-miles to establish whether participant have higher or poor knowledge to waste management and collection. This however is presented by Mamady (2016) that most households in Guinea Conakry have limited knowledge.

In yet another study from a municipal school in India by Raghu and Rodrigues (2020), it is presented that there is a link between solid waste management and physiological model. While the findings to this study are silent about the psychological effects on waste management and collection, the psychological approach is well presented in the theoretical review where an emphasis is presented on the role of control. It is control that raises various psychological questions about reasons or needs for collection and disposal. This study therefore leaves an important gap about the psychological effect of the waste management and collection with the thinking nature of the participants.

5.1.2 The processes of waste generation and collection

The findings of the study show that wastes are generated from the school canteen where students buy products like food and drinks. These are among the inevitable basic needs an individual must access and use if he or she is to stay alive and in a health state. The wastes are generated from the school kitchen where the daily food preparation takes place. These are among other sources of city school wastes which are largely contain waste from the school kitchen and others that are accumulated during the stay of children at school (Abdu et al., 2019). In accordance to Kinobe et al. (2015), waste from the canteen is commercial in nature that includes what is already sold in cash to the consumers or clients. The findings of this study are also in line with what Nyakaana (2016) call waste mainly by packaging material, food wastes, plastics that are witnessed after students have eaten food or drunk soda, water or juice. Some of the waste at such school are presented in form of street sweeping or compound sweeping. They contain materials or item like sand, littered papers, and small drained stones by water. The waste is collected and taken to the bins for further management and transportation.

The findings presented from the key informants indicates that despite some of the student's refusal to participate in waste management practices, they have an understanding or knowledge about the wastes and their effects on the society, and environment at large. The study also indicates that participants are aware of the process and collection methods of waste of wastes like use of designated places and throwing or dumping. This knowledge is what Ifegbesan (2010) calls the genesis or basis to waste management. The refusal to engage in waste management practices in line with the literature from Nigeria where it is presented that despite efforts towards awareness of the waste management waste, school compounds are always accumulate wastes by the students. This has been accumulated alongside poor waste management practices that are always carried out by schools and students in particular, as many refuses from collection due to their family background like class.

5.1.3 Transportation methods and waste management disposal

The findings of this study reveal that wastes are collected from kitchen foods, food from home and canteen. They are transported by students at the school, workers and municipal workers. These individual groups transport waste differently from the dumping places to disposal areas at Kitezi, which is a designated area for the wastes. The findings show that most transported have various challenges like transport vehicles and finance. At times they lack competent workers to collect wastes from designated areas and dumping such to the vehicles. Such information is similar to situation which Ampofo (2020b) present from Wa Municipality, Upper West Region of Ghana. In the study, literature show that solid waste generated include food waste, rubbish, and ashes. These are the same waste this study established in Kampala Capital City. It is also highlighted that students, teachers and management worry about waste disposal situation since there is no proper dump sites in the schools. The same literature indicate that waste is thrown away without clear separation which becomes the main task to some groups of people during loading to vehicles for transportation. The literature and the findings of this study indicate that wastes have similar challenges in most areas where they are generated.

5.2 Conclusions

This conclusion is presented based on the thematic means presented in chapter four. Therefore, there is both negative and positive relationship between the social-economic characteristics of the learners and waste management practices. The characteristics stem from sex to the background

environment where the parents to students live. The most important to this study on socio-economic characteristics is that this relationship is the source to different norms within the school environment which are intended to shape behavior among the learners to continue the management of wastes.

The process of waste generation and collection of waste has been significant. The process has been put in place to increase the occurrence of a conducive atmosphere for learning. This study also presents dumping and throwing as the main collection approaches to wastes generated from school canteen and kitchen. Most of the waste are generated in a positive way towards the end.

Transportation methods and waste management disposal applied have been presented important as they stem from the norms. At school, there are students, school workers and then municipal workers who also among the carries as the load waste to the vehicle. At school, there is burning of some waste while others are transported to the KCCA designated place. Despite such roles and disposing methods, wastes are on rise in such places and thus this study recommends the following.

5.4 Recommendations

This study unveils the fact that there is no policy regulating wastes in schools in Uganda. In fact, whilst there is a general policy towards waste management practice across the nation, the sectorial practice for the schools still lacks. Thus, the Government of Uganda through the Ministry of Education need to liaise with the Ministry of Environment to come up with a policy to such, for schools. Such policies would be incorporated within the school regulations to govern the school cleaning the compound and other department.

Schools within the City Centers need to have separate policies that would bring all students from different background into actual management of waste. This will bring equality and equity in effort to create an environment that is desired by all at school.

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Appendices

Appendix I: Survey questionnaire

Dear Respondent,

I am **Tr. Tom**, student of Makerere University, pursuing a degree of Science Education. I am carrying out a research on: *An Assessment of Factors Affecting Waste Management Practices at a given secondary School in Kampala Central Division*. I am therefore requesting you to spare some time and fill this questionnaire. The information you give will be treated confidentially and will be anonymously used for purposes of writing the research report, not for any other purpose.

Thank you for your cooperation.

SECTION A GENERAL INFORMATION

1. Gender a). Male b). Female
2. Age bracket (years)
a) 12-15 b) 16- 20 c) 21 – 25 d) 25 and above
4. Level of education
a) Ordinary level b) Advanced level
- 5). Religious affiliation a) Christianity b) Islam
- 6). State your social characteristics as presented in the table below

	Social characteristic	Response		
		A	B	C
i	Origin by location	Rural	Urban	
ii	Position in class	Always the best	Middle positions	Weak positions
iii	Family background	Poor – family	Middle	Rich
iv	Parents education description	Literate	Semi-illiterate	Illiterate
v	Attitude towards waste collection	Positive	Negative	Indifferent
vi	Knowledge of awful effect of waste	Aware	Not-aware	

SECTION B

PROCESS OF WASTE GENERATION AND COLLECTION

9(a). To what extent do use the following are the sources of waste generation at the school?

Sources of waste generation		Strongly generates	Moderately generates	Weakly generates	Generates little	No generation
a.	The kitchen					
b.	Dinning					
c.	School compound					
d.	Classes and offices					
E	Laboratory					
f	The school canteen					

9 (b). Mention other sources of waste generation at Victoria Secondary School

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10(a). Fill the table by indicating methods of collecting wastes at schools as it relates to frequency

Methods of collection		Daily	After a week	After two weeks	After a month	Never used it
a.	Picking from compound					
b.	Sweeping classrooms					
c.	Cleaning the dinning					
d.	Washing clothes					
e.	Dumping unused items					
f.	Throwing used papers from the canteen					

10(b). State the transportation methods used waste management at school by frequency

Frequency by transportation		Once in a day	2-4 times	5 – 9 times	More than 10 times	None
a.	School workers’ carriages to the dumping ground					
b.	Students’ carriage to the dumping ground					
c.	Municipality vehicles to the dumping ground					

Mention other transport methods applied by the School in transporting wastes

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11(a). State the frequency of the management practices applied at school

Management practices		Frequently	Irregular
a.	Use of distributed dustbin		
b.	Dumping at desalinated places with the school		
c.	Burning by workers / students		

Mention other management practices used at the school

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Thank You

END

Appendix II: Interview guide for teachers - Key Informants

- a) What are various forms of waste generated within the school premises
- b) In your opinion, do thin the waste generated in the school is harmful to humans and environment? Yes/No. Give reasons to support your answer.
- c) State different methods used in waste collection at the school
- d) Describe the transportation waste used at this school
- e) What are the management practices of waste applied in this school?

End