RESEARCH ARTICLE

FACTORS INFLUENCING THE RECOVERY OF HOUSEHOLD SOLID WASTES IN URBAN KENYA: THE CASE OF ELDORET TOWN

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ARTICLE INFO	ABSTRACT
	Many developing countries are faced with insurmountable levels of urban solid wastes especially in the residential areas. This research aimed at investigating factors influencing urban household's decision to participate in solid waste recycling and the intensity of recycling urban solid wastes through various recycling outlets using a two stage Heckman Model. A multinomial logit model was used to investigate urban household's choice of recycling outlets. Urban households were randomly sampled whereas solid waste vendors / hawkers, waste pickers (scavengers) and the dealers in the buying centres were sampled using snowball sampling technique. This research reveals that a market for solid wastes at the household level has developed in Kenya. Seventy two percent (72 %) of the households sampled agree that they can easily get a market for some of the solid wastes that they generate in the buying centres' / dealers and also to the solid waste vendors who visit them to buy different types of solid wastes. Study also found out that different solid waste prices vary from household to household and from location to location within the same region. Solid waste pickers (scavengers) also play a significant role in household recycling. Ninety two percent [92%] of the respondents indicate that solid waste scavengers forage through their waste bins frequently to collect different types of solid wastes mainly for sale in the local markets. The multinomial logit results indicate that the frequency of collection of wastes by the local authority was negatively related and statistically significant at 5 percent level of significance in influencing the choice of onsite recycling of solid wastes at the household. These results also indicate that household income was negatively related and statistically significant at 5 percent level in influencing the choice to recycling solid wastes through solid wastes agents and dealers. The multinomial logit results further show that price of scrap metal and price of plastics are negatively related and statistically insignificant in the relative log odds in choosing onsite recycling at the household vs. recycling through the vendors / hawkers.

INTRODUCTION

Waste management in Eldoret like many urban cities in Kenya has not been adequate and has failed to meet the required standards for its residents. Previous studies that have been conducted in urban Kenya by United Nations Centre for Human Settlement (2001), Kibwage (1996), Sulo, (1999), Peters (1998), Kiplagat (1998) and Syagga (1992) identified some factors that have been a challenge for most local Governments like UasinGishu County. First, problems associated with inadequate staff and resources have been underscored in Eldoret town. Lack of appropriate skills and capabilities in specific areas of urban management are lacking. Other factors contributing to inefficient waste management in

Eldoret town include poor institutional organization, low public awareness on environmental health, lack of adequate personnel and appropriate equipment, use of poor waste handling techniques, inadequate coverage of the municipality and inappropriate location of the dumping site. The private sector investors and community organizations in Eldoret County have not shown interest in participating in actions to solve the problems associated with urban solid wastes. Other emerging issues that have bedevilledEldoret town include unplanned settlements due to the occurrence of urban sprawl and especially the many uncoordinated economic activities such as road side grocery stalls, car wash, food kiosks and garages. Other challenges include

Recycling Policy Background

Recycling is a process that involves converting waste materials into new products to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials,

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reduce energy usage, reduce air pollution and water pollution by reducing the need for "conventional" waste disposal and lower greenhouse gas emissions as compared to plastic production. Recycling is a key component of modern waste reduction and is the third component of the "*Reduce, Reuse, and Recycle* waste Hierarchy (Hansen 2002). Household solid waste recycling was the main focus in this research and involves either reuse or selling of recyclable non-food waste materials that include many kinds of glass, paper, metal, plastic, textiles, and electronics to solid waste vendors moving from one house to another. Conversion of waste to energy was not considered in this research because this does not take place in Eldoret. However, the County Government in Eldoret intends to source for a '*Waste to Energy*' investor. This research is consistent with resource conservation and recovery that is defined as the reduction of the amounts of solid wastes that are generated, reduction of overall resource consumption and utilization of recovered resources (Elknington J. et al 1989). Urban industrialization has witnessed rapid growth, lack of space for expansion and the limitation of the natural cycle to operate. Recycling gained momentum only a few years ago in Kenya due to the complexity involved in the integration of communities, business establishments and industries in the recycling system [National Environmental Management Authority, (NEMA) 2008]. By 1998, there were over twenty six [26] companies engaged in the waste recycling industry. These companies include among others, Nairobi Plastics, Central Glass, Kamongo Waste Paper, Madhu Paper, and Kenya Reclaim Rubber Co., Premier Rolling Mills. These industries play a key role in resource recovery of solid waste by buying recovered material from the scavengers for re-processing at their factories. The materials that are often recycled from solid waste include waste paper, cardboard, glass, metal and rubber. Given that there is a considerable demand, recycling and resource recovery offers good scope for employment generation and potentially has both positive economic and environmental impacts.

Recycling Policy Questions and Issues

In Eldoret, Materials to be recycled are brought to a collection centres from households, commercial or picked up from the Eldoret Landfill, then sorted, cleaned and are either reprocessed into new materials or sold to agents who transport to bigger recycling factories in Eldoret and in Nairobi, Kenya's Capital City. Solid waste vendors buy the materials from households and sell to agents in the collection centres. The collection centres are located in the residential and commercial areas in Eldoret Town. Typical non-food recyclables that have been found from households are plastics containers, polythene bags, newspapers, magazines, cardboard boxes, old motor vehicle tyres, paper, plastic bottles, glass bottles and jars, metal and metal cans, brass and aluminium wastes. Organic solid wastes were not considered in this study due to its bulkiness and most urban households would rather dispose in municipal receptacles. Some of the Solid Waste Metals collected can go to the market straight away. For instance solid waste metals collected normally easily find instant buyers for welding in the informal market [*Jua Kali*]sector in Kenya. Recycling of a material would produce a fresh supply of the same material or other products. Conversion of organic solid wastes to energy does not take place in Eldoret despite success stories in other parts of Africa on Waste to energy (WTE) strategies using municipal solid wastes. According toOlaleye et al 2013, waste to energy strategies using municipal solid wastes in Nigeria is

viable and can be integrated into the waste management strategy while simultaneously producing energy and can reduce pollutant emissions in urban areas. Some of the policy questions and issues under consideration in this research include the following: Why do households recycle solid wastes in Kenya? Are there any household motivating factors that are important to policy makers? How do the Local Governments in Kenya consider recycling of wastes in Kenya? Are there any policies in Kenya that encourage or penalize recycling of wastes and what are the most successful policies? If recycling of solid wastes is good, what are the central and county governments of Kenya or National Environmental Management Authority [NEMA] doing about it? Some of the policy strategies that have been proved successful in Kenya and other parts of the world include but not limited to the following;

- Amount of *money assigned to goods containers* such as bottles, cartons, crates among others. This policy is used in Kenya's Coca Cola, Kenya Breweries companies among other beverage companies. Beverage containers for hard and soft drinks have an assigned figure varying from Ksh 10 to Ksh 20 depending on the size and type of beverage. This amount is refunded upon return of used bottle for recycling.
- *Pay as you throw* type of policy has also been known to encourage recycling. This is an amount assigned to certain goods refunded upon return for disposal by some designated company. For instance, tyre and battery bills in the US require a fee or deposit at the time of purchase to cover cost of disposal at the end of life of the tyre or battery.
- Government policy *to licence recycling facilities in* various counties in Kenya throughNational Environmental Management Authority [NEMA] is a point of concern in research with respect to the licence conditions, operation and monitoring.
- Plastic waste management in other nations involves the use of economic instruments such as taxes and levies. For instance, Ireland introduced a 15-euro cent levy or surcharge on plastic bags provided by shops. The results are a success in re use and recycling of plastics bags
- The key stakeholders in this research include but not limited to solid waste Vendors, City Councils and County Governments, Ministry of Public Health, National Environmental Management Authority [NEMA], Ministry of Environment and Natural Resources and other development and environment agents.

Literature Review

Factors Influencing Participation and Intensity of Solid Waste Recycling

Previous researches on wastes recycling have focussed on technical and management issues. Technical issues include controlling litter, odour, pests and meeting fire codes (Magnum, 1990). Other technical issues include colour, size, shape and location of recycling containers, Gruder-Adams, (1990). Educations, recycling knowledge and environmental attitudes have also been found to be related to environmentally responsible behaviour (Gruder-Adams, 1990). Attitude variables include pre-ecological attitudes, belief in

effectiveness of recycling and belief in seriousness in environmental problems. Resource recovery and recycling in developing countries are usually driven by forces different from those in the developed nations. Hines et al (1986) also confirmed that knowledge of action strategies has an influence on responsible environmental behaviour. Stacy M. L. (2003) studied factors affecting participation in recycling programs in state capitals of USA. Stacy M.L.[2 003], found that as property values such as homes and land increase, participation in solid wastes recycling programs tend to increase and that highest rates of participation are observed when economic incentives are involved. Results of this research indicated that there was a significant correlation between participation and median values of owned homes, percent renter occupied housing units, level of education and main type of recycling program. On the other hand, Oskamp (1995) observed that when recycling is made convenient, participation in solid wastes recycling tends to increase. In the developing countries the impetus is low opportunity cost of labour, low purchasing power and the scarcity of many raw materials.

A study by Afroz R. *et al* (2008) in Dhaka city, Bangladesh indicates that significant factors for household willingness to recycling wastes were age, education, attitudes toward recycling and knowledge about recycling. Shaufique *et al* (2010) studied the effect of income and demographic characteristics on solid wastes recycling rates in Minnesota, USA. Their results indicate that variable pricing of waste disposal increases the rate of solid waste disposal. They also found out that policy issues such as enactment of recycling ordinances and cumulative expenditures on recycling education significantly increase the rate of solid waste recycling in Minnesota, USA. According to Organization for Economic Co-operation and Development (OECD) 2013, households with higher incomes are more likely to dispose their solid wastes rather than recycle. These households also demand more collection services. The study also observes that the effect of income on solid waste recycling is inconclusive. However, it is believed that recycling among households tend to decrease as income increases for some materials, OECD (2013). This could be because as income rises, the opportunity cost of recycling solid wastes greatly increases. Jean-Daniel et *al (*2006) investigated factors that influence willingness to recycle electronic wastes in California, USA. Their research found out that gender, education, convenience, and environmental beliefs are the key factors that influence recycling of electronic wastes in California. Income and politics were found to be insignificant in influencing recycling of electronic wastes in California, USA.

Ashenafi Haile (2011) carried out a study in Ambo Town, Ethiopia on the determinants of effective household solid waste management. The study results indicated that gender, education, distance from main road, awareness and the access to solid waste collection services are the key determinants of effective household solid wastes management in Ambo Town, Ethiopia. Dickson Etengenen (2012) investigated Municipal Solid Waste Management in Grahamstown in the Republic in South Africa. The major findings of the study were that poor methods of waste disposal, inadequate public awareness and poor enforcement of waste management by-laws affected solid waste management in Grahamstown in South Africa. It was also noted that lack of incentives adversely affected recycling of wastes in Grahamstown in South Africa. Agnes Jonton Kamara (2006), investigated factors affecting household

participation in solid waste disposal and recycling in Tshwane Metropolitan area in the Republic of South Africa. The study found out that the distance from the Central Business District, household income, level of education and especially environmental Education affect household participation in domestic disposal and recycling. The Highest level of participation in solid waste disposal and recycling was observed in the Central Business District of Tshwane Metropolitan area in Waterkloof and Lynnwood and Participation decreases outwards to the suburbs in Mamelodi. Robin R. J. et al (2000) also investigated factors affecting solid waste recycling intensity in twenty metropolitan areas in USA. Specifically, he investigated the impact of two popular solid waste programs on the percent recycled of glass bottles, plastic bottles, aluminium, newspaper, and yard waste in the households. Results indicate that kerbside recycling has a significant and substantial positive effect on the percentage recycled of all the five materials. Unit price was found to be insignificant in influencing the level of solid waste recycling. Benefits of resource recovery are enormous. Cointreau (1982) notes that the resulting savings in energy from using recovered versus virgin materials as manufacturing feed stocks are estimated to exceed 1300 million KW of electricity or 14 million tons of coal. He further notes that wastes should be viewed as resources that are only out of place and some effort is therefore needed to put them to use. Sulo T.(2012) notes that there is need to strengthen existing enterprises that recycle Agricultural Solid Wastes so as to increase their scale of operation and demand for more of these raw materials in Eldoret Municipal Council, Kenya.

Choices of Household Solid Wastes Recycling Outlets

There are few studies today on the choices of solid wastes recycling outlets and preferences. Recycling of solid wastes in Africa have recently come into sharp focus mainly because concerned authorities are challenged and are considering alternative solid waste management strategies. Using a choice experiment method, Katia K. *et al* (2006) investigated household preferences for kerbside recycling services in London. The results of this study indicated that social, economic and attitudinal characteristics of respondents are important on the choice of recycling services in London. Specifically, households are keen on the number of "dry" materials collected, collection of compost, collection of textile and the frequency of collection when making a choice for kerbside recycling services in London. Othman J. (2012) also used a choice model and contigent valuation method to investigate willingness to pay for the different waste services in Malaysia. The results on Kerbside recycling was not conclusive. However, contigent valuation results show that households derive positive utility from the provision of different recycling facilities and compulsory Kerbside recycling.

Factors Motivating the Choice of Household Solid Waste Recycling Outlet

Multinomial Logit model

To determine the factors influencing the choice of household recycling outlet in Eldoret, a multinomial logit model was used. The choice of a given recycling outlet is discrete because it is chosen among other existing alternatives. Households in the

study area could participate in solid waste recycling in any of the following three categories.

- Onsite recycling at the household.
- Recycling through solid waste vendors / Hawkers.
- Recycling through agents / dealers in the buying centers'.

Assuming that P_{ij} represent the probability of choice of any given recycling outlet by the households, the equation representing this is given as.

$$P_{ij}=\beta_o+\beta_1 X_1+.....+\beta_k X_k+ e……………………………..(1)$$

Where i represent the choice of recycling outlet such that 1 = onsite recycling, 2 = recycling through vendors / hawkers and 3 = Recycling through agents / dealers. Xi are factors affecting choice of a recycling outlet and $\boldsymbol{\beta_i}$ are the parameters to be estimated and e is the error. The model estimates are used to determine the probability of choice of a recycling outlet given j factors affect the choice. With the three recycling outlets, the log odds ratio is given as:

$$\ln (P_{ij}/P_{ik}) = \mathcal{E} + \beta_1 X_1+\beta_2 X_2 + ……… + \beta_k X_k+ e…………....(2)$$

Where P_{ij} is the probability of the choice recycling outlet and P_{ik} is the alternative recycling outlet. In (P_{ij}/P_{ik}) is a natural log of probability of choice j relative to probability of choice k. $\mathcal{E}$ is a constant, $\boldsymbol{\beta_i}$ are parameter estimates and e is the error term. The independent variables include age, level of education, gender, household income, household size, distance to landfill, price of scrap metal, price of plastic wastes and frequency of waste collection by the local authorities. The dependent variable is polychotomous and is the household choices to recycle solid wastes. It includes, 1 = onsite recycling, 2 = recycling through vendors / hawkers and 3 = Recycling through agents / dealers. The table 1 here below shows the details of these variables under consideration in the multinomial logit model.

Factors Affecting the Choices of Solid Wastes Recycling Outlets
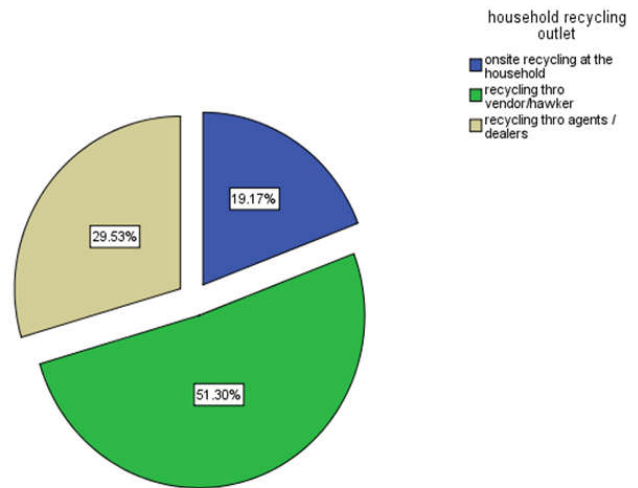
Multinomial Logit Model

Three key solid waste recycling outlets were observed at the household level in Eldoret. They include onsite recycling where household would put to use the different types of solid wastes such as scrap metals, plastic containers and paper wastes. Households also have alternative ways to participate in solid waste recycling through vendors / hawkers and through various agents and dealers who recycle solid wastes. Figure 9 here below show the common recycling outlets and it is noted that 51.3% of the household prefer recycling through vendors / hawkers who move from house to house in search of recyclable solid wastes materials. This is followed by recycling through agents or dealers at 29.53%. To investigate factors that motivate households to use the different recycling outlets preferred, a multinomial logit model was used. Recycling through vendors and hawkers in this analysis was used a base outcome. The output here below has two parts. It is labelled with the categories of the solid waste recycling Outlets outcome variable. They correspond to the following two equations below:

$$\ln(P(\text{onsite recycling})/ P(\text{vendors/hawkers})) = \beta_1 X_1+\beta_2 X_2 + ………+ \beta_k X_k ………………..(3)$$

$$\ln(P(\text{agents/dealers})/P(\text{vendor/hawkers})) = \beta_1 X_1+\beta_2 X_2 + ………+ \beta_k X_k………………………..(4)$$

Where $\boldsymbol{\beta_i}$'s are the regression coefficients.

The multinomial logit results in the table indicate that the frequency of collection of wastes by the local authority was negatively related and statistically significant at five (5) percent level of significance in influencing the choice of onsite recycling of solid wastes at the household.

Source: Field Survey, 2014

Figure 1. Common Household Recycling outlets

A one-unit increase in the variable, frequency of collection, is associated with a 0.68 decrease in the relative log odds of choosing onsite recycling as a household recycling outlet vs. choosing vendors /hawkers as a recycling outlet. The results also indicate that a one-unit increase in the variable frequency of collection is associated with a .0804 decrease in the relative log odds of choosing agents /dealers as an outlet to recycle solid wastes vs. choosing vendors /hawkers as a recycling outlet. These results are plausible considering the fact that as frequency of collection of wastes decreases in the residential areas, it is expected that the tendency of household onsite recycling increases. Further, the results also indicate that household income was negatively related and statistically significant at 5 percent level in influencing the choice to recycling solid wastes through solid wastes agents and dealers. The relative log odds of choosing to recycle solid wastes through solid wastes agents and dealers vs. choosing vendors /hawkers as a recycling outlet will decrease by 0.00014 following a one unit increase in the variable household income. Recycling through dealers and agents is likely to fetch better prices and more utility as compared to onsite recycling and recycling through the vendors / hawkers. Consequently as household income decreases, it is expected that households are more likely to choose a much better recycling outlet; recycling through dealers and agents. Results above also show that price of scrap metal and price of plastics are negatively related and statistically insignificant in the relative log odds of in choosing onsite recycling at the household vs. recycling through the vendors / hawkers.

Table 2. Multinomial Logit Results for the Choices of Solid Waste Recycling Outlets in Eldoret Town, Kenya

Solid Waste Recycling outlets	Coefficient	Robust standards errors	Z-statistic	P-value	Confidence interval	
1. Onsite Recycling						
Price of scrap metal	-0.012	0.035491	-0.35	0.727	-0.0819	0.057
Household size	0.00522	0.214	0.02	0.981	-0.414	0.425
Gender	.858	0.794	1.08	0.28	-0.698	2.415
Price of plastic waste	-.029	0.0570	-0.51	0.607	-0.141	0.0824
Distance to landfill	-0.0027	0.03919	-0.07	0.945	-0.0795	0.0740
Education	0.396	0.261	1.52	0.129	-0.1155	0.907
Age	-0.0466	0.042	-1.11	0.269	-0.1292	0.0360
Household Income	-0.0000803	0.00000454	-1.77	0.077	-0.00017	8.7e-06
Frequency of collection of wastes	-0.687	0.223	-3.08	0.002	-1.1249	-0.249
2. Recycling thro' vendors/hawkers	.................Base outcome..............					
3. Recycling thro' agent / dealers.						
Price of scrap metal	0.00786	0.055	0.14	0.887	-0.1006	0.11632
Household size	0.0916	0.1879	0.49	0.626	-0.2767	-0.4600
Gender	-1.1732	0.9809	-1.2	0.232	-3.0959	0.7493
Price of plastic waste	0.01209	0.0963	0.13	0.900	-0.1767	0.2009
Distance to landfill	0.0620	0.0590	1.05	0.293	-0.0536	0.1778
Education	0.1832	0.4462	0.41	0.681	-0.691	1.057
Age	0.005	-0.562	0.10	0.924	-0.104	0.1155
Household Income	-0.0001434	0.000618	-2.32	0.020	-0.0002645	-0.000022
Frequency of collection of wastes	- 0.0804	0.1984	-0.41	0.685	-0.4690	0.30840

Source: Field Survey, 2014

The same results also show that price of scrap metal and price of plastics are positively related and statistically insignificant in the relative log odds of in choosing recycling through agents and dealers at the household vs. recycling through the vendors / hawkers.. These results suggest that as prices of scrap metal and price of plastics decrease, household would rather choose onsite recycling as a recycling outlet than to choose recycling through the vendors / hawkers. These results also suggest that as prices increase, households would rather choose recycling of solid waste through dealers and agents as a recycling outlet than to recycling through the vendors / hawkers. Dealers and agents are likely to pay much better than the Vendors / Hawkers. The results also indicate that the distance to landfill is positively related and insignificant in the relative log odds of choosing recycling through agents and dealers at the household vs. recycling through the vendors / hawkers. The same distance to the landfill is also negatively related and insignificant in the relative log odds of choosing onsite recycling at the household vs. recycling through the vendors / hawkers. These results are plausible considering the fact that some residential areas are far and inaccessible to the local authorities and companies contracted to collect wastes. Consequently as the distance increases, more valuable solid wastes may be available and households are likely to choose recycling through agents and dealers at the household vs. recycling through the vendors / hawkers.

Factors affecting household recycling and intensity of solid waste recycling in Eldoret Town, Kenya

Heckman two stage model: The Heckman two stage model results generated by the selection equation model and the outcome equation model are shown in table *3b* and table *3a* here below at 10% levels of significance.

Selection equation model: The selection equation model provides results for the first stage of the Heckman model with household recycling decision as the dependent variable. The model was specified as $Yi = \alpha + \beta^1 x_1 + \beta^2 x_2 + \beta^3 x_3 + \beta^4 x_4 + \beta^5 x_5 + \beta^6 x_6 + \beta^7 x_7 + \beta^8 x_8 + \ldots + e$. Where $Yi = 1$ for households decision to recycle and $Yi = 0$ for households decision not to recycle solid wastes. $x_1 = $ age of household

head, $x_2 = $ gender of Household head, $x_3 = $ level of education of the respondents, $x_4 = $ occupation of the household head, $x_5 = $ household income, $x_6 = $ household size, $x_7 = $ amount solid wastes collected by the local authority, $x_8 = $ frequency of collection of the solid wastes by the local authorities, $x_9 = $ attitude of households towards solid waste recycling, $x_{10} = $ Recycling awareness, $x_{11} = $ cost of rental payments. In a nutshell, the results indicate that variable 1 (age of household head) is statistically significant and positively influences the decision of households to recycle at 5% level of significance. The results also show that gender of the respondent is also statistically significant and influences the decision of households to recycle at 10 % level of significance. Household recycling tends to increase with female headed households. Household income and household size and the cost of rental payments per month were found to be statistically significant at 10% level of significance and negatively influence the decision by households to recycle solid wastes. As households' income increase, the tendency to recycle solid wastes by households decreases. It is also observed that as the cost of rental payments increase, households tend to switch away from recycling solid wastes as a source of livelihood to other sources of income. Results also indicate that the attitude towards recycling solid wastes for a living was statistically significant at 5 % level of significance and positively influences the important decision by households as to whether to recycle solid wastes or not. Based on these results, households that recycle solid wastes strongly disagree with the idea that recycling solid wastes as a source of livelihood is an indecent business. The level of education and type of occupation were found to be statistically insignificant at 10% level of significance, though positively correlated with the decision by households to recycle solid wastes. The amount of solid wastes collected by local authority for disposal and frequency of collection of solid wastes per week by the local authority were found to be statistically insignificant at 10 % level of significance and negatively correlated with the decision by households to recycle solid wastes. This sounds plausible because as more solid wastes are picked up for disposal, the decision by households to recycle solid waste recycling awareness was also found to be statistically insignificant at

10% level of significance, though positively correlated with the decision by households to recycle.

Conclusions

This researched aimed at investigating factors influencing urban households decision to participate in solid waste recycling [trade] and the intensity of trading urban solid wastes through recycling using a two stage Heckman Model. This research reveals that an upcoming market for solid wastes at the household level has developed in Kenya and that households can easily get a market for some of the solid wastes that they generate in the buying centres' / dealers. The solid waste vendors also frequently visit households to buy different types of solid wastes. It was also concluded that different solid wastes have prices varying from household to household and from location to location within the same region. This suggests that the market for the different types of solid wastes is still underdeveloped. Results from survey also indicate that some household give out their solid wastes for free without asking for any money from the vendors whereas other households not only sell at the door step but also transport to neighboring buying centers / dealers. Solid waste pickers (*scavengers*) were also found to play a significant role in household recycling in Eldoret, Kenya. Ninety two percent (92%) of the respondents indicate that solid waste scavengers forage through their waste bins frequently to collect different types of solid wastes mainly for sale in the local markets in the neighborhoods. Urban households sampled in the study area expressed animosity and suspicion towards these solid wastes scavengers mainly due to vandalism and other illegal vices in their desperate search for valuable solid wastes. Solid waste dealers in the buying centers and the vendors other the other hand equally expressed deep dissatisfaction from the local authorities due to stringent measures to acquire a permit so as to operate in solid waste especially scrap metal business. The study found out that some dealers operated without license in UasinGishu County. At some point, scrap metal business was banned in Nairobi County mainly due to vandalism. Other challenges observed include inadequate market information among urban households and most other stakeholders. Further, banning of recycling some solid wastes in other counties complicates pricing of various solid wastes all over the country. This situation creates risk and uncertainty in dealing in these solid wastes and unfavorable price fluctuation.

Actionable Policy Recommendations

- This study found out that there are too many Small and Microenterprises (SME) fumbling in the dark with socioeconomic, political and legal challenges associated with recycling of solid wastes in Kenya. With the onset of devolution of Government functions in Kenya, there is need for County Governments and other stakeholders to develop *a policy framework that will support small and microenterprises dealing in recycling of specific solid wastes*. There is need to provide an enabling environment by reducing the licensing fees, avail adequate market information and eliminate too many procedures in acquiring permits to recycle various solid wastes.
- This study found out that there is a high level of onsite recycling going on among urban households. This strongly suggests that there are too many solid wastes that can still be taken back to various factories / industry for re-use as long as there is an appropriate policy is in place. *The policy that assigns an amount of money for every waste bottles, cartons, tyres, crates, plastic cans and bags that are returned to the factory or to the shopping stores / supermarkets*can have a great impact in stimulating recycling of solid wastes.
- This study also observed that solid wastes mixed up and messy is a challenge to recycling in the study area. To encourage recycling, county governments and other stakeholders should consider adopting *a policy on separation and standardization* of solid wastes.
- Based on the multinomial logit results, distance from the landfill and frequency of collection of solid wastes greatly influences household choice of recycling outlets. It is *therefore recommended that small and Microenterprises dealing solid waste recycling be encouraged in urban areas distant from landfills and with low frequencies solid wastes collection* by the local authorities.
- Based on the Heckman Selection model Results, awareness was found to be insignificant in decision making to participate in solid wastes recycling. A policy that boosts the level of awareness on solid waste recycling in Kenya through taxes and levies on plastic bags cans among others provided in shopping stores. *A policy surcharge for every recyclable item can encourage recycling* in Kenya.

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