FACTORS INFLUENCING PRIMARY SCHOOL PUPILS' ATTITUDES AND AWARENESS IN SOLID WASTE MANAGEMENT IN LAIKIPIA EAST DISTRICT, LAIKIPIA COUNTY, KENYA

By

Maina Hannah Njeri (B.Ed (Sci))
N50/CE/11168/06

A thesis submitted in partial fulfillment of the requirements of the award of the degree of Master of Science (Environmental Education) in the School of Environmental Studies of Kenyatta University

November 2012
DECLARATION

This thesis is my original work and has not been submitted for examination in any other University or any other award.

Signature........................................Date. 19/11/2012

Name: Maina Hannah Njeri (N50/CE/11168/06)
Department of Environmental Education, Kenyatta University

This thesis has been submitted for examination with our approval as the University supervisors.

Signature........................................Date. 19th November, 2012
Dr. James K. A. Koske
Department of Environmental Education, Kenyatta University

Signature........................................Date. 19/11/2012
Dr. Richard K. Kerich
Department of Environmental Education, Kenyatta University
DEDICATION

This work is dedicated to my husband Peter and our four children Dennis, Eric, Grace and Faith. I owe this lovely family a debt of gratitude for the love, motivation, support and encouragement they gave me as I carried out my research. Also to my Dad who continuously reminded me of my commitment to continue learning for as long as God enables me.
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Above all I wish to recognize the Divine intervention from my God who strengthened me amidst all challenges and without which I would not have succeeded.
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## DEFINITIONS OF TERMS

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<tr>
<td>Academic performance:</td>
<td>Class position in terms of academic tests done at the end of the term preceding the research period</td>
</tr>
<tr>
<td>Awareness of SWM:</td>
<td>A score on solid waste management awareness scale (specifically developed for this research)</td>
</tr>
<tr>
<td>High Potential Urban Schools:</td>
<td>Schools situated in the central business district</td>
</tr>
<tr>
<td>Low Potential Urban Schools:</td>
<td>Schools situated in the outskirt of town (i.e. slum area)</td>
</tr>
<tr>
<td>Pupils' Attitude:</td>
<td>Opinion, point of view or feelings of pupils towards SWM in schools.</td>
</tr>
<tr>
<td>Recover materials for recycling:</td>
<td>Recycling means the re-manufacture of waste into new products.</td>
</tr>
<tr>
<td>Solid Waste:</td>
<td>Unwanted or discarded non-flowing materials that arise from human activities</td>
</tr>
<tr>
<td>Solid waste management:</td>
<td>Skills and processes employed in handling wastes from generation to time of disposal</td>
</tr>
</tbody>
</table>
LIST OF ABBREVIATIONS AND ACROMYMS

Cal Recycle: California Department of Resources Recycling and Recovery
CGASBPDA: City Government of Addis Ababa Sanitation Beautification Parks Development Agency
CIWMB: California Integrated Waste Management Board
CWG: Collaborative Working Group on Solid Waste Management in Low- and-Middle-income Countries
DEA: Department of Environmental Affairs
EPA: Environmental Protection Agency
HPU: High Potential Urban Schools
KCPE: Kenya Certificate of Primary Education
LPU: Low Potential Urban Schools
MDGs: Millennium Development Goals
MSWM: Municipal Solid Waste Management
NEMA: National Environment Management Authority
SW: Solid Waste
SWD: Solid Waste Disposal
SWM: Solid Waste Management
Three R's: Reduce, Re-use, Recycle
TOD: Teacher on Duty
UNCED: United Nations Conference on Environment and Development
UNDP: United Nations Conference on Environment and Development
WMREI: Waste Management Research and Education Institute
ABSTRACT

Among the studies that have investigated students' awareness of environmental phenomena, events, and issues, only a few have looked specifically at the attitude or the awareness of primary school learners about solid waste management. Given this knowledge gap, it was essential for research in environmental education to explore learners' awareness and attitude about solid waste management which shape the ways in which the pupils handle waste issues and guide their environmental behavior. The main objective of this study was to analyse factors influencing primary school pupils' attitude and awareness of solid waste management. Samples of pupils from five public schools in Laikipia East district, Laikipia County, Kenya, were studied in an effort to assess factors affecting their attitudes and awareness on solid waste management, and how these varied by gender, academic performance, education level and location of the schools. Data collected were analysed using SPSS computer software to obtain frequencies, percentages, and means. The results were presented in form of frequency tables, pie charts and bar graphs. Findings revealed that awareness of solid waste management practices of most pupils from the sampled primary schools differ significantly by academic performance ($p=0.000$), education level ($p=0.000$) and type of school ($p=0.000$). Also, the attitude of the pupils towards SWM differed significantly by the type of school they attended ($p=0.004$). The academically bright pupils, upper class pupils and those from HPU schools exhibited higher awareness of SWM than the academically weak, lower class and those from LPU and rural schools respectively. However data did not provide enough evidence to prove that there was a significant difference in attitude of SWM between boys and girls ($p=0.92$), pupils of different education levels ($p=0.68$), or between the academically weak and strong pupils ($p=0.64$) nor in gender awareness of SWM ($p=0.09$). Paper was the most common solid waste generated in the schools and was mainly disposed of by open burning. It was concluded that academic performance, level of study and type of school attended influenced the pupils' awareness of SWM while their attitude was influenced by the types of schools they attended. It was recommended that further research should be done in future to study health impacts of waste workers, including pupils as they work under unhygienic conditions. Solid waste management should be integrated in primary school curriculum and made more practical and interesting to the pupils, for positive attitude change due to concern over growing problem of garbage disposal and the feeling that the issue should be addressed in a holistic manner.
CHAPTER ONE: INTRODUCTION

1.1 Background of the Problem

One of the greatest challenges facing human beings is the unhealthy disposal of solid waste resulting from activities of development (Joseph, 2006; Longe and Williams, 2006; Kofoworola, 2007). This is hitherto a problem recognized by all nations at the 1992 Conference on Environment and Development, and regarded as a major barrier in the path towards sustainability (UNCED, 1992). There is strong evidence which suggests that individual or group awareness and attitudes towards waste generation and management is critical in the effort to respond to the waste management challenges (Ifegbesan, 2009).

In developing countries, for instance, large and increasing quantities of SW receive inadequate management due to poor administration, shortage of funds, lack of facilities and problems in training and public awareness (Masaku, 2009). The problems are worsened by lack of sound regulatory systems (Wang and Nie, 2001) and unplanned urban developments. In Bangladesh for example, lack of financial resources, institutional weaknesses, improper selection of technology, inadequate transportation systems, dismal disposal options, public apathy towards environmental cleanliness and sanitation have rendered solid waste management services unsatisfactory (Rahman et al, 2009).

Freduah (2007) suggests that irregular services rendered to producers of refuse by municipal councils compel them to find ways of disposing the refuse which mainly includes burning, composting, or indiscriminate dumping. For example in Ghana, it was estimated that about 83% of the population dumped their refuse in either authorized or unauthorized sites in their neighborhood, and due to weak capacity to handle solid waste, unsanitary conditions are created (Freduah, 2007). Like other developing countries, the problem of overuse, misuse, indiscriminate and unintentional littering of plastic bags is relatively more serious in Kenya. The widespread use of the plastic bags may be attributed to the fact that they are either
free or inexpensive (Topfer, 2005). Since most of these bags are thin and highly fragile, re-use is minimal.

A study by Ameyaw and Adu-Asare (2010) revealed that poor sanitary conditions in schools are due to unwillingness on the part of the teachers to educate the pupils, misconception and ignorance on the part of the pupils towards the environment and the absence of environment education in school curriculum. Setting up or improving an existing school waste reduction program can benefit everyone involved; improve economic and environmental performance through implementation of waste reduction initiatives and help them learn about successful waste prevention, composting, and recycling programs (EPA, 2010).

1.1.1 Solid Waste at Schools
Solid wastes are all wastes arising from human and animal activities that are normally solid in nature and that are discarded as useless or unwanted. It is a generic term used to describe substances thrown away including garbage, refuse, and trash (Salequzzaman and Newman, 2001; Rahman et al, 2009). According to UNDP (1992), solid wastes include all domestic refuse and non-hazardous wastes such as commercial and institutional wastes, street sweepings and construction debris. Solid waste at schools mainly consists of food waste, plastic bottles and bags, old copybooks and writing paper, other paper, packaging material and garden wastes. Old and damaged school furniture and building material can also often be found on the schoolyard (Daniel and Thomas, 1999).

1.1.2 Solid Waste Management
The disposal of wastes in or on the land without careful planning and management can present a danger to health and the environment (Smith, 2005). Waste management can be defined as the collection, transportation, processing, recycling or disposal of waste materials produced by human activity (Rahman et al, 2009; Allaby, 1988). It is undertaken to reduce their effect on health, the environment or aesthetics. It includes all the procedures from the source to final disposal which
should not have any harmful effect to the environment or least environmental effect that could be integrated by any physical, technical or social activities (Hills, 2003). Currently, a combination of source reduction, recycling, incineration, and burning in landfills and conversion is the optimal way to manage solid waste (Freduah, 2007). However, the most common method of disposing waste is by open dumping and burning. Open dumping is harmful to health, contaminates drinking water (both underground and surface supplies) and pollutes the air and land (Ogboi and Kperegbeyi, 2009).

Urban non-biodegradable solid wastes include plastic, sachets bottles, containers, leather etc. Burning of combustible non-biodegradable waste gives off gases which eventually lead to acid rain, global warming and ozone layer depletion, while buried plastic products prevent water movement, thus causing irreparable damage to soils. Plastic products block drainage channels causing flooding while cellophane wrappers used for packaging candy, cookies and other baked goods are hazardous to livestock if ingested. Other effects include reduction in aesthetics of places, and affluences from refuse dumps alter soil chemistry. More so, littering, declining biodiversity, excessive leaching of rich alluvial soil, spread of epidemic and pandemic diseases are parts of poor waste management effect (Ogboi and Kperegbeyi, 2009).

1.1.3 Environmental Awareness

Though a serious urban environmental problem, solid waste is not always perceived to be a problem and poor people are not likely to consider such issues as solid waste very seriously (Salequzzaman and Newman, 2001). Management of household refuse is tied to awareness and socio-cultural practices which result in modes of appropriation of space which are greatly differedenced according to whether the space is private or public (Navez, 1993; Freduah, 2007). The effectiveness of many waste measures, particularly those aimed at waste reduction, recycling and litter prevention depends to a large extent on public and consumer awareness and changes in behavior (DEA, 2010).
Schools have a particularly important role to play in advocacy and awareness around waste issues (DEA, 2010) and consequently contributing to the solutions of national waste problems. Not only is there an important role in the education of future consumers and decision makers, but schools can also make significant cost savings, turning waste into a resource and taking action to put the three R’s- Reduce, Re-use and Recycle into practice (Blake et al, 1998).

Within the programs of study of each of the national curriculum subjects there are a range of opportunities to increase understanding of waste and environmental issues. Environmental programs introduced in schools help learners gain knowledge about environmental issues, acquire organizational skills and discover their role by implementing the three R’s (Jose, 2009). Such environmental programs in schools not only help in protecting the environment but also contribute into the creation of well-informed citizens now and in the future to take onus of safeguarding the environment (Rhyner, et al, 1995). Ideas can be generated to make schools get zero waste programs which can benefit both the school environment and the school community and also have positive effects on the wider environment (Donnelley, 2010). There is need therefore to closely look into ways of sensitizing school children so as to aspire to be better managers of the environment in relation to solid waste management. The environmental programs should also include reaching out to students and making them see waste management as a necessity and not a compulsion (Shri, 2009).

1.1.4 Pupils’ Attitude towards SWM

Attitudes can be defined as favorable or unfavorable feelings toward a characteristic of the physical environment or toward a related problem (Ifeegbesan, 2009). From a psychosocial point of view, environmental attitudes refer to beliefs concerning what consequences environmental deterioration may have for oneself, for other human beings, or for the biosphere (Schultz, 2001).
Among the multiple studies concerning attitudes, environmental attitudes have begun to acquire relevance in recent years, thereby symbolizing the growing interest of researchers and educators in conserving the environment (Zelezny and Schultz, 2000). Attitudes of environmental concern are rooted in a concept of self, and the degree to which an individual perceives himself or herself to be an integral part of the natural environment (Ferna’ et al, 2007). Most people think that it is only the government which should be responsible for keeping the environment clean (Ameyaw and Adu-Asare, 2010). This has led to careless and lazy attitude of students towards the cleaning of school compound and most students are not aware of the benefits of a clean environment.

According to Ameyaw and Adu-Asare (2010), creation of awareness in SWM and clean school environment would change the attitude positively. For example, pupils would learn to separate solid waste in to different types during disposal (Kola–Olusanya and Ahove, 2008). There is need therefore to embark on environmental awareness campaign to sensitize pupils to develop the right attitude about solid waste disposal (Nabegu, 2010).

1.2 Statement of the Problem and Justification

The risk of unhealthy disposal of solid waste is one of the serious problems in many societies (Ehrampoush & Moghadam, 2005). The problem of waste management has continued to rise in developing countries where there is little history of the implementation of formal and informal community environmental education awareness program. Irresponsible dumping and not collecting garbage from neighborhoods and schools create health problems and result in the spread of diseases which is a potential threat to staff/student health and the environment (Matthew, 2009). It also leads to problems such as stench, the breeding of flies, rats, cockroaches, mosquitoes and other vermin (Linthoi, 2006). Environmental knowledge and attitude of young people is crucial as their point of view ultimately
plays an important role in providing solution to the future environmental problems (Longe and William, 2006; Kofoworola, 2007).

Waste management practice in schools would create awareness and instill knowledge in these future leaders (pupils) about the situation challenging the present adult generation on waste management and then have a kind of vision for mission on how to save the future generation from most of the disaster experienced today as a result of poor waste management. Also, they would implement projects on waste management easily, because they are faced with lesser opposition, since most of the then generation will be aware of the resultant situation on poor waste management system (Linthoi, 2006). School environmental programs, although addressed to students can also influence upon the environmental awareness, attitude and behavior of adults (parents, teachers and local community members) through the process of integration influence.

The present study was intended to investigate the status of pupils’ awareness and attitude towards SWM in Laikipia East District. This was important because it was expected that negative attitude towards SWM and lack of awareness would discourage proper compliance with laid down guidelines for SWM in a manner that does not further damage livelihoods, affect human health or negatively impact on the environment (Pasche and Kelly, 2005; Philapitiya et al, 2005).

1.3 Research Questions

The study set out to address the following research questions
1. What are the major types of SW generated in different types of schools in Laikipia East district?
2. What are the SWM methods used in different primary schools in Laikipia East district to enhance clean and healthy environment?
3. How is awareness of SWM of primary school pupils’ in Laikipia East district influenced by gender, type of school, education level and academic performance?

4. What is the effect of gender, type of school, education level and academic performance in the pupils’ attitude towards SWM in Laikipia East district primary schools?

1.4 Objectives of the Study

The broad objective of this study was to investigate the factors that influence pupils’ awareness and their attitude towards SWM in primary schools in Laikipia East district in Laikipia County of Kenya. To achieve this, the following specific objectives guided the study:

1. To determine whether types of SW generated vary according to types of primary schools in Laikipia East district.

2. To find out the solid waste disposal methods used in different primary schools to enhance clean and healthy environment.

3. To ascertain whether pupils’ awareness of SWM is influenced by
   (i) gender
   (ii) type of school
   (iii) education level
   (iv) Academic performance

4. To find out whether pupils’ attitude of SWM is differ by
   (i) gender
   (ii) type of school and
   (iii) education level
   (iv) academic performance
1.5 Hypotheses

In this study, the following hypotheses (expressed in the null form) were tested at $p \leq 0.05$ significant level.

1. Types of solid waste generated vary according to types of primary schools in Laikipia East district.
2. Methods of SWM used enhance clean and healthy environment differ according to types of primary schools in Laikipia East district.
3. The awareness of SWM varies significantly by gender, type of school, education level or academic performance amongst primary school pupils in Laikipia East district.
4. The attitudes of SWM among primary school pupils in Laikipia East district vary significantly by gender, type of school, education level or academic performance.

1.6 Significance of the study

A few studies conducted on the environmental education program, regarding children and young people show that the level of environmental awareness is relatively low (Grodzinska and Jurczak, 2001). A deeper understanding of pupils’ attitude and their awareness of SWM will allow educators to identify potential barriers and provide insight toward planning curriculum and designing instruction that builds on students’ existing awareness and attitude (Shepardson et al, 2007).

Incorporating waste reduction as part of the school’s overall way of doing business can provide a number of benefits such as reduced disposal cost, improved worker safety, increased efficiency of school operations and decreased associated purchasing costs (CalRecycle, 2010).

This study provides data to education and environmental stakeholders which may provoke their consciences to focus on purposeful desire to inculcate waste management skills and attitudes to the young in schools. It will also provide the
information (if needed) to the Ministry of Education about necessity of introducing SWM programs in schools as a way of ensuring cleaner, healthy and friendly environment.

1.7 Limitations

The following were the limitations of the study

1. The study was limited to a sample of five public primary schools and the results generalized to the population from which the samples were drawn.

2. There was scarceness of literature on attitudes and awareness of SWM in primary school pupils

3. Generalization was only for class five to seven pupils from Laikipia East district. The results can therefore only be applied to those particular circumstances.

1.8 Delimitations

The study confined itself to pupils in public primary schools. Although the attitude and awareness of SWM affects every child in school the study involved only pupils from class five, six and seven who were presumed to read and understand the questionnaire. In addition class eight pupils were left out to avoid interruption of their preparation for KCPE examination. Finally, there are several other factors that affect attitude and awareness of SWM in primary school pupils, but this study was confined only on gender, class, academic performance and type of school.

1.9 Conceptual Framework

It was expected that pupils’ awareness and attitude of SWM would directly be influenced by their academic performance, gender, type of school and class. The perception and the attitude of the pupils would influence the methods applied in
SWM and consequently the resulting nature of school environment. It was also expected that the amounts of different types of waste differed from school to school.

Women and girls do a greater part of solid waste handling and disposal in the community (Freduah, 2007). They also demonstrate willingness to participate in pro-environmental actions and high level of commitment and responsibility than men in social aspects (Manzanal et al 2007). As a result girls were expected to exhibit a more positive attitude than their counterpart males. The fact that the social status of solid waste workers is generally low (Ogawa, 1997), would result to negative attitude of people regarding the work which involves the handling of waste or unwanted material. Poverty is hence a very important variable that could influence perception and attitude negatively on SWM. As a result, pupils from high potential urban schools were expected to have a more positive attitude towards SWM than their peers from low potential and rural schools. Education level was expected to play a significant role as maturity could affect level of awareness (Bradley, Waliczek, and Zajicek, 1999) on solid waste and its management. Maintenance of school environment would to a large extent depend on the SWM methods applied in an institution which are also dependent on the pupils' attitude and awareness. The concept was simplified in figure 1.1.
The arrows (→) refer to influence

**Figure 1.1: Conceptual Framework**

1.10 Study Area

Laikipia East District is one of the five districts of Laikipia County. It borders Laikipia North to the North, Ndaragwa to the South-West, Nyeri North to the South-East, and Buuri District to the East. It lies between latitudes 0° 20' South and 0° 22' North and between longitude 36° 51' and 37° 20' East (Figure 1.2). The district covers an area of 2,963 km² and is subdivided into two administrative divisions, Lamuria and Central.
Figure 1.2: Position of Laikipia East District in Kenya (Source: Laikipia East district office)
Figure 1.3: Primary Schools in Laikipia East District (Source: Laikipia East district Education office)
CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Wastes are materials arising from human activities that are discarded as useless or unwanted. It includes all the heterogeneous mass thrown away from residences and commercial activities as well as the more homogeneous accumulation of a single industrial activity (Ogboi and Kperegbeyi, 2009). Solid waste management is not just a question of aesthetics, lack of management of solid waste leads to serious risks to public health and the environment, each risk having its own economic cost. According to Gonzenbach and Coad (2007), aesthetics, that is the appearance of a locality and the absence or presence of nuisance, influences behaviour that can lead to pollution and impacts on health, as well as indirectly causing economic costs.

The problem of solid waste is a growing concern worldwide. In America for example, the Federal Government dedicates EPA to solving and preventing problems caused by waste (Huebusch, 2009). Beede and Bloom, (1995) in their study of economics of generation and management of Municipal solid waste (MSW) in major European cities found accelerating urbanization has the major cause of rapid increase MSW generation that dramatically expanded the burden on local governments in many developing countries to collect, process, and dispose of MSW in socially efficient ways (and the amounts of refuse destined for final disposal rapidly consume landfill capacity. Moreover, finding acceptable strategies to cope with such a problem was a quite hard task, owing to the increasing awareness of environmental issues by population and authorities. This awareness led to new perspective holding that waste should be recovered or disposed of without jeopardizing human health and without using processes or methods, which could harm the environment (Zuilen, 2006)
With increase in population and living standards, solid waste in developing countries also increases rapidly. For example, EPA reported that most sub-Saharan countries gave up on SWM to the whole areas of cities along time ago. For instance, CGASBPDA (2005) reported that the daily solid waste generated in the city of Addis Ababa was about 2253m$^3$. The agency also estimated that the solid waste generation increases on average by 3.9%. If such trends continue, the world may see a remarkable increase in waste generation by the year 2025 (Palczynski, 2002). Rapid urbanization and lack of public concern could be major contributing factors to solid waste disposal (SWD) problems.

The United Nations Conference on Environment and Development, held in Rio de Janeiro in June 1992, focused world attention next to other problems also on the undesirable effects of economic and population growth: climate change caused by the accumulation of greenhouse gases, depletion of the ozone layer and the increased levels of municipal solid waste (Beede and Bloom, 1995). The conference reaffirmed that environmentally sound practice for the management of waste is one of the major issues that needs to be addressed for maintaining the quality of Earth’s environment and for achieving sustainable development (Jaya & Dhindaw, 2004). Among the many problems addressed, it was concluded that increased levels of municipal solid waste (MSW) are the undesirable by-product of population growth, the changes in consumption habits and economic development (Ojeda & Beraud, 2003)

Since the early 1970s, Solid Waste Management (SWM) in developing countries has received increasing attention from researchers and policy makers concerned to establish a sustainable management system (Gerlagh, Beukering, Madhu, Yadav, & and Pandey Preety, 1999) The increasing scale of economic activity, which include industrialization, urbanization, rising standards of living and population growth, has led to an increase in the quantity of waste generated (Zuilen, 2006). In Suriname, for example, the most common practice of disposing waste is mainly through legalized open dumping, other used methods are open burning and illegal
dumping. These improper solid waste management practices lead to substantial negative environmental impacts (for example water pollution and emission of greenhouse gases from open dumps), and health and safety problems (such as diseases spread by insects and rodents attracted by garbage heaps). (Zuilen, 2006)

While exploring secondary school students’ belief and attitude about waste management in Northern Peninsular, Malaysia, Yakob, Esa and Yunus (2012) observed that many countries in this world faced problems with solid waste disposal, for instance in 2004, The United States produced more than 509 million tonnes per year (Mc Cornkey, 2006), India, 960 million tonnes per year (Aorara and Agarwal, 2011), while in Gigiri, Kenya, between 200-250 tonnes per year were produced (Waste Management Report, 2004) . The reason of this is the modern 'culture of consumerism' has aggravated the waste problem (Aorora and Agarwal, 2011). In 2001, Malaysia was producing more than 15,000 tonnes of waste per day (Anon, 2001) and by the year 2020, it was anticipated to produce 30,000 tonnes per day (CAP, 2010). The critical issue is the rise of environmental problems which have impacts primarily on human health (Yildiz, 2011; Mohd Badaruddin, 2003). Thus, a proper waste management is needed to ensure the protection of the environment and human health.

In his research of globalization, urbanization and municipal solid waste management (MSWM) in Africa, Achankeng (2003) identified globalization as playing a negative role in SWM in African cities. The impacts of this include transfer of globalized and internationalized waste management methods and ideologies together with an increased volume and variety of waste, resulting from increased flow of goods and services, and changed lifestyles and consumption patterns which directly or indirectly affect the waste sector. In Uganda, for example, the volume of solid waste generated in Kampala every day was 198 metric tonnes in 1969. Eleven years later 275 tonnes were generated, and by the year 2000, 900 tonnes were being generated every day. In 2004, a Kampala City
Council report noted that 12000 tonnes were being generated daily (Masoke, 2009).

According to Gohole (2009), in a research titled *Waste Management in Huruma Grounds (Kenya) and its Hazardous Effects*, Nairobi pollution problems in Kenya are mainly due to lack of appropriate planning, inadequate political will and governance, poor technology, weak enforcement of existing legislation, as well as the absence of economic and fiscal incentives to promote good practice, and also lack of analytical data concerning volumes and composition of waste substances. Gohole (2009) also pointed out corruption, poor relationships between politicians and the general public, political apathy, command-and-control approaches, and dependency (households may depend on central government, the international community, or on ill-adapted technologies) as key impediments to waste management. According to Herald (2007), the growing urbanization, lack of availability of land and the changing quality of wastes have rendered the traditional method of dumping hazardous and non-viable.

Zuilen (2006) affirms that in many developing countries, formal waste collection and disposal services are provided to only a portion of the population and most of the waste is disposed of in open dumps. The first priority is still to get the refuse out from under the roof (conventional approach) and often relies on high cost, bureaucratic, and centralized alternatives. Deficiencies in the provision for waste services are the results of inadequate financial resources, lacking management and technical skills, strong political interference, limited communication with stakeholders in these countries. According to Zuilen (2006) the greatest barriers to efficient and environmentally sound handling of SWM issues, particularly in developing countries, are managerial, rather than technical therefore, governments should learn about new opportunities how to use their limited resources in an effective manner to improve SWM.
When looking at ways to cut down on waste, it is useful to place the choices available inside a waste hierarchy, where some options for dealing with waste are preferable to others. According to the National Solid Waste Management Strategy & Action Plans, Fiji (2008 –2010), the “waste hierarchy” ranks waste management options according to their environmental benefits. Waste minimization through reduce, separation at source, reuse and recycling lessens the creation of waste and reduces the quantity and the impacts of the waste that is generated (NEMA 2008). This is useful because the environmental impacts of waste are not just confined to their disposal and waste disposal methods vary in terms of their sustainability levels (NEMA, 2008). For sustainable waste management, different sectors such as schools, business premises, hospitals and municipal councils should target to reduce the amounts of waste generated in the first place; to maximise the benefit, and make optimum use of those wastes that cannot be avoided and to select waste management options that minimise the risk of pollution and adverse health effects (Blake et al, 2008). In Fort Collins City-USA for example, many young people are working with teachers and administrative staff to implement environmental programs in their schools (Miller et al, 2010). In the process, students gain knowledge about environmental issues, acquire organizational skills and discover they can make a difference by implementing the 3Rs in school.

It is evident that educators have an important task ahead of starting the current generation off with information and habits that emphasize reducing amount of waste being produced, reusing, recycling, and composting whatever is possible, and incinerating, land-filling, and finding other technologies to dispose of the rest (Cornell Waste Management Institute, 1991). Schools have a vital role to play in contributing to the solutions to our national waste problem. Not only is there an important role in the education of future consumers and decision makers, but schools can also make significant cost savings, turning waste into a resource and taking action to put the three R's - reduce, re-use, recycle - into practice (Blake et al, 2008). Schools can reduce waste in many ways, including using paper on both sides, sharing resources where possible, using durable items, reducing disposables
and excess packaging waste in lunches, and setting a good example for others (Waste to Charity, 2006).

2.2 Solid Waste Management in Schools

Wastes disposed by schools represent a significant loss of natural resources and school funds. A report by Rahman et al (2005), on people's perception of the existing solid waste management of Khulna City Corporation (KCC) Area: ascerted that the fundamental objectives of solid waste management program are to minimize the pollution of the environment as well as utilizing the waste as a resource. These goals should be achieved in a way that is financially sustainable, i.e. using methods that can be afforded by the community over the long term and with minimum risk to the persons involved. According to (Zuilen, 2006), an appropriate waste management system should make an effort to protect environmental health, promote the quality of the urban environment, support the efficiency and productivity of the economy and generate employment and income. In the Philippines schools for example, SWM programs are not only meant to enhance the capacity of students' waste management but also to teach them how to train other students about SW (Baula, 2010). Ecological SWM is aggressively incorporated in the school systems at all levels in Philippines, emphasizing the involvement of school administrators, teaching and non-teaching staff, and the students in school-wide and nearby community waste management actions, and in strengthening of the waste management content in the curricula.

Collecting into pits and burning waste has been the easiest means of managing the waste in the educational institutions. While this gives a wrong notion of waste management to the students, it also increases the problem of waste (CalRecycle, 2008). According to Fernández-Manzanal et al, (2007), certain level of worry exists among students regarding environmental problems, which is apparent in the need to increase environmental education and research. To ensure sound environmental maintenance, creation of public awareness at primary school level
should be among the principal remedial measures (Mahar et al, 2007). Such environmental programs in schools not only help in protecting today’s environment but also contributes in creating well-informed citizens of tomorrow who will take the onus of safeguarding the our environment (Linthoi, 2006).

The education programs that build on the knowledge, values, skills, experiences, and determination of human capacity are needed to work on solving waste management issues at an individual and community level (Sakar, 2011). Schools and students are supposed to be the main focus of education programs. While studying approaches toward sustainable urban solid waste management, Mull (2005) recommended use of course curriculum to engage students in waste awareness activities such as calculating the amount of waste created in their household to not only educate the students but also involve all household members in the project raising their awareness. Environmentally engaging education activities provide a platform on which students begin to exercise the knowledge needed to improve the environment (Hogan 2002). Waste education works to enable students to assess the waste disposal conditions within their community.

It is assumed that the new generations have to prepare themselves by acquiring the environmental awareness and knowledge that will allow them to make the appropriate decisions during their professional lives (Ferna’ et al, 2007). Findings by Corcoran and Wals (2004) revealed that Universities increasingly realize that their remarkable environmental impact in terms of the energy they use, the waste they generate, and also in the way they equip their graduates in dealing with sustainability issues in both their personal and professional lives. Research carried out in the Ogun State of Nigeria showed that secondary school students are aware of waste problems on their school compounds, but possess poor waste management practices and therefore waste management remains a serious environmental problem in secondary schools (Ifegbesan, 2009).
CalRecycle (2008) emphasized the need for schools to establish and maintain paper recycling program in all classrooms, administrative offices, and other areas owned or leased by the school. Schools should be encouraged to purchase recycled paper, revise procurement specifications to eliminate discrimination against recycled paper and to give preference to the purchase of recycled paper. Quality education for residents, schools, and community organizations can be achieved through continued education outreach, teacher resources, school recycling opportunities and solid waste reduction grant program can be designed to help schools begin or improve waste reduction and recycling programs (Howard, 2008).

The challenge to schools is to make waste management a viable and even exciting part of the total learning experience. Instead of simply teaching children and youth to place the waste into the proper receptacle, educators, administrators, and parents have a real opportunity here to teach meaningful and lifelong lessons (Barlow, et al, 2004). Without a strong lead from schools and colleges, the challenges of meeting the targets for sustainable waste management set for the 21st century (Local agenda 21) may not be met (Mansoor and Azam, 2006; Ehrampoush and Moghadam, 2005)

A research by (Zagozewski, Judd-Henrey, Nilson, & Bharadwaj, 2011) studying perspectives on past and present waste disposal practices in Canada revealed that, dump site location and open trash burning were a significant health issues related to waste disposal practices in the communities. They recommended introduction of educational programs to encourage the adoption and implementation of waste reduction, reutilization and recycling activities in the communities.

2.3 Solid Waste and Management in Urban and Rural Schools

Waste practices differ for developed and developing nations, for urban and rural areas and for residential and industrial producers. Generally, management of non-hazardous waste is usually the responsibility of the generator (Environment
Agency, 2007). Solid waste collection in peri-urban area is often more complex compared to urban area. Sutandyo-Buchholz, (2005) in a study of the importance of Community-based Solid Waste Management in Indonesia established that beside its own waste, the peri-urban area is burdened by urban waste as it is often used as disposal places.

Ogboi and Kperegbeyi, (2009) did a study of Waste generation and its environmental consequences in Ika urban and rural environs of Delta State, Nigeria and noted ill health, un-conducive environment, flood disaster, blocking of gutter, are major problems of waste generation in urban and rural areas while unavailability of collection centers and lack of treatment face are major disposal problems in urban and rural areas respectively. From their study, 60% of urban respondents reported that incineration was their major means of waste disposal while open dumping was the major means/system of waste disposal in the rural areas as opined by 82% of the respondents. They observed that waste generation is a problem in both urban and rural areas, but its impact is more in urban areas. The study therefore, recommended that proper disposal of waste would help reduce the problem of waste.

Schools are classified among institutions that are typical solid waste generators producing waste such as paper, cardboard, plastics, wood, food wastes, glass, metals and hazardous wastes (UNEP, 2002). Waste characterization information helps in planning how to reduce waste, step up recycling programs, and conserve money and other resources (CalRecycle, 2008). The nature of waste generated is also related to the economic activities of the area as well as the major sources of waste. (Ogboi and Kperegbeyi, 2009)

Findings in a study by Nooraida et al (2012), “Exploring secondary school students’ belief and attitude about waste management in northern peninsular Malaysia”, revealed that students from urban schools have a high belief about composting compared to students in rural schools. The students in urban setting
were more exposed to a variety of techniques of waste management through interaction with non-Governmental Organisations (NGOs) while students in rural schools were apparently marginalized in the acquisition of knowledge to waste management (Nooraida et al, 2012). Simple open dumping has been the most common option because it is a cheap, fast, and a convenient mode of disposing of wastes in many developing countries (Rotich, Yongsheng, & Jun, 2005). The open dumps are responsible for the different environmental, aesthetic and health hazards.

2.4 Awareness and Attitude on SWM in Schools

Chen and Chai (2010) defined attitude as: “A mental and neural state of readiness, which exerts a directing, influence upon the individual’s response to all objects and situations with which it is related”. According to Zelezny and Schultz (2000), “attitudes of environmental concern are rooted in a person’s concept of self and the degree to which an individual perceives him or herself to be an integral part of the natural environment”. In conclusion, attitude represents what consumers like and dislike (Blackwell et al., 2006) and consumers’ product purchasing decisions are often based on their environmental attitudes (Chen and Chai, 2010).

Waste disposal of a community are influenced by their prevailing attitude towards the environment and SWM practices (Mull, 2005). In a research on factors impeding effective and efficient solid waste management in Nima, Nigeria, by Freduah (2007), it was found that negative attitude and little awareness of the people about sanitation issues contributed to solid waste management problems. This was attributed to the fact that majority of the households did not educate their members on the need to clean their surroundings. Freduah (2007) therefore recommended that more education should be provided to sensitize the people on the need to keep the surroundings clean.
The waste disposal problems also stem from the fact that attitudes and perceptions towards wastes in people’s minds and government officials have not been adequately considered and people do not feel responsible for the waste generation and disposal because they feel that it is the government’s responsibility (Zuilen, 2006). Remigios (2010) in an overview of the management practices at solid waste disposal sites in African cities and towns asserted that public awareness and attitudes to waste can affect the population’s willingness to participate and cooperate in adequate waste management practices. Remigios (2010) therefore recommended that the population needs to be reminded time and again of the importance of environmental awareness and the health risks associated with poor waste management practices.

People’s apathetic and relaxed attitudes towards matters relating to personal hygiene and environmental cleanliness, of which waste management in general is its focal point (Freduah, 2007) might have compounded the problem and therefore should not be overlooked. A few studies conducted on the environmental education program, regarding children and young people show that the level of environmental awareness is relatively low (Grodzinska and Jurczak, 2001). According to Nze (1978), urban wastes in Nigeria are regarded as “non resources” having at best a nuisance value and therefore not surprising that an equally negative attitude has been adopted in managing wastes from urban concentrations in the country. The waste disposal problems also stem from the fact that attitudes and perceptions towards wastes in people’s minds and government officials have not been adequately considered. People do not feel responsible for the waste generation and disposal because they feel that it is the government’s responsibility.

According to Nooraida et al (2012), personal belief can be influenced by the experience, the knowledge acquired and by daily practice of acquired hereditary. Therefore, belief is an abstract awareness that can be observed through the action of individual behaviour. Belief about waste management is the awareness that students’ have on how they deal with the waste that they produced. This
awareness can predict the potential behaviour that students want to perform. Awareness plays an important role in pro-environmental behaviour (Cary, 1993). However, this can be positive or negative. If the students hold a positive belief on waste management, it will help students to have a good behavior on waste management and vice versa. They will care about the environment cleanliness and realize on how to manage the waste in a proper way.

Environmental behaviors of individuals mostly reflect their environmental knowledge. According to Pe'er, Daphne, and Bela, (2007), developing environmental knowledge would empower individuals with ability to contribute to environmental solutions through their personal behavior, either as an individual or part of groups. Findings in a study by Ifegbesan (2009), found that secondary school students in Nigeria were aware of waste problems in their school compounds and understood waste management as a major environmental problem but possessed poor waste management practices. Effective education and awareness programmes, coupled with suitable, user friendly resources would help reduce the amount of waste people produced (Ogboi and Kperegbeyi, 2009). In other words, when dealing with what they do and what they are willing to do to help sustainability, the results are less favorable.

Introduction of waste management programmes would result to a noticeable change in the attitude of the schools involved and their local communities, particularly in relation to waste management and environmental care (IDEP and Mack, 2000). Such programmes may include separating waste for recycling waste paper, composting organic wastes, organic gardening and Arts and Crafts using local natural and recycled resources. To be responsible stewards of the environment, schools should review processes, operations, and curriculum choices (CalRecycle, 2008). Including waste management in the set of learning outcomes empowers students to consider their personal habits and shared responsibilities in terms of the whole school and the greater community. What is important is how
students perceive SWM strategies and the school’s commitment to include waste management in the learning process (Blake et al. 1995).

Findings by Nooraida et al (2012) showed that with pre-knowledge on the impact of improper waste disposal, students knew what they should do with waste. This situation is a good indicator that students had the potential to change their attitude towards behaviour in order to have a good intention and high-quality behaviour on waste management. Thus, to increase the level of students’ belief on those three dimensions, students should be exposed to a variety ways in waste management. To achieve this, teachers play an important role to disseminate the knowledge about waste management. Teachers therefore should be able to integrate activities related to waste management creatively to ensure students have a good understanding and appreciation related to waste management issues.

Education level and education are two of the most explanatory variables related to environmental attitudes. Gender, residence, income and political tendency are also predictors of environmental attitudes (Muammer, 2003; Zelenzny et al, 2000). Study by Ifegbesan (2009) showed that tendency for waste management practices differ by gender, class of study and age of students. Also, significant relationships exist between students’ sex, class and age and their level of awareness, knowledge and practices of waste management (Ifegbesan, 2009)

The following sections looked at literature related to effects of gender, class, academic performance and school background on awareness and attitude towards SWM.

2.4.1 Gender Roles and SWM at School

Ajzen (2001) says the stability of attitudes is relative and they may vary with gender, age, education among others. In social aspects and collective actions women tend to display a higher level of commitment and responsibility than men (Zelezny, 2000). In his work, Elaborating on Gender Differences in
Environmentalism, Zelezny (2000) highlights new evidence of gender differences in environmental attitudes and behaviors across class and countries. Females consistently report more concern for environmental issues and also more frequent pro-environmental behaviors. Manzanal (2007) observed big attitude differences between female students and male students on the need for conservation and in environmentally favorable behavior.

Similarly, Schultz (2002) found relevant differences in environmental attitudes and conduct in boys and girls, with the latter achieving more favorable results. In the same way, Am’erigo and Gonz’alez (2000) show that male university students are less organized to protect the environment than their female counterparts. According to Schultz (2002) female students display higher scores in conservational aspects, the same as those referred to by Am’erigo and Gonz’alez in both urban and rural areas, women are very much concerned in sanitation of the environment than the male and hence much interested on environmental issues.

The finding by Nooraida et al, (2012) revealed that girls’ belief in what to do with waste are higher than boys. They have a high medium level of belief compared to boys. Girls have a great maturity than boys that enable them to make a decision on a certain issue (Nari, 2008). Therefore, they feel that they have a responsibility to do something good to the waste. A study carried out by Kibert, (2000) to determine whether there is a correlation between the environmental literacy components of attitude, behavior and knowledge in undergraduate university students indicated that females have a significantly higher attitude than males while males have a significantly higher awareness than females.

2.4.2 Type of School and SWM

According to Ogboi and Kperegbeyi (2009), the nature of waste generated is related to the economic activities of the area as well as the major sources of waste. As alluded by Jacobs and Bleeker (2004), the social background of the children, especially the parents, can play an important role in inculcating environmental,
precisely WM, values in their children. When children are young, they are not particularly good at assessing their own competence (Nicholls, 1978), so they must rely on their parents' interpretations of their performance as a major source of information about their competence. Parents' awareness of their children's abilities and interests also are likely to affect the types of experiences parents provide (Jacobs and Eccles, 2000).

A damaged local environment hits the most vulnerable groups of the society the hardest. These groups include the poor and marginalized people who lack the resources to reduce the negative effects of degraded environment (Sighal and Pandey, 2001).

2.4.3 Influence of education level on Attitude and Awareness of SWM

According to Agenda 21, Chapter 36, Education, including formal education, public awareness and training, should be recognized as a process by which human beings and societies can reach their fullest potential. It is critical for promoting sustainable development and improving the capacity of people to address environment and development issues. Muammer (2003) in a research on environmental attitudes found that highly educated respondents always have more pro-environmentalist values than lower academic respondents. With regard to the time spent by students at school, the differences between junior and senior class students, especially in assessing the importance of environmental awareness, indicated that students in their senior classes present more environmental concern (Muammer, 2003). Freduah, (2007) also found some kind of relationship between the respondents' level of education and their awareness about cleaning their own surroundings.

Chen and Chai (2010) established that the quality of the environment depends critically on the level of knowledge, attitudes, values and practices of consumers. A higher percent of those with relatively higher education find it appropriate for individuals to clean their own surroundings. Gallagher et al, (2005) carried out a
study on *public attitudes towards solid waste landfill infrastructure* and observed that students at higher class incline a respondent to accept the landfill development as compared to those residents who have not attained the same level. This confirms the findings of Pacey (1990) that formal education is a prerequisite for change in sanitation behavior.

Akhter (2011) in an assessment of determinants of public awareness and attitudes on climate change in urban Bangladesh said that people with formal education, media access, personal or family experiences of environmental problems are more likely to be concerned about environment and climate change and more likely to develop proper environmental attitudes. The people who have been less exposed to formal education are also least informed about environmental issues. The findings indicated that people who do not have formal education, no media access are least informed about the issue and therefore recommended innovative approaches to inform them about climate change.

There is not much literature on the Kenyan solid waste management sector with the exception of Nairobi. Even for Nairobi, the available literature dwells largely on performance description and its causes, household waste generation behavior and waste characteristics (Ikiara *et al*, 2004). It does not dwell on SWM in schools in Kenya.

### 2.5 Summary

Schools generate a great deal of waste, especially as a by-product of food service and waste paper. Disposal of large amounts of waste in schools represent a significant loss of natural resources and school funds, as well as a potential threat to student/staff health and the environment. The challenge is to find ways to reduce levels of waste or to initiate new programs that would reduce future waste flows in schools, helping to conserve resources and the environment. From the outlined literature, research in environmental education tends to focus on students’ factual knowledge about environmental issues, their environmental
attitudes and behaviors, and less on pupils’ awareness and attitude to waste management so as to conserve the environment. Although much of the literature on academic level was found to dwell more on University and Secondary school students from other countries, literature revealed that awareness and attitude improved with academic level (See 2.4.1). That, no evidence was found relating attitude and awareness of SWM to primary school pupils, it was found necessary to research on it in public primary schools from Laikipia East District, Laikipia County, Kenya.

Researchers in other countries have strongly indicated that female students display more positive attitude and sense of responsibility about SWM and environmental issues, than their male counterparts (See 2.4.2). Such a research had not been done in Kenya, and therefore the researcher undertook to find out whether similar findings apply to primary school pupils in Laikipia East District, Laikipia County, Kenya.

From section 2.4.3, it was found that the social economic background of pupils highly determines the type of school they would attend and that waste management values of children highly depend on their parents’ interpretation and the experiences the parents provide. However, literature did not reveal any research ever done to investigate whether the location of a school would affect pupils’ attitude and/or their awareness of SWM.

It is evident that there exists a gap in solid waste management in schools because little, if any, has been done in Kenya as far as involvement of pupils/students in SWM is concerned. Relationship between academic performance and pupils’ attitude and awareness of SWM in schools has not been explored in Kenyan schools.

Given this knowledge gap, this study was carried out to analyse factors that affect primary school pupils’ attitude and awareness about SWM in schools. The study was therefore done to determine whether different types of schools generated
different types of solid waste and whether SWM practices differed from school to school. It was also done to establish whether pupils’ attitude of SWM differed with academic performance, gender, academic level and the location of the schools the pupils attend. It also sought to determine whether awareness of SWM differed significantly with academic level, gender, academic performance and type of school they attended.
CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter describes the methodology applied in this research study. It included the research design, the study area, population sampled, sampling techniques, research instruments, and data collection procedures and analysis. The study was carried out in two stages in order to get an overview of the study area, choice of appropriate materials for data collection and time required for preparation.

Stage one comprised a survey of the district to establish the number of schools by type, their locality from the district headquarters, familiarization with the terrain of the place and coming up with the necessary materials for data collection. This was done with the assistance of two officers from Laikipia East District Education Office. Stage two involved selecting the schools to be studied, selecting the respondents from those schools according to performance and data collection through administration of questionnaires to the respondents and also making direct observations on handling solid waste in the selected schools.

3.2 Research Design

The study adopted a descriptive survey design (Orodho and Kombo, 2002) which involved collection of information by interviewing and administering questionnaires to a sample of respondents. The design was useful in collection of information from respondents on their awareness and attitude to SWM and the factors influencing them.

3.3 Study Area

The study was carried out in Laikipia East District, Laikipia County, Kenya. Purposive sampling was used to select the district for it was easily accessible to the researcher and also because literature did not provide any evidence that it had been targeted for such a study in the past. Also, the district had the three categories of
schools that were to be studied. Further, it was suspected that the challenges resulting from SW in the environment also faced residents and schools in the district.

3.4 Target Population

The target population for the study comprised all public primary school pupils in Kenya. The accessible population was all public primary school pupils in Laikipia East District of Laikipia County, Kenya. The district had 83 public primary schools, 73 in the rural setting, eight (8) in the urban setting and two (2) in the slums. The total public primary school population was 26820; 13720 (51.19%) boys and 13092 (48.81%) girls. The sample included pupils from classes five (5), six (6) and seven (7). In total, there were 8496 pupils in classes five, six and seven, 4308 (50.71%) boys and 4188(49.29%) girls.

3.5 Sample Size

The total public primary school population in Laikipia East district was 26820. Out of this, 8496 were form classes five, six and seven from which the sample was drawn. Assuming that 75% of the population had high awareness and positive attitude towards SWM in schools, the following formula was used to calculate the sample size.

$$n = \frac{Z^2pq}{d^2}$$

Where $n=\text{sample size}$

$Z=\text{confidence interval 95\%=1.96}$

$p=\text{probability that the target population have positive attitude and high awareness of SWM}$

$q=1-p$

$d=\text{the level of statistical significance set (0.05)}$

$$n = \frac{(1.96)^2 \times 0.75 \times 0.25}{(0.05)^2} = 289$$

(Fisher, Laing and Stoeekel, 1983)
To take care of those who may decline to attempt the questions or to hand the questionnaires back, this sample size was increased from 289 to 300.

### 3.6 Sampling Design

The sample consisted of 300 children drawn from five primary schools; Nanyuki, St Moses, Tigithi, Mia-Moja and Likii primary schools. The schools from the central business district of Nanyuki town were classified as “high potential urban” (HPU), those in the rural areas of the district as “rural”, while those in the slum areas were classified as “low potential urban” (LPU) schools. The schools were then randomly selected to obtain two from the rural, two from high potential urban and one from low potential urban schools. This was done to enable the researcher to compare pupils’ attitude and awareness of SWM with the type of schools they attended. Out of the 83 public primary schools in the district, 73 were in the rural setting, eight (8) in the high urban settlement and two were in the low potential urban settlement.

In order to assess how pupils’ attitude and awareness on SWM related with their level of education, academic performance, type of school and gender, 20 pupils per class were selected from classes five, six and seven from each of the five schools. This gave a total of 300 respondents. Class five, six and seven were selected because it was assumed that pupils from upper classes were able to read and understand the questionnaires. However, class eight pupils were left out to avoid interference with their preparation for KCPE examination.

To select the 20 pupils per class, stratified random sampling approach was employed, in which the classes were divided into four subgroups (quarters) according to the previous term’s performance, using the class merit lists. This was to ensure that the selected group fell into four categories that would enable the researcher to compare their attitude and awareness of SWM with their academic performance. The targeted population comprised 51.19% boys and 48.81 girls while classes five, six and seven enrolment consisted of 50.69% boys and 49.31%
girls. From each subgroup, five respondents were randomly selected assuming that both gender had equal chances in selection.

### Table 3.1: Sampling design from each of the five schools

<table>
<thead>
<tr>
<th>CLASS</th>
<th>ACADEMIC PERFORMANCE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1&lt;sup&gt;ST&lt;/sup&gt; QUARTER</td>
<td>2&lt;sup&gt;ND&lt;/sup&gt; QUARTER</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

### 3.7 Research Instruments

A questionnaire was designed to collect data from the respondents for the study. During the school visits, the researcher also noted down observations related to the objectives of the study. Clarification of assumptions made from such observations was sought by seeking more information from the education officer in charge of each of the education zones under study and a watchman/cleaner of each school. This was helpful in understanding pupils’ behavior patterns in their physical and social context. The questionnaire was used to collect data on types of solid waste generated by different schools, different ways used by the schools to manage waste, and pupils’ attitude and awareness of SWM according to gender, academic performance, type of school and class.

The questionnaire consisted of two parts.

Part I dealt with three areas: 1) Personal details: Gender, class, academic performance and school 2) open ended questions that provided general information and 3) ten multiple choice questions with specific expected responses testing the pupils’ awareness on SWM. This was meant to determine the respondents’ prior knowledge of solid waste, effects of SW and its management. It was expected that, respondents with high awareness would choose the right answers and hence score highly in this area. It was marked out of ten (10) where each correct
response scored one mark. Respondents’ scores therefore ranged from zero (0) to ten (10).

Part II comprised twenty 5-level Likert scale questions determining the attitude of the pupils towards SWM in schools. A Likert scale is used to measure attitudes, preferences, and subjective reactions (Hall, 2010). Twenty items, ten of which were of positive and ten were negative in nature were included. The respondents were asked to tick in the appropriate parenthesis to indicate whether they strongly agreed, agreed, disagreed, strongly disagreed or were undecided on the statements provided.

Scores were attached to the responses as follows: strongly agree-5, agree-4, undecided-3, disagree-2, strongly disagree-1. The response score for each of the items that were reversed in meaning from the overall direction of the scale was reversed before scoring. That is, a respondent who gave a 1 was given a score of 5; if they gave a 2 a score of 4 was given; 4 = 2; and, 5 = 1 as shown in table 3.1 below. Undecided responses were ignored in the final analysis.

**Table 3.2: Scoring and Analysis Mechanism**

<table>
<thead>
<tr>
<th>Response</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>During Presentation</td>
<td>+Statement</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>-Statement</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Scores during Analysis</td>
<td>+Statement</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>-Statement</td>
<td>5</td>
<td>4</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

The survey data was further simplified by combining the four response categories (i.e. strongly agree, agree, disagree, and strongly disagree) into two nominal categories (agree and disagree) and finally appropriately as positive and negative responses. Neutral responses were not included in the analysis. The total number of positive responses and of negative responses was summed up and percentages determined for all the respondents. The score for each item was used as a
grouping variable and then the number of respondents in each category compared
with those of other categories for selected parameters using Chi-squared test.

3.8 Reliability Test

Reliability measures the degree to which a particular measuring procedure gives
similar results over a number of repeated trials (Orodho, 2005). To determine
reliability of the instrument, a test-retest method was used to estimate the degree to
which the same results could be obtained with a repeated measure of accuracy.
The developed pupils’ questionnaire was first given to 15 pupils from Garrison
primary school (not part of the sampling frame), scored and again administered to
the same pupils after about ten days.

Answers obtained in the two tests were compared. Crobach’s Alpha formula
(Gliem and Gliem, 2003) was then employed to compute the correlation
coefficient to establish the extent to which the contents of the questionnaire were
consistent in giving the same responses every time it was administered. A positive
correlation of 0.76 was obtained between the first and second administration.
Schuessler (1971) stated that a scale is considered reliable if it has an alpha value
greater than 0.60. Hair et al (1998) added that reliability estimates between 0.60
and 0.70 represent the lower limit of acceptability in quantitative research studies.
The procedure was therefore found to be reliable.

3.9 Content Validity

Validity establishes the extent to which factors that have been modified actually
have a systematic effect in the experimental setting and whether the observed
occurrence were not influenced by extraneous or uncontrolled factors. It also
establishes whether systematic relationship observed can be extrapolated in
another situation. To establish validity of the questionnaire content, a panel of
three education officers was requested to assess the relevance of the content used
in the questionnaire. Their recommendations were incorporated in the final questionnaire.

3.10 Data Collection Procedure

Before embarking on data collection, the researcher sought authority to enter schools and administer questionnaires to the pupils from the Ministry of Education which was granted (Appendix IV). The questionnaires were administered by the researcher with the assistance of class teachers who accompanied the researcher during the exercise to instill their confidence in the researcher and assure them of confidentiality. Each class was informed about the purpose of the test, how to complete the scale, and that their responses would be kept confidential. Clarifications sought by the subjects on unclear statements were given.

3.11 Data analysis

Both qualitative and quantitative data was obtained during the study. After completion of the instrument, the scale was hand scored, and the data gathered from various sources checked for accuracy, coded, and analysed using Statistical Package for Social Scientists (SPSS). Simple descriptive statistical and analytical tools such as frequencies, percentages, pie charts and bar graphs were employed in the analysis. Data on types of SW generated and methods employed to manage waste by different schools was analysed using frequencies and percentages. Likert scale was used in measuring the attitude of the respondents towards SWM and then analysed using Chi Square. ANOVA was employed to analyse pupils’ awareness towards SWM and presented in form of tables and bar graphs. The results of the analysis were interpreted in relation to the objectives stated in section 1.3 of this thesis. The hypotheses (expressed in null form) were tested at pre-selected alpha value p≤0.05 significant level.
3.11.1 Analysis of Variance (ANOVA)

One way ANOVA was used to determine whether there were significant differences in the awareness of SWM between respondents from different types of schools, those with different academic levels and different academic performance. ANOVA was the most appropriate test for this because the data generated was quantitative and the groups considered in each case were more than two (Mugenda and Mugenda, 1999; Baumgartner et al, 2002).

3.11.2 Post Hoc Test

Post hoc tests in analysis of Variance are designed for situations in which the researcher has already obtained a significant omnibus F-tests with a factor that consists of three or more means and additional exploration of the differences among means is needed to provide specific information on which means are significantly different from each other. In this study, post hoc tests were used to determine the significant means in awareness about SWM amongst pupils from different types of schools, those of different academic performance and from different academic levels.

3.11.3 Likert type scale

In survey research, a Likert scale is an approach to response categories that measures the extent of a person's satisfaction or agreement with a set of statements or questions. This type of response category makes it easy to quantify survey responses, simplifying data analysis (Geoff, 2010). It is also used as a rating scale (with 3 or 5 responses to select from) when measuring awareness, attitudes, values and behavior (Baumgartner et al, 2002). Likert scale overcomes the problem of those respondents who are not keen on giving appropriate responses, who form a pattern of agreeing or disagreeing with statements (Hall, 2010). The scale was used in this study to test the hypothesis that “Pupils' attitude towards SWM does not differ by gender, academic level, type of school or by academic performance”.
3.11.4 **Chi Square Test**

A variety of options for analyzing Likert scale data exists, including the Chi Square statistic, which compares respondents' actual responses with expected answers (Geoff, 2010). Chi square assesses the statistical significance of a given hypothesis. The greater the level of deviation between actual and expected responses, the higher the chi square statistic and, thus, the less well the results fit the hypothesis. In this study, Chi Square test was used to test whether pupils' attitude towards SWM in schools differed significantly with their class levels, types of schools they attended, academic performance and gender.

3.11.5 **Cronbach's alpha**

Cronbach's alpha is a measure of internal consistency or coefficient of reliability, that is, how closely related a set of items are as a group. A "high" value of alpha is often used (along with substantive arguments and possibly other statistical measures) as evidence that the items measure an underlying (or latent) construct.

Cronbach's alpha can be written as a function of the number of test items and the average inter-correlation among the items.

\[
\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N - 1) \cdot \bar{c}}
\]

Where N is equal to the number of items, c-bar is the average inter-item covariance among the items and v-bar equals the average variance. Note that a reliability coefficient of 0.70 or higher is considered "acceptable" in most social science research situations (George and Mallery, 2003).

3.11.6 **Student T-Test**

T-Test is a statistical hypothesis test used for comparing the means of two samples (or treatments). It compares the actual difference between two means in relation to
the variation in the data (expressed as the standard deviation of the difference between the means). T-test in this study was used to determine whether boys and girls differed significantly in their awareness of SWM.

### 3.12 Hypotheses testing

Hypotheses are formulated from past experience, literature review or existing theories. A hypothesis is a researchers' anticipated explanation or opinion regarding the results of the study. It states possible differences, relationships, or causes between two variables or concepts. The test of a hypothesis involves collection and analysis of data. Results may either support or fail to support the hypothesis. Failure to support the hypothesis does not mean that the study has failed but that the existing theories or principles need to be revised or re-tested under various situations (Mugenda and Mugenda, 1999). Researchers usually base their conclusions on the results of the tests of their hypotheses.

To test the hypothesis, the researcher formulated the null hypothesis statements (section 1.4), selected the probability (alpha, $\alpha$) level at 0.05 and then collected and analysed data using Statistical Package for Social Sciences (SPSS) which provided the probability value ($p$) for statistical test. The hypothesis was either accepted or rejected depending on the $p$-value obtained. If the $p$-value of the statistical test was less than the $\alpha$-level, the null hypothesis was rejected. If $p$-value was greater than 0.05, the hypothesis was accepted. Tests that indicated significant difference were rejected and assumed that the observed error was not due to sampling only (Baumgartner et al, 2002)
CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results of the data collected and analysed and also discusses its findings. The purpose of the study was to analyse the factors influencing primary school pupils’ awareness and their attitude towards solid waste management. A total of 300 pupils from five primary schools were sampled out for the study. Out of the 300 expected respondents, 296 handed back the questionnaire which translated to 98.33% of the targeted group. The results, analysis and discussions were based on the objectives of the study as outlined in Chapter One. Using SPSS computer software, data was analysed using descriptive statistics and presented in form of means, frequencies and percentages in tables, and bar graphs.

4.2 Types of Solid Waste Generated by Different Schools

Respondents were asked to state the types of SW that are often generated in their schools starting with the most common. The responses were then classified as follows.

Table 4.1: Classification of solid waste

<table>
<thead>
<tr>
<th>Paper</th>
<th>Sweepings</th>
<th>Plastics</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old and worn out text books</td>
<td>Leaves</td>
<td>Plastic containers</td>
<td>Broken furniture</td>
</tr>
<tr>
<td>Filled up exercise books</td>
<td>Grass</td>
<td>Plastic bottles</td>
<td>Wood</td>
</tr>
<tr>
<td>Newspapers</td>
<td>Tissue paper</td>
<td>Shoes</td>
<td>Scrap metal</td>
</tr>
<tr>
<td>Polythene bags</td>
<td>Food remains</td>
<td>Rubber materials</td>
<td>Broken glass</td>
</tr>
<tr>
<td>Used examination papers</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: This classification was generated for purposes of this study

The number of respondents that mentioned a particular type of waste was determined and recorded in Table 4.2.
Table 4.2: Types of Solid Waste Generated in Different School Categories

<table>
<thead>
<tr>
<th>TYPE OF WASTE</th>
<th>SCHOOL TYPE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RURAL</td>
<td>HPU</td>
</tr>
<tr>
<td>Paper</td>
<td>86</td>
<td>108</td>
</tr>
<tr>
<td>Hardware</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>Sweepings</td>
<td>55</td>
<td>50</td>
</tr>
<tr>
<td>Plastics</td>
<td>26</td>
<td>54</td>
</tr>
</tbody>
</table>

f represents the number of times each category of SW is mentioned.

From the results, 253 out of 296 (85.47%) respondents said that paper is generated as waste in their schools. Sweepings were rated second with 44.26% responses. However, newspapers were rarely mentioned. A similar finding by UNEP (2002) indicated that schools are classified among institutions that are typical solid waste generators producing waste such as paper, cardboard, plastics, wood, food wastes, glass, metals and hazardous wastes (section 2.3 and Plate 4.1)

Plate 4.1: School compound littered with solid waste (date: 24th September 2009)
Sharp stones and broken pieces of wood found in Plate 4.1 are a threat to the security of the pupils as well as other people in the compound. They also cause the school environment to be very untidy.

It was found that a high percentage (23.28%) of respondents from HPU schools reported that plastics (i.e. Plastic containers, plastic bottles, shoes and rubber materials) are found in their schools as solid waste compared to rural schools (13.68%) and low potential urban (14.47%) schools while the percentage of hardware (i.e. broken furniture, wood scrap metal and broken glass) was highest in LPU schools (18.42%) compared to rural (12.11%) and HPU (8.62%). Sweepings (which included leaves, grass, tissue paper and food remains were least reported as waste from HPU schools (21.55%), followed by rural schools (28.95) and the highest was from LPU schools (34.21%). This is evidence that solid waste generation is influenced by type of school which supported findings by Ogboi and Kperegbeyi (2009) that the nature of waste generated is related to the economic activities of the area as well as the major sources of waste (section 2.3).

The high generation of paper is due to the fact that it is easily obtained in schools in form of books which when used up or damaged are considered as waste. Also, most pupils do not consider examination papers as useful after their results are released and therefore they throw them away as waste while most of those from rural and LPU schools use polythene papers to carry books and food to school. The polythene papers used are usually light and delicate and therefore easily get torn and are discarded as waste. At times pupils use the papers to improvise play materials such as balls. Again these play materials are considered as waste after use because these pupils do not attach any cost to them.

While most of the foodstuff for rural people is obtained from the farms, those in town do a lot of purchases from the shops, especially from supermarkets. These purchases are normally packed in plastic containers, bottles and paper bags. Such containers are then used by the children to carry food and drinks to school, which
explains why a higher percentage of plastic materials are reported from the HPU schools.

The composition of waste found in LPU schools included broken wooden materials, plastics, paper, old car tyres, sticks and stones formed. This could be attributed to the nature of activities their parents/guardians are involved in for their survival such as casual labourers in flower farms, construction sites, vehicle repairs, “jua kali” artisans and quarrying.

4.3 Methods of Solid Waste Management in Schools

One of the objectives of the study was to find out the methods of SWM used in primary schools to enhance friendly environment. Several approaches of disposing waste were identified as being used in the proportions shown in Table 4.3

<table>
<thead>
<tr>
<th>Method</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burning</td>
<td>187</td>
<td>79.57</td>
</tr>
<tr>
<td>Rubbish Pit</td>
<td>41</td>
<td>17.45</td>
</tr>
<tr>
<td>Composting</td>
<td>5</td>
<td>2.13</td>
</tr>
<tr>
<td>Municipal Council</td>
<td>2</td>
<td>0.85</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>235</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

The table of frequencies above is an indication that open burning is the most common method in use for disposing SW (79.57%) in schools. 17.45% of the respondents said their schools use rubbish pits for dumping waste, 2.13% used composting while municipal council was only reported to collect SW in HPU schools which was also rare (0.85%). When the methods used by the three types of schools were analysed separately a similar trend was observed (Table 4.4 on page 37)
Table 4.4: Methods of SWM used in Different Schools

<table>
<thead>
<tr>
<th></th>
<th>RURAL</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>METHOD</td>
<td>Count</td>
<td>%</td>
<td>Count</td>
<td>%</td>
<td>Count</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BURN</td>
<td>75</td>
<td>81.5</td>
<td>86</td>
<td>71.7</td>
<td>26</td>
<td>81.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PIT</td>
<td>14</td>
<td>15.2</td>
<td>22</td>
<td>18.3</td>
<td>5</td>
<td>15.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMPOSTING</td>
<td>3</td>
<td>3.3</td>
<td>1</td>
<td>0.8</td>
<td>1</td>
<td>3.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M/COUNCIL</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1.7</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All schools used burning as the major method of SWM. This could be because burning requires little effort and less time as compared to other methods in dealing with waste. This could be attributed to the fact that burning reduces the solid mass of waste tremendously and at once. Throwing waste into pits would require continued monitoring to ensure any solid strewn by wind or scattered by birds or animals is collected back into the pit (Figure 4.1).

Schools therefore preferred to burn the waste as soon as it was collected into dump pits. Composting was hardly used in any of the schools studied. Observations did not indicate any kind of farming in any of the schools. Lack of interest in farming could have contributed to reluctance in use of composting as a way of SWM in schools. These results conform to findings of CalRecycle (2008) (section 2.2) that collecting into pits and burning waste has been the easiest means of managing the waste in the educational institutions.

4.4 Factors Affecting Pupils’ Awareness of SWM

In this section, awareness referred to a score on solid waste management awareness scale (specifically developed for this research). The researcher developed a questionnaire to test awareness of the respondents on SWM. The researcher intended to find out whether pupils were able identify solid wastes from given choices, classify given methods of solid waste management as reduce, reuse or recycle, identify health issues related to presence of SW, state best methods of disposing different types of SW, identify SWM activities from other activities carried out in school etc. The researcher then analyzed the scores obtained to determine whether pupils’ awareness of SWM differed by type of their school,
gender, class and academic performance. This part was marked and each respondent awarded a mark which ranged from zero (0) to ten (10). The findings were based on the score attained by each respondent from this part of the questionnaire. Frequencies of scores obtained by respondents were tabulated in Table 4.5. The scores were then classified as low (0-5) and high (6-10) awareness.

**Table 4.5: Awareness Scores and percentage**

<table>
<thead>
<tr>
<th>Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>21</td>
<td>31</td>
<td>58</td>
<td>67</td>
<td>57</td>
<td>32</td>
<td>14</td>
<td>6</td>
<td>295</td>
</tr>
<tr>
<td>%</td>
<td>0.3</td>
<td>0.7</td>
<td>2.0</td>
<td>7.1</td>
<td>10.5</td>
<td>19.7</td>
<td>22.7</td>
<td>19.3</td>
<td>10.8</td>
<td>4.7</td>
<td>2.0</td>
<td>100</td>
</tr>
</tbody>
</table>

Out of 295 respondents, 119 (40.34%) scored between zero and five and were therefore found to have low awareness while 176 (59.66%) had high awareness. These results are presented in figure 4.1

![Figure 4.1: Percentage of pupils with High and Low Awareness of SWM](image)

The results obtained indicated that most pupils (59.66%) exhibited high awareness of solid waste management.

### 4.4.1 Awareness of Respondents According to Gender

The scores obtained by pupils were analysed according to gender and tabulated as shown in Table 4.6
Table 4.6: Comparison of relationship between Gender and Awareness of SWM

<table>
<thead>
<tr>
<th>Awareness scores</th>
<th>LOW AWARENESS</th>
<th>HIGH AWARENESS</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Males</td>
<td>58</td>
<td>38.67</td>
<td>92</td>
</tr>
<tr>
<td>Females</td>
<td>61</td>
<td>42.07</td>
<td>84</td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>40.34</td>
<td>176</td>
</tr>
</tbody>
</table>

From the Table 4.6, 92 out of 150 (61.33%) of the male respondents attained higher awareness scores compared to 84 out of 145 (57.93%) of their female counterparts as presented in Figure 4.2.

Figure 4.2: Solid Waste Management Awareness by Gender

However, results did not provide enough evidence to show that awareness of solid waste management differed significantly between boys and the girls (p=0.09), and therefore we accept the null hypothesis

4.4.2 Pupils’ Awareness and types of schools

Table 4.7 shows the distribution of awareness scores according to types of schools. Out of all the respondents from each category of schools, 75.63% from HPU schools had high awareness of SWM, 50.83% from rural schools and 44.64% from LPU schools.
Table 4.7: Percentage of frequencies of Awareness Scores for Different Schools

<table>
<thead>
<tr>
<th>School</th>
<th>Low Awareness (0-5)</th>
<th>High Awareness (6-10)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>RURAL</td>
<td>59</td>
<td>49.17</td>
<td>61</td>
</tr>
<tr>
<td>HPU</td>
<td>29</td>
<td>24.37</td>
<td>90</td>
</tr>
<tr>
<td>LPU</td>
<td>31</td>
<td>55.36</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>40.34</td>
<td>176</td>
</tr>
</tbody>
</table>

The awareness of SWM of pupils from different types of schools differed significantly (Means HPU (6.56), LPU (5.57), Rural (5.57), f (2,292) =16.159, p=0.000). Post Hoc Test using Student-Newman-Keuls procedure revealed that pupils from HPU schools differ significantly in awareness of SWM from pupils from LPU and rural schools while there was no significant difference in awareness between from LPU and rural schools (Table 4.8)

Table 4.8: Awareness of SWM for different types of schools

<table>
<thead>
<tr>
<th>Type of the school</th>
<th>N</th>
<th>Mean</th>
<th>Std Deviation</th>
<th>Std Error</th>
<th>Subset for alpha = .05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Low Potential urban</td>
<td>56</td>
<td>5.20</td>
<td>1.67</td>
<td>0.22</td>
<td>5.20</td>
</tr>
<tr>
<td>Rural</td>
<td>120</td>
<td>5.57</td>
<td>1.65</td>
<td>0.15</td>
<td>5.57</td>
</tr>
<tr>
<td>High potential Urban</td>
<td>119</td>
<td>6.56</td>
<td>1.76</td>
<td>1.16</td>
<td>6.56</td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.153</td>
</tr>
</tbody>
</table>

The results from the table show that the pupils from high potential urban schools have relatively high level of awareness of SWM compared to those of other schools. Generally people leaving in town show more concern about health and sanitation which could result to awareness creation about solid waste, its negative effects and ways of SWM. Their children therefore are more conversant with SWM.

4.4.3 Awareness of SWM according to education level

In this section, the pupils’ mean awareness scores of SWM was compared for different education levels and tabulated in table 4.9.
Table 4.9: Awareness of SWM in different classes

<table>
<thead>
<tr>
<th>Education level/class</th>
<th>Low Awareness</th>
<th>High Awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>frequency</td>
<td>%</td>
</tr>
<tr>
<td>5</td>
<td>48</td>
<td>48.48</td>
</tr>
<tr>
<td>6</td>
<td>41</td>
<td>43.16</td>
</tr>
<tr>
<td>7</td>
<td>27</td>
<td>27.55</td>
</tr>
</tbody>
</table>

The percentage of pupils with high awareness of SWM increased from 51.52% in class five to 56.84% in class six and 72.45% in class seven, while the percentage of pupils with low awareness decreased as years of schooling increased. One way ANOVA test was carried out for the respondents from the three classes and presented on Table 4.10.

Table 4.10: ANOVA test on awareness of SWM for different classes

<table>
<thead>
<tr>
<th>Class</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>99</td>
<td>5.535</td>
<td>1.716</td>
<td>.17248</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>95</td>
<td>5.537</td>
<td>1.556</td>
<td>.15965</td>
<td>.000</td>
</tr>
<tr>
<td>7</td>
<td>98</td>
<td>6.561</td>
<td>1.873</td>
<td>.18916</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>292</td>
<td>5.880</td>
<td>1.783</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results confirmed significant difference in awareness of the three classes where means class 5 (5.535), class 6 (5.537), class 7 (6.561), $F(2,289) = 11.546$, $p<0.001$. Post Hoc Test using Student-Newman-Keuls procedure revealed that class 7 differs significantly from classes 5 and 6. The data does not provide enough evidence to show that the awareness of class 5 differs from that of class 6 since $t(192) = -0.006$, $p>0.05$. 
The more the number of years in school, the higher the awareness of SWM. Muammer (2003) attributed these differences to maturity and/or to knowledge obtained from time spent at school (section 2.4.1). Formal education is a prerequisite for change in sanitation behavior (Pacey, 1990) meaning that the problem of SWM and people’s attitude and awareness can be linked to the levels of formal education (section 2.4.1).

4.4.4 Comparison of Awareness Score with Academic Performance

To determine whether there was a relationship between awareness of SWM and academic performance of pupils, five respondents were randomly selected from each quarter of the end of the previous term’s examination merit list in classes five, six and seven. The total number of respondents from 1st, 2nd, 3rd & 4th quarters was 89, 68, 73 & 63 respectively. Their awareness was then classified as high or low depending on their scores and the results presented in figure 4.3.
From the graph above, it is evident that academically bright children have higher awareness of SWM than academically weak children. One way ANOVA showed that the four groups (positions) differ significantly. Means 1st quarter (6.57), 2nd quarter (5.93), 3rd quarter (5.70) and 4th quarter (5.14), F (3,289) = 8.945, p<0.001. Post Hoc Test using Student-Newman-Keuls procedure revealed that significant differences exist between awareness of SWM of pupils in the 1st quarter (6.57) and those in all the other quarters, and also between pupils in the 2nd quarter (5.93) and those in the 1st and the 4th quarters while there was no significant difference between the 2nd and 3rd quarters or between 3rd and the 4th quarters (Table 4.11).

Table 4.11: Mean awareness according to academic performance

<table>
<thead>
<tr>
<th>Performance</th>
<th>N</th>
<th>Mean</th>
<th>Std Deviation</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>89</td>
<td>6.5730</td>
<td>1.71814</td>
<td>.18212</td>
<td>0.000</td>
</tr>
<tr>
<td>2nd</td>
<td>68</td>
<td>5.9265</td>
<td>1.73047</td>
<td>.20985</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>73</td>
<td>5.6986</td>
<td>1.56954</td>
<td>.18370</td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td>63</td>
<td>5.1429</td>
<td>1.87391</td>
<td>.23609</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>293</td>
<td>5.8976</td>
<td>1.78936</td>
<td>.10454</td>
<td></td>
</tr>
</tbody>
</table>

The results show that the level of awareness of SWM is higher for academically bright pupils than for weaker ones.
4.5 Pupils Attitude towards SWM

Another objective of the study was to find out whether the attitude of the pupils towards SWM in schools differs according to types of schools, class, gender or academic performance. To achieve this objective, the respondents were subjected to a five level Likert scale questionnaire of both positive and negative statements aimed at assessing their attitude. The scores were given with the most positive scoring five and the most negative scoring one. The undecided responses scored three as in the table 4.12.

More than 50% of the respondents exhibited positive attitude towards solid waste management in each of the items in the Likert scale. These items dwelt mainly on respondents’ attitude about being physically involved in SWM (2, 5, 8, 10, 13, 18, 19 & 20), usefulness of SWM (12 & 15), appreciation of healthy environment (3, 4, 6, 14 & 17), different types of waste and desire to learn about solid waste and its management (1, 7, 9, 11, & 16).

Most of the respondents i.e. 203 (70.98%) agreed that SWM should be introduced as a subject in schools, 68.17% of the respondents felt that waste management activities are as important as the rest of school work. Majority (68.79%) were in agreement that safe waste disposal is the responsibility of all pupils while 71.97% felt that they should be involved in waste programs in their schools. This was strengthened by the fact that 71.88% strongly disagreed that prisoners should be used to collect SW in schools instead of involving pupils. About 75.35% of the respondents expressed willingness for their schools to be classified as waste free schools. Sixty three percent (63.07%) of the respondents agreed that solid waste negatively affects the school environment.
Table 4.12: Respondents attitude score

<table>
<thead>
<tr>
<th>Scores</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Solid waste management introduced as a subject</td>
<td>38</td>
<td>32</td>
<td>13</td>
<td>70</td>
<td>133</td>
<td>286</td>
</tr>
<tr>
<td>2 Safe waste disposal responsibility of pupils</td>
<td>32</td>
<td>44</td>
<td>12</td>
<td>94</td>
<td>100</td>
<td>282</td>
</tr>
<tr>
<td>3 Compound littered with waste is unhealthy</td>
<td>54</td>
<td>26</td>
<td>26</td>
<td>55</td>
<td>126</td>
<td>287</td>
</tr>
<tr>
<td>4 Solid waste lowers the aesthetic quality of environment</td>
<td>46</td>
<td>39</td>
<td>24</td>
<td>71</td>
<td>102</td>
<td>282</td>
</tr>
<tr>
<td>5 like to be involved in waste management programmes</td>
<td>32</td>
<td>31</td>
<td>18</td>
<td>91</td>
<td>117</td>
<td>289</td>
</tr>
<tr>
<td>6 like my school to be classified a waste free school</td>
<td>39</td>
<td>22</td>
<td>10</td>
<td>72</td>
<td>145</td>
<td>288</td>
</tr>
<tr>
<td>7 Plastic bags available, prefer non-biodegradable bags</td>
<td>55</td>
<td>50</td>
<td>18</td>
<td>72</td>
<td>89</td>
<td>284</td>
</tr>
<tr>
<td>8 Pupils should take part in reducing solid waste</td>
<td>33</td>
<td>29</td>
<td>12</td>
<td>76</td>
<td>134</td>
<td>286</td>
</tr>
<tr>
<td>9 Waste management activities is a good way of understanding the environment in which I live</td>
<td>31</td>
<td>15</td>
<td>13</td>
<td>80</td>
<td>152</td>
<td>291</td>
</tr>
<tr>
<td>10 like to participate in waste management activities</td>
<td>23</td>
<td>17</td>
<td>16</td>
<td>96</td>
<td>140</td>
<td>292</td>
</tr>
<tr>
<td>11 Buy a product, assess type of packaging and choose one</td>
<td>39</td>
<td>46</td>
<td>31</td>
<td>96</td>
<td>73</td>
<td>285</td>
</tr>
<tr>
<td>12 Waste management activities only useful for adults</td>
<td>28</td>
<td>24</td>
<td>24</td>
<td>80</td>
<td>132</td>
<td>288</td>
</tr>
<tr>
<td>13 For me, being active in SWM is not good at all</td>
<td>66</td>
<td>39</td>
<td>18</td>
<td>59</td>
<td>107</td>
<td>289</td>
</tr>
<tr>
<td>14 What I learn about solid waste does not affect me at all</td>
<td>40</td>
<td>59</td>
<td>20</td>
<td>65</td>
<td>102</td>
<td>286</td>
</tr>
<tr>
<td>15 Programmes in SWM in school can't help resolve problems</td>
<td>49</td>
<td>43</td>
<td>16</td>
<td>61</td>
<td>120</td>
<td>289</td>
</tr>
<tr>
<td>16 Don’t generate any waste in school or at home</td>
<td>53</td>
<td>67</td>
<td>5</td>
<td>73</td>
<td>93</td>
<td>295</td>
</tr>
<tr>
<td>17 Waste management activities are a waste of time</td>
<td>33</td>
<td>42</td>
<td>17</td>
<td>87</td>
<td>110</td>
<td>289</td>
</tr>
<tr>
<td>18 Prisoners be used to collect solid waste in school</td>
<td>30</td>
<td>29</td>
<td>22</td>
<td>84</td>
<td>123</td>
<td>288</td>
</tr>
<tr>
<td>19 Cows left to graze in school to reduce solid waste</td>
<td>19</td>
<td>19</td>
<td>16</td>
<td>74</td>
<td>164</td>
<td>292</td>
</tr>
<tr>
<td>20 Not interested in environmental issues at all</td>
<td>28</td>
<td>30</td>
<td>15</td>
<td>66</td>
<td>153</td>
<td>292</td>
</tr>
</tbody>
</table>
Although 84.25% of the respondents expressed interest in environmental issues, only 56.69% preferred biodegradable bags to the more convenient plastic paper bags for carrying luggage and 59.29% felt it was necessary to assess whether the type of packaging on a product was recyclable or not while buying a product.

In general, 72.61% of the respondents expressed willingness to be involved in SWM activities, 68.12% were positive about the usefulness of solid waste management, 63.27% appreciated healthy environment while 64.58% found it necessary to avoid non biodegradable bags for packaging and were positive in learning about SWM.

The survey data was further simplified by combining the four response categories (i.e. strongly agree, agree, disagree, and strongly disagree) into two nominal categories (agree and disagree) and finally appropriately as positive and negative responses. The neutral responses were not included in the analysis as the respondents did not indicate any opinion about the statements. The total number of positive responses and of negative responses was summed up and percentages determined for all the respondents and tabulated according to types of schools, gender, class of study and academic performance, in Table 4.13 below.

**Table 4.13:** Frequencies (N) and percentages (%) of positive and Negative Attitude Responses

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>TYPE</th>
<th>+VE N</th>
<th>-VE N</th>
<th>+VE%</th>
<th>-VE%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCHOOL</td>
<td>HPU</td>
<td>1687</td>
<td>505</td>
<td>76.93</td>
<td>23.07</td>
</tr>
<tr>
<td></td>
<td>LPU</td>
<td>697</td>
<td>333</td>
<td>67.67</td>
<td>32.33</td>
</tr>
<tr>
<td></td>
<td>RURAL</td>
<td>1603</td>
<td>629</td>
<td>71.82</td>
<td>28.18</td>
</tr>
<tr>
<td>GENDER</td>
<td>MALE</td>
<td>2054</td>
<td>712</td>
<td>74.26</td>
<td>25.74</td>
</tr>
<tr>
<td></td>
<td>FEMALE</td>
<td>1921</td>
<td>740</td>
<td>72.19</td>
<td>27.81</td>
</tr>
<tr>
<td>CLASS</td>
<td>STD 5</td>
<td>1214</td>
<td>553</td>
<td>68.70</td>
<td>31.30</td>
</tr>
<tr>
<td></td>
<td>STD 6</td>
<td>1210</td>
<td>520</td>
<td>68.09</td>
<td>31.91</td>
</tr>
<tr>
<td></td>
<td>STD 7</td>
<td>1495</td>
<td>370</td>
<td>80.16</td>
<td>19.84</td>
</tr>
<tr>
<td>ACADEMIC PERFORMANCE</td>
<td>1&lt;sup&gt;ST&lt;/sup&gt; QUARTER</td>
<td>1101</td>
<td>282</td>
<td>78.21</td>
<td>21.79</td>
</tr>
<tr>
<td></td>
<td>2&lt;sup&gt;ND&lt;/sup&gt; QUARTER</td>
<td>1015</td>
<td>332</td>
<td>75.35</td>
<td>24.65</td>
</tr>
<tr>
<td></td>
<td>3&lt;sup&gt;RD&lt;/sup&gt; QUARTER</td>
<td>881</td>
<td>411</td>
<td>68.19</td>
<td>31.81</td>
</tr>
<tr>
<td></td>
<td>4&lt;sup&gt;TH&lt;/sup&gt; QUARTER</td>
<td>776</td>
<td>435</td>
<td>64.08</td>
<td>35.92</td>
</tr>
</tbody>
</table>
Note: Each respondent responded to 20 items which were counted and summed up. This explains why the number of positive and/or negative responses exceeded the number of the respondents (Table 4.13).

The data was then subjected to Chi square ($\chi^2$) statistical test using the SPSS software as shown in Table 4.14 and discussed in sections 4.5.1 to 4.5.4.

### Table 4.14: Chi Square Test on pupils’ Attitude towards SWM

<table>
<thead>
<tr>
<th>Variable</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>df</td>
<td>N</td>
</tr>
<tr>
<td>School</td>
<td>30</td>
<td>296</td>
</tr>
<tr>
<td>Gender</td>
<td>30</td>
<td>296</td>
</tr>
<tr>
<td>Class</td>
<td>30</td>
<td>296</td>
</tr>
<tr>
<td>Performance</td>
<td>30</td>
<td>296</td>
</tr>
</tbody>
</table>

#### 4.5.1 Attitude distribution by gender

Table 4.14 provides Chi test results for gender (male/female) and their attitude on SWM. Based on the SPSS results, the null hypothesis was supported ($p > 0.05$). It was therefore concluded the data did not provide evidence that girls differ from boys in attitude towards SWM (Table 4.14). This was contrary to literature which revealed that girls achieve more favourable results than boys in environmental attitudes (Schultz, 2002) and that girls consistently report more concern for environmental issues (Zeleny, 2000) as discussed in section 2.4.2 of this report. Many studies have shown significant differences between men and women in environmental attitudes (Brown and Harris, 1992; Tikka et al. 2000). For example, Schultz (2002) found relevant differences in environmental attitudes and conduct in boys and girls, with the latter achieving more favorable results. Thus results from gender-based investigations are still far from conclusive (Getzner and Krauter, 2003) and seems to warrant more future research.-Move to chapter 4 under discussion
4.5.2 *Attitude distribution by type of school*

This part presents analysed results on pupils' attitude about SWM according to types of school they attended (Table 4.13 and Figure 4.5). More pupils from all the types of schools exhibited positive attitude towards SWM than those with negative attitude. The percentage of positive responses was highest in HPU schools pupils followed by rural and lowest from LPU respondents. The opposite was true for negative attitude.

![Graph showing attitude distribution by type of school](image)

**Figure 4.5:** SWM attitude scores for different schools

From Chi test, analysis indicated significant difference ($p<0.05$) in attitude of SWM among pupils of the three types of schools.

4.5.3 *Attitude Distribution by class*

Frequencies of pupils with high and low attitude of SWM show that a higher percentage of class seven (7) pupils are positive about SWM in schools than class five and class six pupils as illustrated in Figure 4.6.
Nevertheless, Chi Square data did not provide enough evidence to show that there was a significant difference in attitude for pupils from different classes since $p>0.05$. We therefore accept the null hypothesis and conclude that there is no significant difference in attitude between different academic levels (Table 4.14). This disagrees with findings by Muammer (2003) that highly educated respondents always have more pro-environmentalist values than lower academic respondents (section 2.4.1).

4.5.4: Attitude Distribution by Performance

Figure 4.7 shows the distribution of attitude frequencies for the four groups of pupils according to their academic performance.
From the figure, it is evident that a higher percentage of the academically bright children exhibit positive attitude towards SWM than academically weak ones. Despite this observation, Chi square test did not provide any evidence that there was a significant difference in the attitude of SWM between academically bright and weak pupils' (p>0.05)

4.6 Observation by the researcher

Paper was the most common solid waste observed in all the schools where the study was carried out. There were also plastic containers and tins mostly littering the HPU schools. These were mainly containers for commercial juices and mineral water. Old car tyres and broken pieces of metal were found in the LPU School. A number of window panes from the LPU and rural schools were broken and in some instances, the pieces of glass not collected.

Except for HPU schools, the other schools did not have rubbish pits where their waste would be thrown after collection. The waste was thrown at some areas referred to as “the pit”. It was noted that much of that waste was strewn by wind almost immediately after collection and the compounds continued to be untidy.
Once in a while, this waste would be burnt form “the pit” under the supervision of the teacher on duty.

It was common practice that waste collection, water sprinkling of classes to re settle dust and sweeping was done as a form of punishment, especially by pupils who reported to school late in the morning. This resulted to wrong attitude about SWM and maintenance of a healthy environment in the pupils. Among the observations made during the school visits was that even the teachers who are expected to play an exemplary role in the schools were not environmentally sensitive/friendly. They always asked the pupils to throw away solid waste they generated without finding out whether they have been properly disposed. The children involved seemed to always seek for opportunities to free themselves and did not willingly show interest in environmental cleanliness.

Plate 4.2: Solid waste in a water drainage canal neighbouring a HPU school in Nanyuki town (date: 15th July 2009)

The communities in the areas surrounding the schools that were studied seemed to deal with waste differently. The HPU areas were relatively clean except for water
drainage systems which were clogged with rubbish. The compound surrounding the LPU School was littered with plastic containers, worn out car tyres, torn polythene bags, old-dirty rugs and thrown away vegetables. The areas around rural schools were generally clean and had almost no waste from human activities.

There were no posters in the school compounds to remind the pupils on the need to keep the environment clean. Environmental education was incidental and talked about occasionally during morning assemblies as a way of reprimanding those who did not perform their duties as expected. It is very important that people are constantly reminded of the need to maintain their surroundings very neat (Ameyaw and Adu-Asare, 2010).

Plate 4.3: Solid waste dumped next to a school compound in a LPU area (date: 20th August 2009)

Members of the community dump their waste indiscriminately along hedges and drainage systems. This could be attributed to lack of organized solid waste management systems in the areas.
CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The broad objective of this study was to analyse primary school pupils’ awareness and attitudes towards solid waste management in schools. It was carried out in five primary schools namely Nanyuki, St Moses, Likii, Mia Moja and Tigithi. To achieve this, the following specific objectives guided the study: (i) to determine whether types of SW generated and management methods vary according to types of schools, (ii) to find out solid waste disposal methods used in primary schools to enhance clean and healthy environment, (iii) to find out whether pupils’ awareness and their attitude of SWM in school differ according to academic performance, gender, type of school and education level. Data was collected, analysed and presented in form of frequency tables, percentages pie charts and bar graphs. SPSS computer software was employed to analyse the data.

5.2 Summary

Solid waste generated by primary schools in Laikipia East district include paper (old and worn out text books, filled up exercise books, polythene bags and used examination papers), sweepings (leaves, grass, and food leftovers), plastics (plastic containers, plastic bottles, old shoes and rubber materials) and hard broken materials such as wood, timber, metal and glass.

The methods of SWM applied in different types of schools were similar where very high percentage of respondents (79.57%) said that waste was burned in their schools, 17.45% said it is thrown into pits and a negligible percentage said waste was composted.

When awareness scores were compared for different schools, it was found that 75% of respondents from HPU schools had high awareness while this was 50.83%
and 43.86% for respondents from rural and LPU schools respectively. The result of ANOVA test on awareness of SWM for the different schools gave $p < 0.001$ and therefore rejected the null hypothesis that the awareness does not significantly differ according to type of school. The probability that pupils' attitude of SWM does not differ according to types of schools was $p < 0.005$. The hypothesis was therefore rejected.

Frequency counts provided that 61.33% of the boys had high awareness as compared to 57.93% of girls. T-test results did not provide enough evidence to conclude that there was a significant difference in awareness between boys and girls since $p > 0.005$. Also, probability that there was no significant attitude difference between boys and girls was $p > 0.005$ and therefore the null hypothesis was therefore accepted.

The results provided by ANOVA test for awareness of SWM by respondents from classes 5, 6 and 7 was $p < 0.005$ and therefore the null hypothesis that there was no significant difference in awareness between classes 5, 6 and 7 pupils was rejected. However, Chi Square test did not provide evidence that there was a significant difference in attitude of SWM between these classes in that $p > 0.005$.

ANOVA test carried out for awareness of different quarters in academic performance showed means as 1st quarter (6.57), 2nd quarter (5.93), 3rd quarter (5.70) 4th quarter (5.14) and $p < 0.005$. The null hypothesis was therefore rejected and conclusion made that awareness of SWM differed significantly according to academic performance. On the other hand, Chi square test did not provide evidence that their attitude of SWM differ significantly with academic performance ($p > 0.005$) and therefore the null hypothesis was accepted.
5.3 Conclusions

1 Although paper, plastics, sweepings and broken solid materials were the most common solid wastes found in the primary schools in Laikipia East district, the types of waste generated varied from one type of school to another. For example, generation of plastics was reported mostly by respondents from high potential urban schools while much of the hard broken material waste was reported by respondents from low potential urban schools. This is evidence that solid waste generation is influenced by type of school which supported findings by Ogboi and Kperegbeyi (2009) that the nature of waste generated is related to the economic activities of the area as well as the major sources of waste (section 2.3).

2 Solid waste disposal methods commonly used in primary schools in Laikipia East district include burning, throwing into dump pits, and composting in that order. This was in agreement of findings by CalRecycle, (2008) that collecting into pits and burning waste has been the easiest means of managing waste in the educational institutions. This was an indication that schools have not embraced less pollutant and more economical methods of waste management such as source reduction, recycling, incineration and burning in landfills (Freduah, 2007). They have opted for the less involving and time saving methods of waste management.

3 The awareness and the attitude of SWM for HPU schools were significantly higher compared to LPU and rural schools. This could be attributed to the fact that, residents of high potential urban areas are normally more exposed to environmental and sanitation challenges such that they are more careful in handling related issues. Their practices and resulting attitude are more likely to be instilled into their children and hence the latter are found to be more positive. This is accordance with findings in a study by Ogboi and Kperegbeyi, (2009) that the nature of waste generated is related to the economic activities of the area as well as the major sources of waste.
The results support the hypothesis that there is no difference between gender in their attitudes and awareness of SWM. This was in tandem with a Canadian study by Eagles and Muffitt (1990) which found no differences between the genders in environmental attitudes. Also Tan and Lau (2010) in their study on attitude towards the environment and green products found no difference between genders in environmental attitudes.

The awareness of SWM differed significantly between pupils from different class levels. The research findings indicated that the higher the education levels of respondents, the better the awareness of SWM. A similar observation was made by Freduah, (2007) that there exists some kind of relationship between the respondents’ level of education and their awareness about cleaning their own surroundings. Conversely, the attitude of the pupils did not differ according to classes. This disagreed with the findings of Muammer, (2003) that there exist differences in attitude in SWM that could be attributed to maturity and/or to knowledge obtained from time spent at school.

There exists a significant difference between academically bright and weak pupils in awareness of SWM and but not in attitude of SWM. The awareness towards SWM was higher for academically bright pupils than the weak ones.

**5.4 Recommendations**

1. To minimize the amount of paper and plastic waste in schools, learners should be made to appreciate the importance of reuse as a way of SWM, care and maintenance of useful materials such as past examination papers and old books. To improve school environment, each school should be encouraged to establish and maintain a paper recycling programme in all classrooms, administrative offices and other areas owned or leased by the school.

2. To ensure sound environmental maintenance, creation of public awareness at primary school level should be among the principal remedial measures.
introduced by the Ministry of Education. The instigation of such program is essential to rapidly educate the public and facilitate the development of environmentally friendly community waste behavior. To be successful, useful programs should be designed to engage their target audience in not only increasing their environmental knowledge but their environmental skills, attitudes and behaviors as well.

3 Introduction of a school curriculum with accurate waste management information that would encourage children to look at the SWM issue seriously should be seriously considered due to concern over growing problem of garbage disposal and the feeling that the issue should be addressed in a holistic manner. Improved teaching and learning of issues of sanitation in all levels of education could help improve the general sanitation in the communities. Developing environmental knowledge would empower individuals with ability to contribute to environmental solutions through their personal behavior, either as an individual or part of groups

4 SWM education should be made as practical and as interesting as possible to encourage and instill positive attitude in pupils of all backgrounds, academic abilities and classes. It should include its benefits such as clean and healthy environment, freedom from certain illnesses, reduced disposal cost, improved safety, reduced long-term liability, increased efficiency of school operations and decreased associated purchasing costs

5 The Government give consideration to waste issues when developing policies for purchasing, efficient use of resources, waste collection, maintenance of the school and its grounds and other aspects of school life. Introduction of waste management programmes would result to a noticeable change in the attitude of the schools involved and their local communities, particularly in relation to waste management and environmental care.
Further studies should be done in future to develop possibility of composting, recycling and energy recovery projects, to study the health impacts of waste workers, including the pupils because they work under unhygienic conditions so they are susceptible for diseases.
References


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Kibert, N. C. (2000). An analysis of the correlations between the attitude, behavior, and knowledge components of environmental literacy in undergraduate university students Thesis- University of Florida)


APPENDIX I: Pupils’ Questionnaire

Answer the following questions as honestly as possible.
This is not an examination and there is no wrong or right answer in these questions.
All responses will be treated with confidentiality.

1.0 Personal details of the respondent
   1.1 Name of the respondent (optional) ____________________________
   1.2 Name of school ____________________________
   1.3 Boy or Girl (specify) ____________________________
   1.4 Education level ____________________________
   1.5 Education level, in years ____________________________
   1.6 Position in last term’s examination ____________
   1.7 Home/area of residence ____________________________
   1.8 Nature of area you live:
      Village  □
      Shopping centre  □
      Town  □
   1.9 With whom do you live ____________________________
   1.10 Specify what the people/person you live with do.

2.0 Where do you get knowledge about waste management from?
   a. Parents  □
   b. Teachers  □
   c. Television  □
   d. Peers  □
   e. Others (specify)

2.1 List three types of solid waste often generated
   a. at home i ____________ ii ____________ iii ____________
   b. at school i ____________ ii ____________ iii ____________

2.2 Who is in charge of waste management at?
a. school ______________________
b. Home ______________________

2.3 At home, where is waste placed after generation?

2.4 What happens to waste after collection?
   a. At home ______________________
   b. At school ______________________

3.0 Which of the following would you consider as solid waste?
   a. Useless, unwanted and thrown away non-flowing materials
   b. Food remains and paper safely kept for later use

3.1 Which of the following is Solid Waste management?
   a. Tidy arrangement of files in shelves
   b. Collecting litter and then burning it in a pit

3.2 Which one of the following do you think can be caused by disposing solid waste in an open dump?
   a. Common cold
   b. Rats and mosquitoes
   c. Sweet smell

3.3 Burning waste near our houses is
   a. Healthy
   b. Unhealthy

3.4 All filled-up exercise books are solid waste.
   a. True
   b. False

3.5 It is enjoyable to be in a school compound littered with solid waste.
   a. True
   b. False

3.6 Select the type of solid waste that does not easily decay.
   a. Polythene bags
   b. News papers
3.7 Using an arrow (→), match each of the descriptions below to the corresponding method of solid waste management on the right.

a. Buy fruits and snacks loose instead of in package
   - Recycle

b. Use old clothes as rags for cleaning
   - Reduce

c. Composting solid waste into manure
   - Disposal

Part II:

Tick the symbol that best fits your judgment, where

**SA** = Strongly Agree, **A** = Agree, **N** = Not Decided, **D** = Disagree, **SD** = Strongly Disagree

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<td>2. Safe waste disposal should be the responsibility of all pupils</td>
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<td>3. A compound littered with solid waste makes me unhappy</td>
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<td>4. Solid waste lowers the aesthetic quality of the school environment</td>
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<td>5. I would like to be involved in waste management programmes in my school</td>
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<td>6. Even if plastic paper bags are convenient in carrying luggage, I prefer to use more biodegradable bags</td>
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<td>7. I would like my school to be classified as a waste free school</td>
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<td>8. Pupils should take part in reducing solid waste in your school</td>
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<td>9. I like to participate in waste management activities because it is a good way of understanding the environment in which I live</td>
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<td>10. When I buy a product, I assess the type of packaging and choose one that is recyclable</td>
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<td>11. Waste management activities are only useful for adults.</td>
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<td>12. For me, being active in SWM is not good at all</td>
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<td>13. What I learn about solid waste does not affect me at all</td>
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<td>14. Programmes in SWM in school cannot help to resolve waste problems at all.</td>
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<td>15. I do not generate any waste in school or at home</td>
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<td>16. The best solid disposal method that can be applied at home is heaping it at one corner of the house</td>
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<td>17. Waste management activities are a waste of time, the most important thing is class work.</td>
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<td>18. Prisoners should be used to collect solid waste in schools instead of involving pupils.</td>
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<td>19. Cows should be left to graze freely in the school compound as one way of solid waste reduction</td>
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<td>20. I am not interested in environmental issues at all</td>
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APPENDIX II: Observation Schedule

This schedule was prepared to assist the researcher objectively make observations on activities that generate solid waste in schools and how the schools manage their wastes. Interviews enabled the researcher to gather the general information about the background of the learners in each of the schools studied.

From the observation, the observer intended to find out

1. The various types of SW that are commonly found in the schools, classrooms and just outside the school compound.
2. The approaches employed to manage waste in the schools.
3. Who was mostly involved in SWM
4. Whether environmental education was part of the learning and teaching in the schools.
5. The methods used by the surrounding communities to managing waste
APPENDIX III: Request for Authority to carry out Research

Maina H. Njeri
P.O. Box 1174,
Nyahururu *
20\textsuperscript{th} April 2009
Tel 0721704458

The Permanent Secretary
Ministry of Education
Jogoo House ‘B’
P.O. Box 30040
Nairobi

Dear Sir

RE: REQUEST FOR PERMISSION TO ENTER SCHOOLS AND COLLECT DATA FOR EDUCATIONAL RESEARCH

I am a self sponsored student enrolled in the Master of Environmental Education (Adm. N50/CE/11168/06). I kindly wish to request for permission to enter Primary schools in Laikipia East District for purposes of collecting data, for my research, from the pupils. I intend to sample out pupils from classes five, six and seven in about six primary schools. The data collection will be carried out in the months of May, June and July 2009, if granted permission.

Yours Faithfully

Maina H. N.

CC: District Education Officer
Laikipia East District
APPENDIX IV: Laikipia East District primary school enrolment-2009(Source: Laikipia East District Education Office)

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