SOCIO- ECONOMIC HAZARDS OF PLASTIC PAPER BAGS LITTER IN PERI- URBAN CENTRES OF KENYA; A CASE STUDY CONDUCTED AT ONGATA RONGAI TOWNSHIP OF KAJIADO COUNTY

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ABSTRACT

This study examined implications of plastic paper bags litter as a major environmental and public health problem, particularly in the urban and peri-urban areas of Kenya. Due to the many problems caused by plastic litter the main objective of the study was to establish on the social - economic hazards occasioned by plastic bags litter in peri- urban centres of Kenya. This study used questionnaires to collect empirical data from the obtained sample size. Each item in the questionnaire was developed to address a specific objective and research questions. Data nalysis was done as per questionnaires that were used to collect data and the results presented in tables and figures to highlight the major findings. They are presented sequentially according to the research questions of the study. This study found out that the condition of plastic paper bag littering has gone from bad to worse due to unchecked littering. Besides visual pollution, plastic paper bag litter is non-biogradable and thus accumulates. Its disposal method is a challenge as plastic paper bag waste recycling is not economically viable. Plastic paper bag litter contributes to blockage of sewers and drainages, poses threat to biotic species and abiotic components when incinerated, buried or damped. Furthermore, when filled with rainwater, plastic paper bags litter become breeding grounds for mosquitoes, which cause malaria. In landfills, it acts as a habitat for vectors that transmits pathogens like flies and rodents. There is no immediate alternative paper bag that is likely to replace plastic paper bag in the near future. Due to the enormous environmental problems caused by the plastic paper bags litter, this study recommended that immediate public awareness be made to the consumers on the hazards that are occasioned by the plastic paper bags. Other strategies to curb the behavior of litter-louting include the reduction in manufacturing of plastic paper bag, re-use, recycling and re-collection of the plastic paper bag litter.

Key Words: *Plastic paper bags; environmental degradation; health hazards; re-use; recycling; re-collection; litter; non-biodegradable.*

I: INTRODUCTION

Plastic shopping bag was designed and made from plastic by Swedish Engineer Gustaf Thulin in 1960s (http.//www:answerbag.com/q_view 1905324, accessed on 13 June 2010). The design was patented worldwide by Celloplast; well-established company in plastics processing in 1965 (Cherrier,2006). Cherrier (2006) noted that the Company's patent position gave it a virtual monopoly on plastic shopping bag and associated materials production, and the company set up manufacturing plants across Europe and in USA. Cherrier (2006) further indicated that other companies saw the attraction of the plastic bag

and associated products, too, and the USA petrochemicals group Mobil overturned Celloplast's USA patent in 1977. The Dixie Bag Company of College Park, Georgia, owned and operated by Jack W. McBride, was one of the first companies to exploit this new opportunity and it introduced plastic carrier bags to all major shopping stores. The Dixie Bag Company, along with similar firms such as Houston Poly Bag and Capitol Poly, were instrumental in the manufacturing, marketing and perfecting of plastic bags in the 1980s. Kroger, a Cincinnati-based grocery chain in USA, began to replace its other paper shopping bags with plastic bags in 1982. It was followed by its rival, Safeway. From the mid-1980s onwards, plastic bags became common for carrying groceries from the store to vehicles and homes throughout the developed world (Aadland, 2006).

Plastic bags are made from LDPE,(http.//www.answerbag.comp/q.view 1905324 26, Retrieved 17 April 2012.) .One of the main problems of polyethylene is that without special treatment it is not readily biodegradable, and thus accumulates. In Japan getting rid of plastics in an environmentally friendly way was the major problem discussed until the Fukushima disaster in 2011. It was listed as a $90 billion market for solutions. Since 2008 Japan has rapidly increased the recycling of plastics, but still has a large rate of plastic wrapping that goes to waste, (Strife, 2010). Strife (2010) indicated that during the 1980s and 1990s it was shown that many endangered marine species including birds that habituate in the marine environment were at extra hazard of suffocation from swallowing plastic bags litter or waste. In 2009 it was discovered by a resident of Hawaii upon returning from a ship race that degraded plastics bags were a major cause for marine life destruction .Plastic bags were found to constitute a significant portion of the floating marine debris in the waters around southern Chile in a study conducted between 2002 *and 2005. If washed out to the rivers by runoff water, it can be drained to lakes and seas, thus,* plastic bags can be carried long distances to oceans and lakes, and can strangle marine animals (Clover, 2007)

Plastic carrier bags are sometimes called single-use bags, referring them as tools for carrying shopping goods from stores to homes. The use of plastic carrier bag created new alternatives and opportunities for carrying groceries at home as well as problems for waste and disposal (Mesthane, 1986). Each year millions of discarded plastic shopping bags end up as litter in the environment when improperly disposed of. Due to their durability, plastic bags waste in form of litter takes centuries to decompose. On land, waste plastic bags are one of the most prevalent types of litter in inhabited areas. Waste plastic bags when carried by run-off water can clog drainage systems and contribute to flooding, as occurred in Bangladesh in 1988 and 1998 and almost annually in Manila .Littering is often a serious problem in developing countries, where waste collection infrastructure is less developed than in wealthier nations.

The trade in plastic bag is an international business for capitalists, (Giddens, 2006). Giddens (2006) proposed that, capitalism was not created to save the earth; it was created to turn nature into wealth, as fast as possible through the creative dynamics of exploitation and non-preservation which are both disruptive to the society and the natural world. Capitalists belief in the culture of accumulation of wealth and do not believe they owe anything to nature, (Waste Digest, 2006). In this regard, those engaged in the business of plastic bag trade are in pursuit of making profit from the business and they disregard harmful effects of plastic bags to the biotic and abiotic components in the ecosystem that are related to its disposal.

Plastic bag littering is prevalent in urban settings. Urbanization initiates a long term historical process of detaching individuals from comprehensive and familiar shared networks of interrelations embedded in rural folk communities marked by greater degree of functional interdependence, (Graves, 1984). Rapid rate of urbanization has given rise to the concept of over-urbanization, (Amani, 1992). Amani (1992)

stated that as migrants flock to urban areas, the diversity and heterogeneity of urban areas increase and new arrivals often identify more closely with their native villages or with such social cultural groupings as tribes, race or religion than with the urban life and what the city can offer. They ignore the norms and values of hygiene and discard plastic bag litter in the environment.

Peri-urban and urban are characterized by unplanned, large sizes of urban settlements, high population density, anonymous and specialized interrelationship (Wirth, 1938). Wirth (1938), reasoned that the greater the number of people interacting in the urban set up, the greater the potential for differentiation, bringing about lesser dependence on particular persons, less intimate relations, more freedom from the personal and emotional control of intimate groups, and no individual alliance to a single group. Because of a high degree of differentiation, no common set of values exists in the urban areas. As a consequence of these factors, urban dwellers develop characteristic personality attributes and attitudes. Because of the many lifestyles and kinds of people, they develop a "*relativistic perspective*", they become secularized and free from intimate ties; they lack a strong sense of integration and participation, thus, the city or urban areas are characterized by *anomie*. Individuals in urban set up feel lonely, sense friction and irritation, and experience personal frustration and nervous tension, (Wirth, 1938).For these reasons, Wirth (1938), suggested that the incidence of personal disorganization and disorder tend to be higher in cities than in rural communities.

The use of Plastic carrier bag by consumers is a form of social change, (Park, 1975). Accordingly plastic shopping bags are not only durable, versatile and convenient, but also inexpensive, easy to store and transport on account of their thinness and lightness. Plastic carrier bag is popular to the consumers because they are "functional", light weight, strong, inexpensive and hygienic. Because plastic carrier bags are cheap, there is excessive consumption and a tendency of mis-use. In peri-urban centres of Kenya, an individual shopper uses about 3 new plastic carrier bags per day because they are "given free". While it is "free" to the customer, the cost of plastic bag is passed on to the consumer in form of "consumption cost" by the retailers and other supermarkets (UNEP, 2005).

The city of Nairobi is inhabited by over 3 million inhabitants who generate a combined total of over 2,400 tons per day of solid wastes, out of which 20% comprises of plastics. This amount of solid waste generation is getting worse by the day as a result of increasing population that is fuelled by large-scale rural-urban migration into the city. A Japan International Co-operation Agency (JICA) study estimated that about 1,450 tons of Municipal Solid Waste (MSW) was generated daily in Nairobi in the late 1990s (UNEP 2005). The study put the Municipal Solid Waste (MSW) per capita generation at the time at 0.67kg/day, which translates to about 245 kg per person per year. A recent study by Intermediate Technology Development Group, (ITDG,) puts the daily solid MSW generation at a relatively higher value of 2,400 tones. The study estimates a per capita solid waste generation of about 253kg per person per year. This figure falls within the range specified by International Environment Technology Centre (IETC) for African urban centres. The City Council of Nairobi estimates for daily waste generation is between 1,600 to 2,400 tons which appears to be a projection based on the JICA study. The corresponding estimate of per capita generation is 0.65kg/person day and is again based on the JICA study (Maranga, 2005).

II: Problem Analysis

The problem with plastic paper bag is that the bags most used by consumers are designed for single use, (NEMA News, 2007). Ninety-nine percent of carrier bags used around the world follow the cradle to grave cycle (Clover, 2007). This use pattern means that carrier bags, like most other consumer goods, finish their lives decomposing in landfills,(NEMA,2005) .There are several social, economic and

environmental hazards associated with plastic bag littering, (UNEP, 2005). According to the report, plastic bag litter causes, visual, noise and thermal pollution that affects sectors like tourism. Plastic bag litter also bocks drainage that occasion "traffic clogging" and urban flooding. Waste plastic litter blocks gutters and drains that creates serious water flooding, causes death to animals and marine life when ingested and it takes approximately 20 to 1000 years for waste plastic carrier bag to decompose. When filled with rainwater, plastic bag litter has been breeding grounds of mosquitoes, (KIPPRA, 2006).The most destructive by-product of plastic carrier bag litter when incinerated, is the emission of "*dioxins*" and "*furans*", which are persistent organic pollutant in the environment (Lindens, 2010). Their health impacts include cancer and acting as "*endocrine disruptors*" that affects the reproductive system of human and other living organisms, (NEEMA news, 2005). The disposal methods of plastic paper bag pose serious environmental challenges due to its non-biogradable characteristics. Plastic paper bags are disposed of into the environment by two methods: deliberate and inadvertent littering. Deliberate littering can be everywhere in the city, parks, beaches, roads, and open spaces (Cherrier, 2006). The most popular agent that aid in inadvertent littering is wind. Because their low weight and flimsiness plastic bag litter discarded in the environment are easily carried by wind and blown everywhere especially on trees, drains and ponds. Even when disposed of properly in bins, plastic bags frequently are taken by the wind and end up as litter. Not only is litter aesthetically displeasing, but it can also cause environmental hazards. Littered plastic bag contain Municipal Solid Waste (MSW) .The contents of the Municipal Solid Waste contained in plastic bag litter can have negative impacts on the social and natural environment (Ritch, 2009).The Environment Protection Heritage Council (EPHC) report says that the threat to animals is through ingestion and entanglement by plastic litter, and that both marine, livestock, and wildlife are at risk. Likewise, humans are affected when littered plastic bag waste blocks drainage and sewer systems, leading to health hazards. (Waste Digest, Jan-July 2007). It is observed that the current behavioral practices of littering by the residents of the Ongata Rongai are largely unsustainable. Plastic bag littering at Ongata Rongai is an indicative of material possession and irresponsible wasteful. Consequently, majority of the residents suffer from "affluenza" as they consume more that they actually need, (Waste Digest, July-December 2006). It is estimated that in Nairobi, the release level of plastic bag is over 11 million plastic carrier bags per year, with supermarkets contributing 73% (Bahri, 2005). Plastic bag litter at Ongata Rongai is noticeable by the bright colours and persistence in the environment, (Waste Digest, July-December 2005) .The ever increasing plastic litter generation in Ongata Rongai Township has by far outstripped the ability of the Kajiado County Council to collect and dispose of the waste in safe and acceptable manner. There is inadequate collection of waste with at least 55 per cent coverage, (NEMA News, 2005). The uncollected waste is burnt, buried or dumped haphazardly in unfit places. These disposal methods have serious long term consequences on the environment.

III: Note on Methodology

Research design adopted for this was a descriptive research design; Bogdom (1992) defines descriptive research as a process of collecting data in order to answer questions concerning the current status of the study subject. Descriptive research designs are used in preliminary and exploratory studies to allow researchers to gather information, summarize, present and interpret it for the purpose of clarification,(Borg,1989). According to Borg (1989), the purpose of descriptive research is to determine and report the way things are. Borg (1989) noted that descriptive research is intended to produce statistical information about aspects of education that interest policy makers and educators. The steps involved in descriptive research are: formulating the objectives of the study, designing the method of data collection, selecting the sample, data collection and analyzing the results, Borg (1989). This study fitted within the provisions of descriptive research design because the researcher employed all the steps of descriptive research in his study in evaluating the problem of plastic bag littering at Ongata Rongai

Township and the social-economic hazards of plastic bag littering. This design attempted to describe such things as sample of population in relation to behavior of plastic bag littering, attitudes, values and characteristics as it exist at Ongata Rongai Township. The design was concerned with the collection, organization, description and analysis of plastic bag littering data from the sample and making inference to the entire population. Its objective was to get a snapshot view of social-economic hazards of plastic carrier bag litter as it is on the ground at Ongata Rongai Township without looking at the past trends. The design provided a room for generation of findings in form of descriptive statistics such data coding, measures of central tendency, measures of dispersion, distributions and relationships to the problems .and also reliable data for presentation and analysis. The goal of the study was to acquire factual, accurate and systematic data to account on the problem as it exist on the ground. Data analysis was done using descriptive statistics. Social-economic data included respondents' background, causes of plastic bag littering, the extent of plastic bag litter, effects of plastic bag litter and the possible solutions to plastic bag littering. Descriptive statistics involved the collection, organization and analysis of all data relating to some population or sample under study. For quantitative data analysis processing and editing ensured that the data collected is free from inconsistencies and any incompleteness. After cleaning, the data was coded. Coding of data involved developing a code book, pre-testing code book, coding the data and verifying the coded data. Once the data was coded, a selected few responses from the instruments were recorded and examined to identify any discrepancies in coding. Finally, content analysis which involved identify the main themes, assigning codes to the main themes, and classify responses under the main themes was to analyze qualitative data, (Chandran, 2004).

IV. Results and Discussion

Data analysis was done as per questionnaires that were used to the collect data. The study targeted a population of 120 respondents and they all responded giving a response rate of 100% which according to Mugenda and Mugenda (1993) a response rate of more than 80% is sufficient enough for the study. Data collected from the field was sorted and later analyzed using statistical package for social sciences (SPSS) software. The results are presented in tables and figures to highlight the major findings. They are also presented sequentially according to the research questions of the study. Mean scores and standard deviations analysis was used to analyze the data collected. The raw data was coded, evaluated and tabulated to depict clearly the results obtained on the social - economic hazards of plastic bags litter at Ongata Rongai peri- urban centre in Kajiado County.

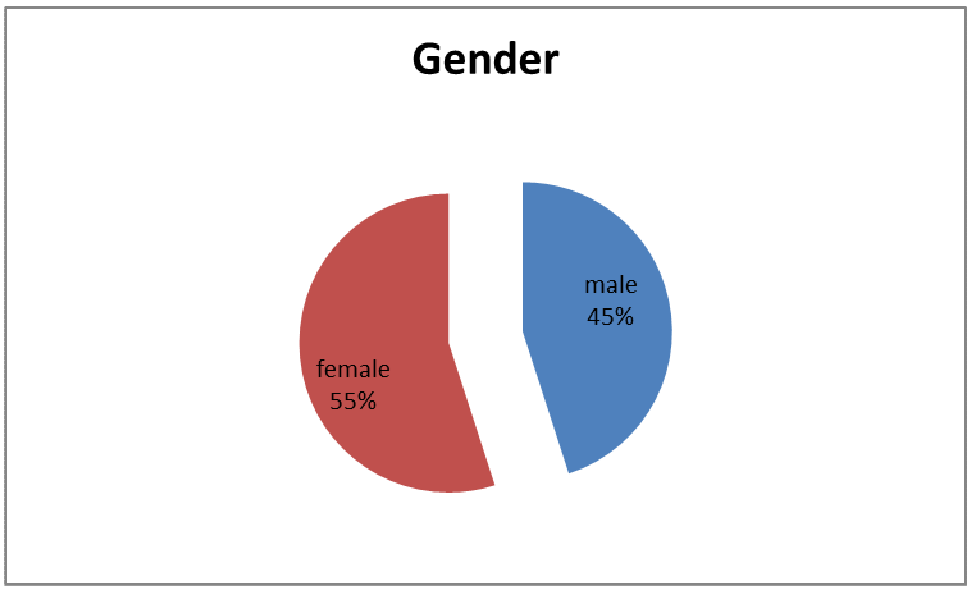
Demographic Characteristics

The study sought to establish the information on the respondents employed in the study with regards to the gender, age, how long they have stayed in Ongata Rongai. These bio-data points at the respondents' appropriateness in answering the study questions.

Gender of the respondents

The respondents were asked to show their gender. This was expected to guide the researcher on the conclusions regarding the degree of congruence of responses with the gender characteristics. Figure 4.1 below shows the study finding.

Gender Response

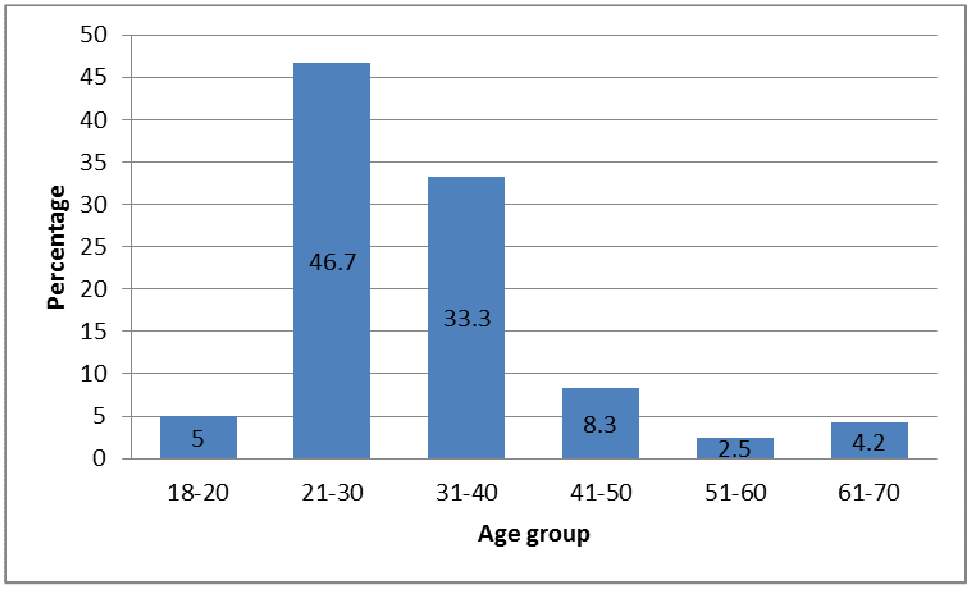


The results as in the figure 4.1 show that majority of the respondent were female at 55% while male was 45%. The results of gender distribution indicate that female gender is more than men in Ongata Rongai. It can be attributed by number of factors such as environment gender adaptation, gender urbanization and natural sex ratio theory of 1:5. Generally in any society, if the ratio of men: women remain at 1:1; the society is likely to experience a strain in the co-existance equilibrium

Distribution of Age Group

The respondents were asked to disclose their age. The figure below shows the study finding:

Plastic Paper Bag Usage by Age



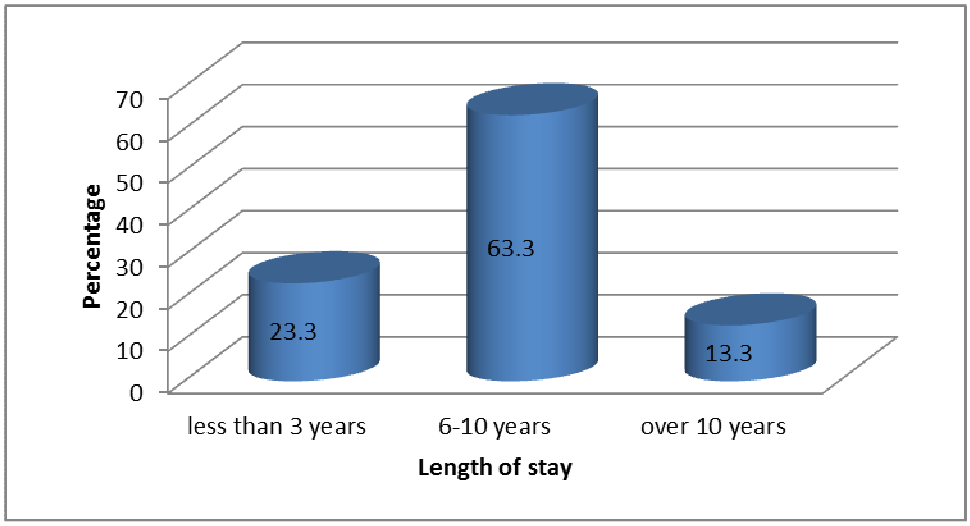
The results presented in figure 4.2 show that a large proportion of 46.7% the respondents were aged between the ages of 21 to 30 years; this was followed by a significant percentage 33.3% that were aged

between 31-40 years. 8.3% were aged 41-50 years, 5% were aged 18-20 years 4.2% were aged 61-70 while 2.5% were aged between 51-60 years. The conclusion drawn from the above table indicates that the majority of the Ongata Rongai residents are primarily young people who should be given adequate considerations in finding solutions to plastic paper bag littering.

Length of stay in Rongai

The respondents were asked to indicate their length of stay as a residence of Rogai. Figure 3 shows the study findings.

Figure 1**: Length of stay at Ongata Rongai**



From the figure above, 63.3 % of the respondents said they had stayed in Rongai for 6-10 years, 23.3% had stayed in Rongai for less than 3 years while 13.3% had been residents for over 10 years. This is indication that majority the residents interviewed had stayed in Rongai for over 6 years and therefore were in a position to give accurate information on the socio economic effects of plastic litter in the peri urban center.

Way of disposing plastic Paper Bag litter

The respondents were asked to indicate their way of disposing plastic litter. Table 4.1 shows the study findings.

Table 1**: Way of disposing plastic Paper Bag litter**

Description	**No. of respondents**	**Percentage**
Re use	11	9.2
Discard as litter	59	49.2
Burying	24	20
Burning	26	21.7
Total	**120**	**100**

From the results in table above, 49.2% of the respondents indicated that they dispose their litter by discarding it, 21.7% indicated they burn their plastic litter, 20% burry their plastic litter while 9.2% re use they plastics. The above data indicates that the most prevalent method of plastic paper bag littering at Ongata Rongai is deliberate littering.

Average no of bags used each week

The respondents were asked to indicate the Average no of bags used each week. The table below shows the study findings.

Table 2**: Average no of bags used each week**

Description	Frequency	Percent
0-5	16	13.3
6-10	35	29.2
10-15	12	10
16-20	19	15.8
21-25	25	20.8
25+	13	10.8
Total	**120**	**100**

The results in table above shows that majority 29.2% of the respondents use an average of 6-10 plastic bags in a week, 20.8% use 21-25% of plastic bags in a week, 15.8% use 16-20 plastic bags in a week, 13.3% use 0-5 plastic bags in a week, 10.8 use 25 and more plastic bags in a week while 10% use 10-15 plastic bags in a week.

Plastic products use

The respondents were asked to indicate which kind of plastics products they used excessively. The figure below shows the study findings.

Figure 2: **Plastic products use**

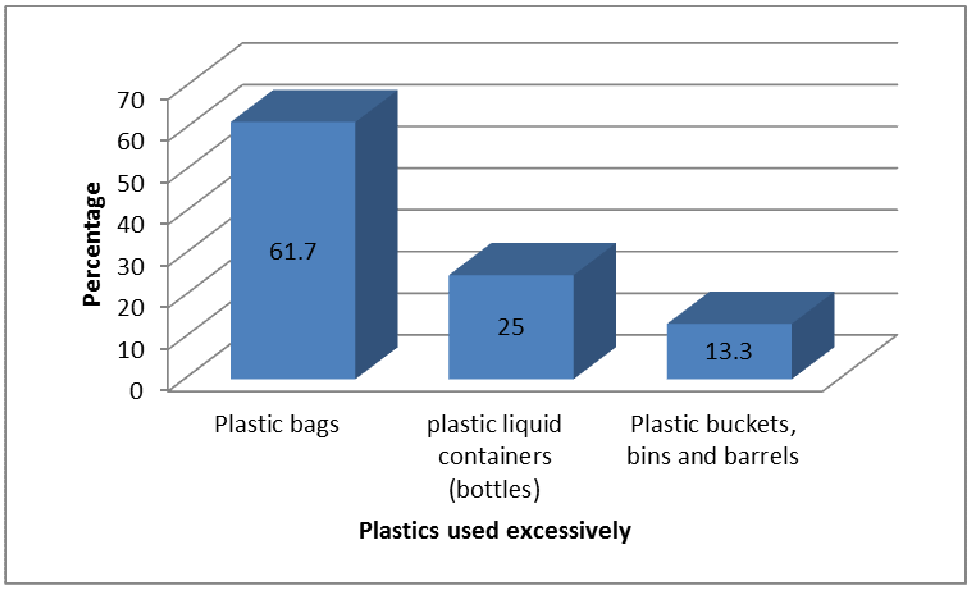


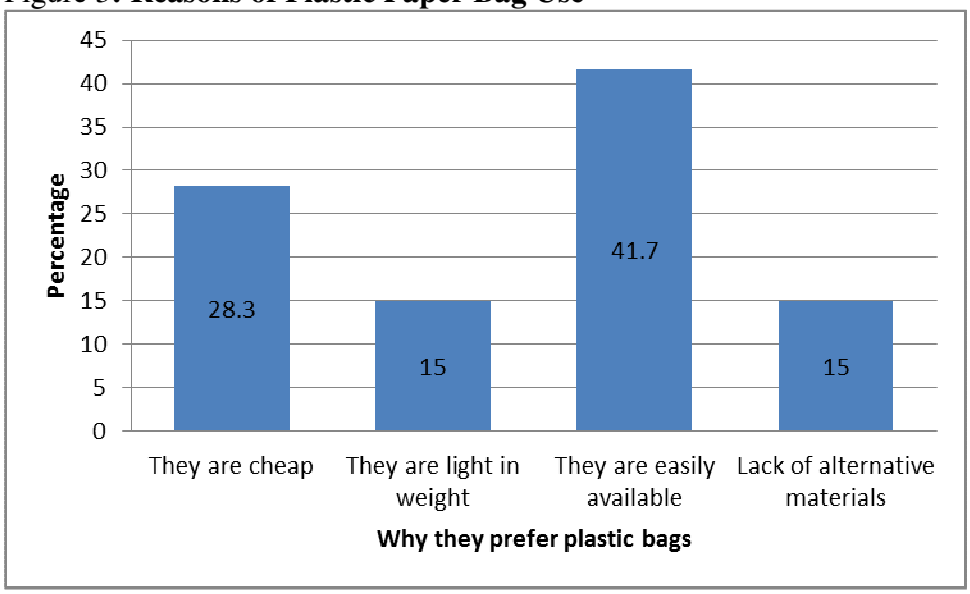
Figure 4 presents the findings on the Plastic products used excessively. The findings show that majority of the respondents 61.7% used plastic bags excessively; this was followed by those who use plastic liquid containers (bottles 25% while 13.3% used plastic buckets, bins and barrels excessively. The data

indicates that the most widely used paper bag product is plastic paper bag which has contributed significantly in the plastic paper bag littering.

Reason why people prefer to use the plastic bag

The respondents were asked to indicate why they prefer to use the plastic product(s).

Figure 3**: Reasons of Plastic Paper Bag Use**

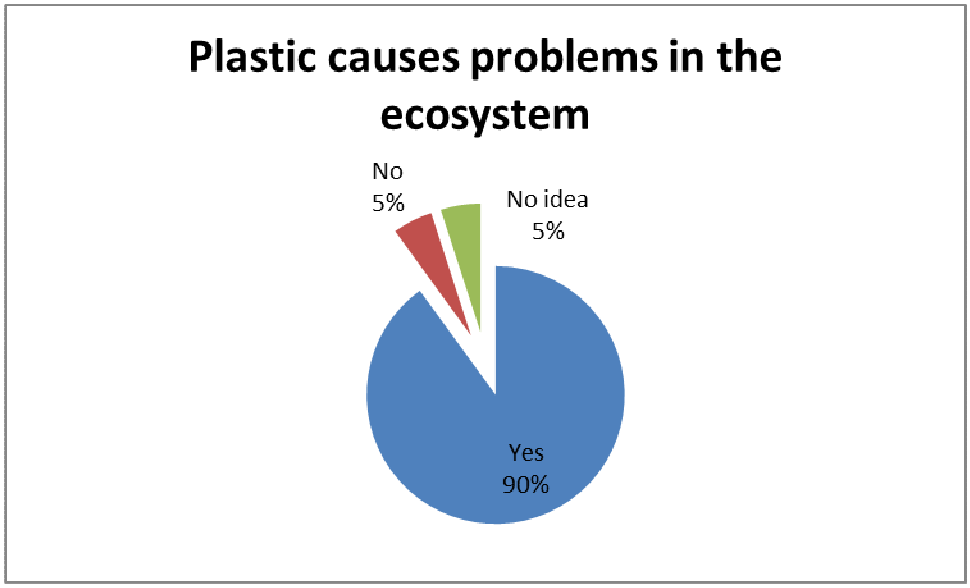


The above figure indicates that plastic paper bag is used excessively because they are readily available and given freely at the shopping outlets which has led to the excessive littering problem in Ongata Rongai

Social-economic problems of Plastic Paper Bag in the ecosystem

The respondents were asked to indicate whether they were aware that plastic paper bag wastes causes problems. Figure 6 below shows the study findings:

Figure 4**: Awareness levels of social-economic problems of Plastic Paper Bag in the ecosystem**

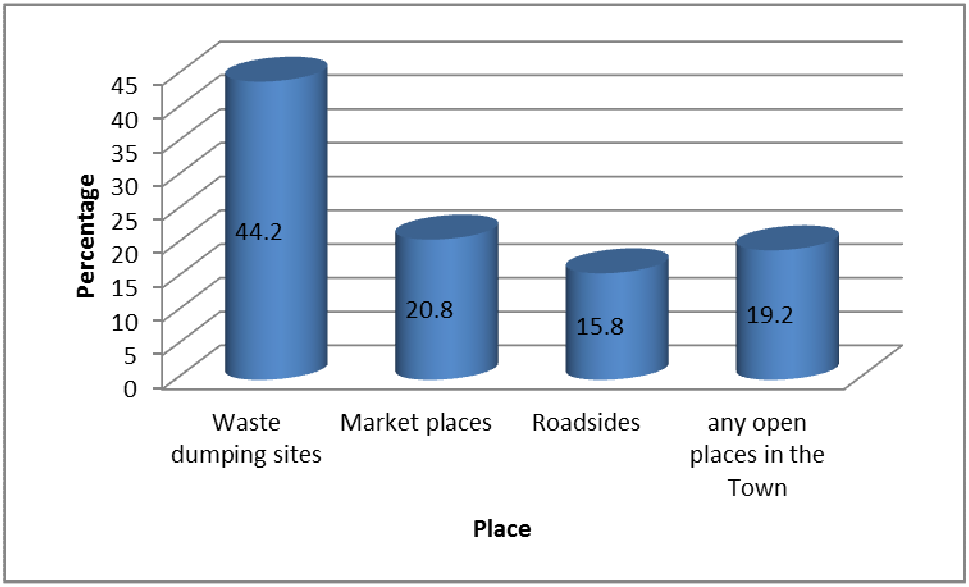


The results show that 90% of the respondents were aware that plastics bag litter causes social-economic problems in the ecosystem, 5% did not know that plastic bag litter causes problems to the ecosystem while another 5% also had no idea whether plastic bag litter cause problems in the ecosystem. It can be concluded from the above figure that majority of the population contributes to plastic paper bag littering despite knowing that plastic paper bag contributes to environmental hazards.

Places where plastic carrier bag litter commonly found at Ongata Rongai

The respondents were asked to indicate the places where plastic carrier bag litter is commonly found at Ongata Rongai. The figure below shows the study findings.

Figure 5**: Places where plastic litter is commonly found**



The results in figure above show that plastic bag waste that contributes to littering is commonly found in the waste dumping sites. Plastic paper bag litter is also common in market places and roadsides.

Effects of charging for plastic bags

The respondents were asked to indicate how they would respond if charges were introduced on the plastic bags. The figure below shows the study findings.

Table 3**: Effects of charging for plastic bags**

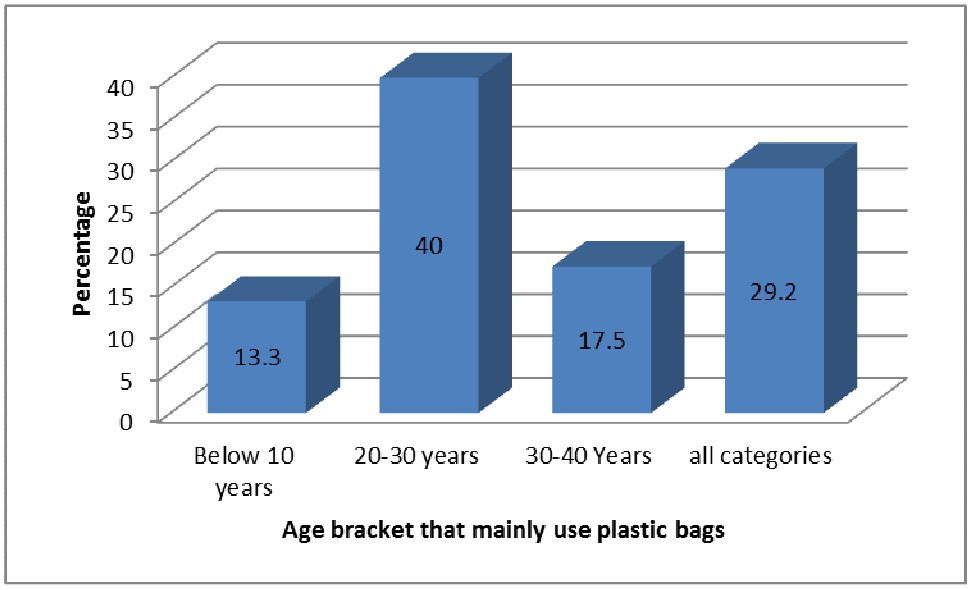
Description	**No. of respondents**	**Percentage**
Pay the small charge for each bag I use	22	18.3
Buy reusable bags and stop using plastic bags	38	31.7
Stop using bags	22	18.3
Bring my own bags from home	38	31.7
Total	**120**	**100**

The table above depicts that the problems of plastic paper bag littering can be minimized if the people are encouraged to re-use the plastic paper bags.

Use of Plastic Paper Bag by Age

The respondents were asked to indicate the age bracket which they think mainly use the plastic bags. The figure below shows the study findings.

Figure 6: **The Use of Plastic Paper Bag by Age**

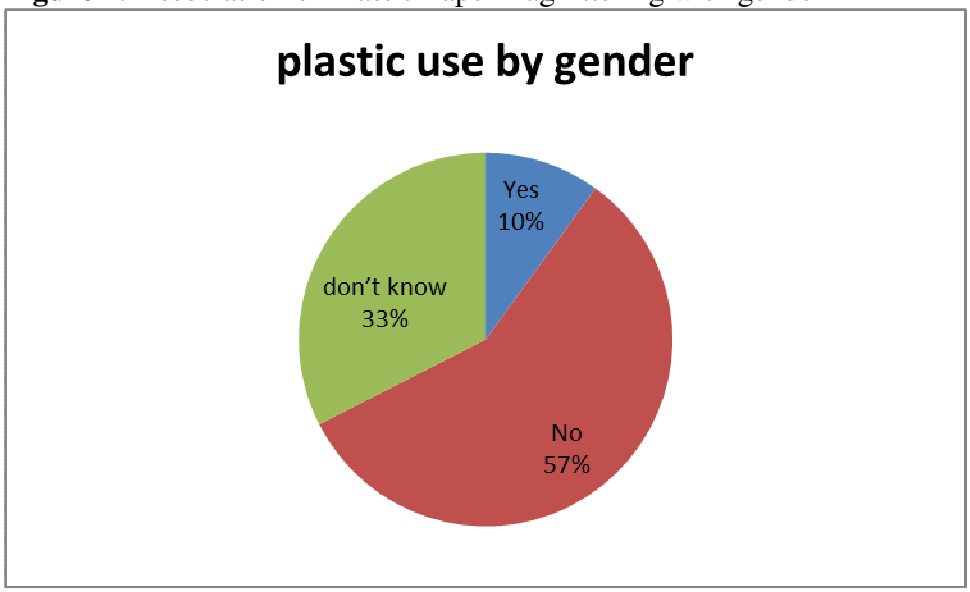


The results show that 40% of the respondents indicated that those aged 20-30 years used the plastic bags more often, 29.2% indicated that it was all age brackets, 17.5% indicated those who were 30-40 years used plastics more often, while 13.3% indicated those below 10 years. The table indicates that the best age bracket to target while addressing the problems of plastic paper bag litter is 20-30 years in age.

Association of Plastic Paper Bag littering with gender

The respondents were asked to indicate whether plastic littering associated with any type of gender. The figure below shows the study findings.

Figure 7: Association of Plastic Paper Bag littering with gender



The results show that majority 57% of the respondents indicated that plastic littering was not associated with any gender, 33% indicated that they did not know while 10% indicated that plastic littering was associated with the gender characteristics. The results from the above figure indicate that plastic paper littering is not associated with any gender.

Social class associated with plastic bag littering

The respondents were asked to indicate the social status class associated with plastic bag littering. The figure below shows the study findings:

Figure 8**: Social class and plastic Paper bag Use**

The results in the figure above shows that majority42.5% of the respondents indicated all categories of classes use plastic bags. 29.2% indicated that plastic littering was associated with self employed people, 23.3% indicated that plastic littering was associated with casual workers and 5% indicated plastic littering was associated with full time employed people. The result concludes that the social status of individuals in the society does not contribute significally to littering behavior.

Causes of plastic Paper Bag littering

The respondents were asked to show their level of agreement with the following statements on plastic littering. The results are shown in the table below.

Table 4: **Rating of Causes of plastic Paper Bag littering By Criteria**

Description Of Criteria	**SD**	**D**	**M**	**A**	**SA**	**Mean**
Plastic bags have become overly cheap fuelling present-day use and throw away consumerism.	5	7	8	70	30	4.3511
The spread of plastic bag littering is associated with urbanization	7	8	5	60	40	4.1342

The amount of plastic wastes keeps on increasing due to the increase of population and life style of the people	8	10	2	35	65	4.4583
Absence of life cycle considerations amongst manufacturers	10	15	35	40	20	3.8534
There is no well organized way of disposal of solid wastes. People dispose the wastes in their own ways, wherever they find it necessary to dispose them	7	8	10	55	40	4.4235
plastic bags are manufactured from non-renewable and non-biodegradable materials also adds to the overall environmental burden	10	15	20	45	30	4.2917
Low public awareness on the responsible disposal of waste	5	12	4	60	39	4.1333

From the descriptive statistics presented in table above show that majority agreed with all the statements in the following order. The amount of plastic wastes keeps on increasing due to the increase of population and life style of the people (m=4.4583). There is no well organized way of disposal of solid wastes and therefore people dispose the wastes in their own ways, wherever they find it necessary to dispose them (m=4.4235). Plastic bags have become overly cheap fuelling present-day use and throw away consumerism (m=4.3511). Plastic bags are manufactured from non-renewable and non-biodegradable materials also adds to the overall environmental burden (m= 4.2917). The spread of plastic bag littering is associated with urbanization (m= 4.1342). Low public awareness on the responsible disposal of waste (m= 4.1333) and Absence of life cycle considerations amongst manufacturers m= 3.8534).

Own opinion

The respondents were asked o give their own opinion on what causes plastic bag littering in Rongai. The report indicates that Plastics bags have been used extensively in both food and water packaging because of their inherent properties such as low bulk densities and inertness that make them convenient carrier materials and low risk contaminants. Plastic bottles and sachets used to package water to people in transit points and in moving vehicles have become widespread in the Rongai. The adoption of a more hygienic mode of food, beverages, and other products brought plastic packaging to replace the existing other cultural packaging methods (leaf wrappers, brown paper and metal cup uses) in cities and towns. As a result of their unique properties, plastics have become the most favoured packaging materials in commerce with firms making windfall profits and transferring the environmental cost associated with cleaning plastic waste on the general public.

Causes of plastic bag litter in Ongata Rongai

Supermarkets, kiosks and outdoor markets are the sources of plastic paper bags that litter Ongata Rongai environment. The situation is even worse in informal settlements and slums in Ongata Rongai where plastic consumption is higher. Since the level of re-use and recycling of post-consumer flexible in Ongata Rongai isvery low, tones of year of plastic paper bag waste are released into the waste stream.

Tuskeys, Uchumi and Cleanshelf and are the three biggest supermarket chains operating in Ongata Rongai. They provide customers with free, branded- and plain plastic shopping bags. A discussion with the staff from chain stores revealed that, these chain store do not encourages customers to bring back used plastic shopping bags and they do not have facilities or bins for disposing plastic

FGD on causes of plastic waste

The results from Focus group discussions shows that some of the reasons that has made Ongata Rongai a place of litter includes Limited focus on plastic paper bag pollution control mechanisms and inadequate waste collection services. This has caused adverse effect on the environment and public health. There is also fragmented approach with single media focus and a lot of conflict of interests, the residents has insufficient information and the authorized bodies have inadequate environmental planning, and also inadequate research and development programmes, there exists fragmented regulatory approach and regulations are inadequately enforced.

Extent of Plastic Paper Bag pollution

The respondents were asked to show their level of agreement with the following statements on extent of pollution. The results are shown in the table below.

Table 5: **Rating of Extent of Plastic Paper Bag pollution**

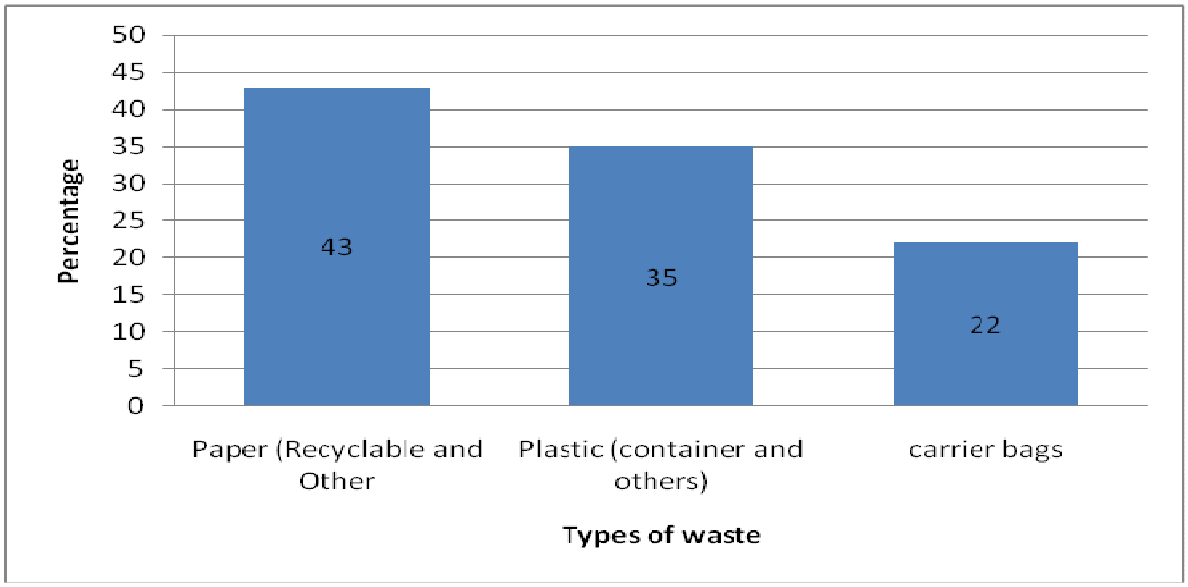
Description of Criteria	**SD**	**D**	**M**	**A**	**SA**	**Mean**
While more techniques and improvements to the recycling process arise, so do more people and more waste	10	8	8	62	32	4.1167
Hazards caused by plastic and plastic bag pollution create everlasting, detrimental effects upon the environment	10	10	5	50	45	4.4917
The extent of harm created by the disposed bags is not widely recognized by recipients	8	5	2	40	65	4.0583
Effects are currently causing global warming and "climate change" is often used to describe human-specific impacts	5	10	20	50	35	4.0833
Ordinary municipal landfills are the source of many chemical substances entering the soil environment	10	15	10	50	35	4.3167
Dioxins have been considered highly toxic and able to cause reproductive and developmental problems, damage the immune system, interfere with hormones and also cause cancer	10	15	20	45	30	4.1833

The descriptive statistics show that the respondents agreed with the statements on the extent of pollution in the following order. Hazards caused by plastic and plastic bag pollution create everlasting, detrimental effects upon the environment (m= 4.4917). Ordinary municipal landfills are the source of many chemical substances entering the soil environment (m=4.3167). Dioxins have been considered

highly toxic and able to cause reproductive and developmental problems, damage the immune system, interfere with hormones and also cause cancer (m=4.1833). While more techniques and improvements to the recycling process arise, so do more people and more waste (m= 4.1167). Effects are currently causing global warming and "climate change" is often used to describe human-specific impacts (m =4.0833). The extent of harm created by the disposed bags is not widely recognized by recipients (m=4.0583).

The report from Key informants in Ongata Rongai drawn from chain stores operating at Ongata Rongai that includes Tuskeys Supermarket,Uchumi and Cleanshelf indicates that history view plastics bag as one of the most important technical developments of the 20th century. Use of plastics have opened the way for new inventions and have replaced other materials in existing products. Plastic materials are light, durable and versatile, as well as resistant to moisture, chemicals and decay. Yet these of plastic properties can also bring challenges to plastic waste management. Worldwide, policies are being introduced that demand recycling that diverts plastic waste from landfills that increases greater levels of resource conservation. It is clear that the use of plastics reduces the mass of materials needed in many applications and many sectors. However, the more numerous, specialized, engineered and differentiated become plastics materials, the more difficult will be their recovery especially by material recycling which must be a first choice after reuse and prevention.

Figure 4 **: Plastic Paper bag Waste Levels**

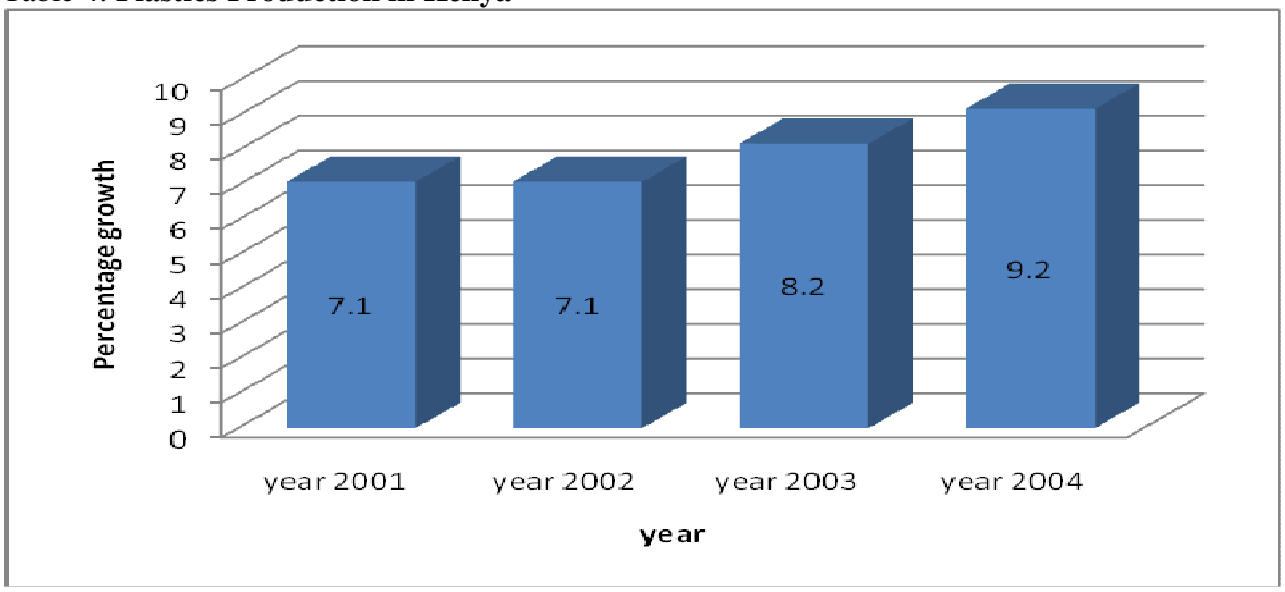


The amount of plastic bag waste generated in Ongata Rongai is getting worse by the day as a result of large scale urbanization and lack of adequote capacity by Kajiado County council to manage MSW.

A discussion with retailers of plastic bags , indicated that the bags most responsible for littering at Ongata Rongai environment are carrier bags of between 6 and 7 microns (known locally as *juala)* for which there is a very high demand due to their affordability. The County MSW disposal site at Ngong Township is overfull with plastic bags waste at the dump site being scattered with the help of wind due to their light weight, which again makes them difficult to collect. As a result, the thin plastic bag litter is

now scattered in Ongata Rongai environment, polluting and contaminating the ecosystem. In the Ongata Rongai, plastic bag litter is major causes of drainage blockage and water stagnation. In open dumpsites at Ngong, the accumulation of plastic bag waste has greatly increased due to their poor degradability. The plastic waste problem is exacerbated by lack of effective collection and recycling infrastructure in Ongata in the County.

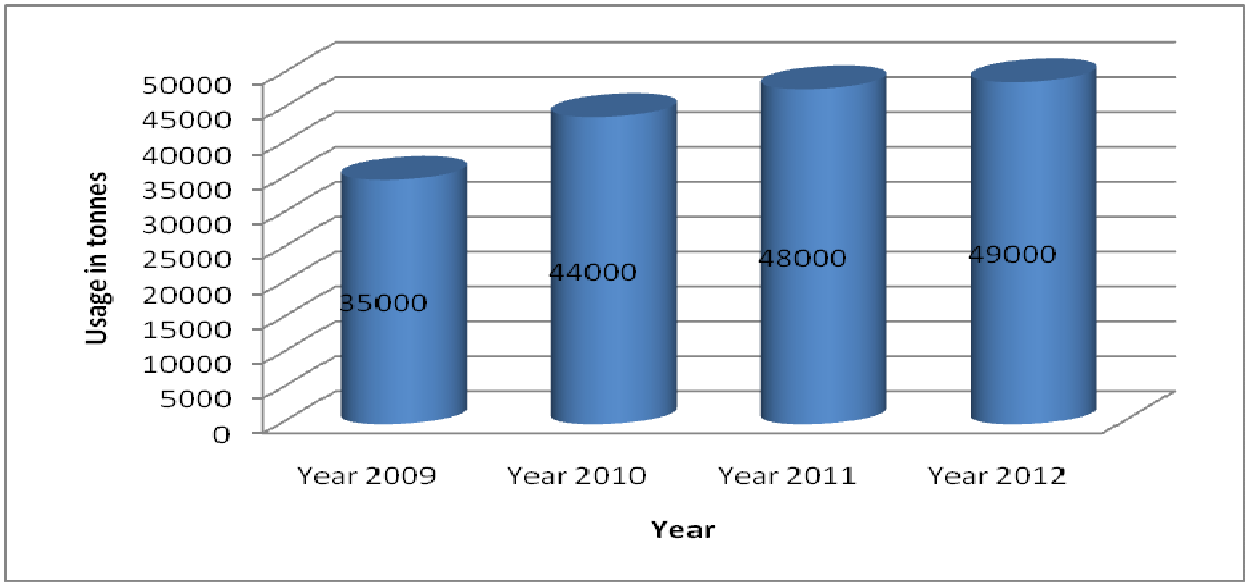
Table 4: **Plastics Production in Kenya**



Kenya does not have petrochemical industries and hence the virgin raw materials for plastics and polythene industries are imported from overseas. Plastics are imported and exported either as raw materials or as finished plastic products. Most of the plastics manufactured in Kenya are consumed locally while the remaining portion is exported to Uganda, Tanzania, Burundi, Democratic Republic of Congo (DRC), Zimbabwe, Sudan, Ethiopia, Ghana, Rwanda, Zambia, Burkina Faso, Egypt, Cameroon and Mauritius, Norway, Taiwan and Cyprus.

The first plastics factory in Kenya was inaugurated on November 16th 1968. At the time, the then minister for Commerce and Industry (Retired Former the President of the country), Mr. Mwai Kibaki, is reported as having hailed the use of plastics as "a new boon to young Developing Nations". Since then, the plastic manufacturing industry has grown rapidly due to the increasing demand of plastics products. The plastic manufacturing sub-sector grew by 7.1% in 2001, 7.1% in 2002, 8.2% in 2003 and 2.9% in the year 2004. There are about 50 plastic manufacturing industries located in Nairobi.

Table 5: **Plastic Bag Use in Kenya**



Manufacture of plastic bags in Kenya boomed around the early 1990s strongly driven by consumer demand. Major growing Kenyan supermarkets in Kenya resorted to using plastic paper bags as other paper bags were proving scarce and expensive. Another reason why plastic paper bag is often used in Kenya is that was that plastic bags turned out to possess better features in many respects.Of the 193,000 tons/year of plastics output, a sizeable 49,000 tonnes/year is plastic bags. About half of this (an equivalent of approximately 24,500 tonnes) are less than 15 microns thickness and primarily are used for carrying consumer products. This category comprises plastic bread bags whose average thickness is only 6-7 microns; these are the major causes of inadvertent littering observed in Nairobi and many other urban and rural environments in Kenya.

Effects of plastic paper Litter at Ongata Rongai

The respondents were asked to show their level of agreement with the following factors on effects of plastic littering. The results are shown in the table below.

Table 6: Effects of plastic paper bags

The scale is illustrated in the table as 1=strongly disagree (**SD**), 2= disagree (D), 3=moderately (M), 4= agree (A) and 5= strongly agree (SA).

Description	**SD**	**D**	**M**	**A**	**SA**	**Mean**
The plastic wastes do not affect only the people but also animals such as sheep, goats, cows, fowls.	10	20	8	42	40	4.5025
Plastic wastes find their way into the water bodies thus polluting the water	15	5	7	45	48	4.5225
Marine animals are killed by plastic waste that finds their way in water bodies as they mistakenly eat plastics as food.	5	8	2	40	65	4.3583
Every bag that ends up in the woodlands of the country threatens the natural progression of wildlife	20	10	5	50	35	4.1333
Without the balance of the ecosystem food sources dry up and starvation occurs	15	20	10	40	35	4.1245
There is no way to strictly limit the effects of plastic bags on the environment because there is no disposal method that will really help eliminate the problem	10	15	20	30	45	2.2125
Throughout the world plastic bags are responsible for suffocation deaths of woodland animals as well as inhibiting soil nutrients	5	12	4	50	49	4.6083

The results show that respondents strongly agreed with the following statements: Throughout the world plastic bags are responsible for suffocation deaths of woodland animals as well as inhibiting soil nutrients (m=4.6083). Plastic wastes find their way into the water bodies thus polluting the water (m=4.5225). The plastic wastes do not affect only the people but also animals such as sheep, goats, cows, fowls (m= 4.5025). the respondents agreed with the following statements ; Water animals are killed by plastic waste that finds their way in water bodies as they mistakenly eat plastics as food (m=4.3583). Every bag that ends up in the woodlands of the country threatens the natural progression of wildlife (m=4.1333). Without the balance of the ecosystem food sources dry up and starvation occurs (m= 4.1245). The respondents disagreed with the following statements: There is no way to strictly limit the effects of plastic bags on the environment because there is no disposal method that will really help eliminate the problem (m=2.2125).

Possible solutions

The respondents were asked to show their level of agreement with the following factors possible solution of plastic littering. The results are shown in the table below.

Table 7**: Possible solutions**

Description	**SD**	**D**	**M**	**A**	**SA**	**Mean**
Effective collection of plastic waste can be done by identifying the sources of plastics wastes, the contributors of the plastic wastes	5	10	15	40	50	4.4655
The plastic wastes can be collected for recycling from people in residential areas by putting recycling plastic waste bins in vantage places for easy collection later and also collecting from the roadside	10	15	5	55	35	3.9667
Plastic waste management is basically a welfare and development matter and it is commonly accepted that public participation is essential for its success	10	20	5	45	40	4.5125
Awareness can be created through formal and non-formal education with the assistance of both the print and electronic media	5	10	20	40	45	3.9833
Extensive and intensive sensitization is essential in enabling people to bring sound environmental practices into focus	8	15	4	44	49	4.0667

From the descriptive statistics presented in table above shows that the mean are above 3.5 for all the factors on possible solutions to the plastic litter. The respondents strongly agreed that Plastic waste management is basically a welfare and development matter and it is commonly accepted that public participation is essential for its success (m=4.5125). They agreed that Effective collection of plastic waste can be done by identifying the sources of plastics wastes, the contributors of the plastic wastes (m=4.4655). Extensive and intensive sensitization is essential in enabling people to bring sound environmental practices into focus (m= 4.0667). The plastic wastes can be collected for recycling from people in residential areas by putting recycling plastic waste bins in vantage places for easy collection later and also collecting from the roadside (m=3.9667). Awareness can be created through formal and non-formal education with the assistance of both the print and electronic media (m=3.9833).

Opinion on possible solutions

The respondents indicated that the possible solution would include: Shops should only stock plastic bags thicker than 60 microns (a micron is 1 thousandth of a millimeter). Stronger, thicker plastic bags are re-useable and easier to recycle than thin bags. Shoppers should pay for the stronger bags, so that they would be more likely to re-use them than throw them away. Manufacturers should make sure that plastic bags are made of materials that can be recycled more easily. Manufacturers, distributors, and retailers of plastic carrier bags should apply environmental policies for the management and disposal of plastic bags .The use of recycled paper bags and cloth bags should be promoted.

Plastic Waste Management Initiatives

Since its inception in 2003, the National Environmental Management Authority (NEMA) has received numerous complaints from members of the public abbut the significant adverse environmental impacts of plastic materials. There have been reports of sewer blockages and livestock deaths attributed to plastics waste. The additives contained in plastics such as colorants, stabilizers, and plasticizers often

contain toxic constituents such as lead and cadmium posing varying level of health hazards. According to NEMA, discarded plastic products and packaging materials make up a growing portion of municipal solid waste. In response to the expanding scope of the problem and the growing concern expressed by the public, NEMA initiated stakeholders discussions taking into consideration the provisions of the Environmental Management and Coordination Act issued in 1999. The consultation which has been carried out with the active participation of the plastic sector under the Kenyan Association Manufacturers (KAM) identified a 10-point action plan covering such areas as plastic recycling, introduction of a standard thickness, development of economic measures, legal measures on littering and selection of disposal methods as reflected in the table below:

Challenges faced when implementing the action plan

The NCC was to implement the strategic initiatives developed by NEEMA .However , the City Council of Nairobi faces several challenges in (plastic) waste management, namely, very high consumption levels of different types of plastics, particularly of the flimsy type; absence of an overall solid waste management policy, weak institutional capacity to handle plastic waste and other types of wastes, inadequate enforcement of anti-littering by-laws, and inadequate awareness and recycling technologies. Given the magnitude of environmental impacts of plastics waste in Nairobi, this comprehensive strategy was developed with the expectation that it was to lead to overall Reduction of plastics use, increased Reuse of plastic products as well as Recycling levels of plastic wastes.

Key elements of the comprehensive strategy

The strategy involves creating awareness and education on litter avoidance, reusing and recycling of plastic products. Streamlining and strengthening of the waste management services through the active involvement of the private sector arid the community-based organizations Development of the waste management infrastructure of the city by establishing liner collection systems, solid waste collection and transfer points, and landfills development. Promotion of plastic recycling by providing support to community-based recycling groups. Due to lack of commitment to reduce the plastic paper bag litter by the Government, the present state of plastic bag littering remains in the peri-urban areas of Kenya.

Recommendations

The focus group discussions came up with the following recommendations; the government and the people in the community should focus on integrated and comprehensive approach (prevention, minimization and recycling). There should be adequate waste collection services for all and come up with a sustainable protection of the environment and public health. The media should use consolidated approach and there should be transparency in conflict resolution. There should be integrated waste information system, Holistic integrated environmental planning and capabilities, Focused investigations that take cognizance of cross-cutting implications, Integrated regulatory approach and they should make sure there is an enforcement body which ensures all the plans are effected. The polluter should pay principle amount and total cost accounting

Conclusions

The process of urbanization in Kenya has provided impetus for social disorganization or anomie. The result is that the collective purposes of society are less fully realized than they could be under a different, better organized system. When there is no provision of a shared set of priorities among these competing obligations, the individual's behavior has become unpredictable in the urban set up. The anomy existing in the urban set up has been exploited by capitalist to sell their merchandize uncontrollably. Capitalism is open- ended, internally contradictory process and it produces manifest and

latent functions that are difficult to predict and control. Capitalism has dynamics that are driving social changes that are full of new risks called "*manufactured risks*" that are incalculable in origin and indeterminate in their consequences. These risks are created by the impact of human knowledge and technology to the natural world. They are the outcome of human interventions into the nature. Manufactured risks manifest themselves in form of environmental and health risks that include urbanization, pollution, contamination, global warming, flooding, and consumption of genetically modified organisms, use of non-bio gradable materials. The collective outcome of capitalism has been creation of widespread environmental destruction whose precise cause is indeterminate and whose consequences are similarly difficult to calculate phenomena called "*technological disaster"* .The dichotomy of plastic paper bag characteristics is that at micro-level, it has latent functions but at macro-level, it has manifest functions. The behavior of litter-louting is acquired through classical conditioning, operant conditioning or through social learning. The purpose human's behavior is to fulfill certain kinds of needs. , behavior can also be un-learned through positive reinforcement, negative reinforcement or by extinction. Behavior occurs in response to an identifiable event or stimuli, behavior is weakened or strengthened by the consequences that follow the behavior, behavior is a form of communication and behaviors serve a function and have a purpose. If benefits do not result from displaying certain behavior, n individuals would stop doing them.

Recommendations

Because there is no roadmap to these new dangers and risks for capitalism, modernity or urbanization that has resulted in plastic paper bag littering impacting on biotic species and abiotic components adversely, individuals, counties, organizations and the government of Kenya including the international community of states also known as "*global risk society*" must negotiate risks as they make choices how live is to be lived. The risks of plastic paper bag litter are not restricted spatially, temporally or socially but they affect the global community and the environment and all social classes. They have global consequences. Manufactured risks caused by plastic paper bag litter are controllable when individuals act responsibly.

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