

FACTORS INFLUENCING HOUSEHOLD SOLID WASTE MANAGEMENT IN URBAN NYERI MUNICIPALITY, KENYA

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<http://dx.doi.org/10.4314/ejesm.v6i3.8>

Received 30th January 2013; accepted 12th April 2013

Abstract

The main objective of this study was to determine factors that influence household solid waste management practices in urban Nyeri Municipality. Descriptive cross-sectional household survey was conducted in June, 2011. Households were randomly selected in all four urban sub-locations of the Municipality; 313 households were selected across formal and informal estates. A questionnaire was used to collect quantitative data. Training of interviewers was done and the instrument was pre-tested. Data was collected from households through interviews and further information was collected through key informant interviews and focus group discussions. Respondents were household heads. The proposal was approved by the Great Lakes University of Kisumu and the National Council for Science and Research. Informed consent from respondents was obtained before interview. Results from the survey showed that 26.2% of households practiced correct methods of household solid waste management. The percentage of households where separation of solid waste was practiced was 24.6%; the 75.4% incorrect practice was associated with carelessness, socialization style and long distances to the nearest garbage chamber. The common correct methods of solid waste management were: use of a self-provided bin for storage, use of garbage chamber, compost pit and kerbside services for household disposal.

Key words: Household, solid waste management, household head, settlement, urban.

Introduction

Households' practices in solid waste management have a critical effect on the overall health and environmental impact. The public health problems of concern with household solid waste are aesthetics and disease; effects of generation and handling of the wastes documents the problems to be worldwide. Waste is substances or objects which are disposed off or are intended to be disposed of by the generator. These wastes are normally solid in nature and are discarded as useless or unwanted. They are further categorized as non-hazardous and hazardous, which can be biodegradable or non-biodegradable. Non-hazardous waste is mainly biodegradable in nature and includes waste such as household food waste, animal and farm wastes. It is a common sight of litter and indiscriminate dumped piles of domestic waste within the estates of Urban Nyeri Municipality. According to the Municipal Council Public Health Officer, household wastes account for about 80% of the Nyeri Municipality solid waste. Organic domestic wastes pose serious health hazards to the residents by creating conditions favourable to the survival and growth

of vermin and other microbial pathogens when they ferment. This phenomenon is worsened by the study area's climate that promotes moist surfaces and especially humidity in the solid waste; worsening further during rainy seasons.

The vermin population increases during rainy seasons. This exposure has direct bearing on health and welfare of household members (KDHS 2008-2009). Unstructured observation by the researcher while doing home visits with nursing students revealed that at least three out of five homes were unkempt; solid waste littered the homesteads and estates. The aim of this study was to determine factors influencing household solid waste management in urban Nyeri Municipality.

The specific objectives were: to assess demographic factors that influence household solid waste management in Urban Nyeri Municipality; to identify socio-economic factors that influence household solid waste management; to establish the type of solid waste disposal methods households in Urban Nyeri Municipality use; to identify knowledge and attitudes that influence household solid waste management in Urban Nyeri Municipality.

Methodology

Description of Study Area

This research was confined to household solid wastes in the urban Nyeri Municipality. The study was carried out in Nyeri municipality Division, Mukaro location of Nyeri County; concentrating on the urban sub-locations.

Nyeri County is situated 150 kilometres north of Kenya's capital Nairobi. It is the country's densely populated and fertile central highlands; lying between the eastern base of Aberdare (Nyandarua) range, which forms part of the eastern end of the Great Rift Valley, and the Western slopes of Mount Kenya. The minimum temperature is 12°C and a mean maximum of 27°C. Annual rainfall varies from 600mm to 1500mm. during short rains and 1200mm to 1600mm during the long rains. The rainfall is influenced by Mt. Kenya and The Aberdare range. This climate promotes moist surfaces and especially humidity in the solid waste encourages fly breeding and other vermin in the unattended dumped solid waste; with the situation worsening during rainy seasons.

Experimental Design and Data Collection

The study was a cross-sectional descriptive survey study which used survey design in which both quantitative and qualitative methods of data collection were used. The questionnaire method was used because it made it easy to reach and interview the respondents in the 313 sampled households in Urban Nyeri Municipality. The study covered the four urban sub-locations in the location namely, Majengo, Kamakwa, Ruringu and Kiganjo. The sampling unit was households in urban Nyeri Municipality. The main respondents were household heads (a person who was 18 years and above and was either a father or mother or any significant other present in the household during the survey). A two stage sampling technique of probability random sampling was used; population proportionate to size and simple random. Each sublocation has major roads that were used as boundaries to mark and access the households in villages/ estates. To get the number of households in each estate, again proportionate sampling method was used. The data was collected in a day, to ensure quality data was obtained, the supervisors ensured the questionnaires were completed fully before enumerators left the field.

The qualitative data was collected using key informant interviews and three homogenous focus group discussions; two females and one male. Structured observation method was also used to assess the general cleanliness of the estates and houses.

Data Analysis

After data collection, cleaning was done both at the field and centrally and entry was done. Descriptive and inferential statistics were used for data analysis using statistical package for social sciences (SPSS) version 16.0.

Results

Generally the households under study in both formal and informal settlement were headed by men (74.1%) who instead preferred their spouses to be respondents. The literacy level was high; the percentage of the respondents who could not read and write was 1%. The results indicated that respondents with the higher levels of education did not practice correct solid waste management. The correct household solid waste management methods in this study constituted: separation, storage in a receptor, deposit into a compost pit, garbage chamber and use of kerbside collection services. The incorrect methods were: no separation, no storage in a receptor, no deposit into a compost pit, garbage chamber or use of kerbside collection services. A small percentage (24.6%) of the households practiced solid waste separation before they temporarily stored for disposal (primary storage).

The females (26.7%) practiced the separation more than their male counterparts (17.1%). Inferential statistics indicated that separation of solid waste was not significantly related to household solid waste management. However this practice needs to be encouraged. Table 1 shows respondents' solid waste separation practice in relation to gender.

Household Solid Waste Storage Facilities

The common facility for storage was the self-provided bin; the results are illustrated in Figure 1 below.

Household SW Disposal Methods

On average 53.3% of the households deposited their waste into a garbage chamber and compost pit. When asked for reasons of choosing their preferred methods, the respondents gave two major reasons: convenience (47.9%) and

availability (28.4%). The estate with highest number of garbage chambers and utilizers was King'ong'o; this estate is in the upmarket area of the Municipality. Inferential results indicated that use of garbage chamber was significantly related to correct methods of solid waste management by households. Figure 2 indicates the solid waste management methods in general.

Correct Household Solid Waste Disposal Methods

The study findings showed that 26.2 % households in the study population practiced correct solid waste management. The considered correct methods of household solid waste disposal methods in this study were: separation, having a receptor for storage, depositing into a compost pit/garbage chamber or using kerbside collection services. The commonest method used was garbage chamber. Table 2 illustrates the utilization of garbage chamber in relation to estates.

The study further established that that 58.8% of households live more than 40 metres away from the nearest garbage chamber. The recommended distance is 30 metres from the house (UNEP 2009). This was said to be a contributing factor to incorrect household solid waste management in the urban Municipality. Burning and burying methods of solid waste management should be discouraged due to related health effects on both human and environment. Burning produces chlorinated organic chemicals (dioxins) which are carcinogenic while burying produces methane gas which are harmful to human health.

Respondent's Value of Solids Waste.

This study established that on average the residents of urban Nyeri Municipality considered household solid waste to have no value. Responses to how respondents value of solid waste are as indicated in figure 3.

Further, the residents need to be encouraged to reduce, re-use and recycle of solid waste. This can be done in form of health promotion messages on how solid waste can be turned into useful utilization safely.

Knowledge on Hazards Related To Incorrect Solid Waste Disposal

The study also established that the respondents had good knowledge on hazards related to incorrect solid waste disposal (94%), but was in discrepancy with correct practice (26.2%). The common known hazards by respondents were

pollution (31%) and disease (29.1%). The low percentage of correct practice as reported by respondents was related to factors such as carelessness, landlords leaving no space for household solid waste deposit and a culture which considers dirt as not an issue to worry about.

Discussion

Demographic Factors

The study indicated that 74.1% of household heads were males, however more females (77.6%) responded to the questionnaire than males (22.4%). The males who were present at the time of the survey preferred their spouses to respond with a common reason that their spouses were better at household solid waste management matters. This signified that women in urban Nyeri Municipality play a central role in controlling the management of household solid waste. These findings tally with those of (Tadesse and Hadgu, 2007) whose study on household waste disposal in Mekelle City Ethiopia established that household solid waste management was left to women and girls.

This study further identified disparities between knowledge and practice. A majority of the respondents; 94.2% were aware of health hazards brought about by incorrect solid waste management yet only 26.2% practiced correct management methods. Also the respondents' level of literacy was high only 1% of the respondents did not have any formal education. The results indicated that formal education, and in particular higher levels did not positively influence the practice of correct household solid waste management. The percentage that practiced correct methods of solid waste management was (26.2%).

Socio-Economic Factors

The mode of gross household income was Kshs 600- 25000; the higher earners of above Kshs 50,000 were commonly found in the upmarket estates of King'ong'o and St. Jude. This suggests that economic factors are determinants of one's residence and subsequently accessibility to better facilities of household solid waste management such as garbage chambers and curbside garbage collection. The household solid waste management was significantly associated to monthly gross income. The households who earned below Kshs 6000 were common in Majengo and Ngangarithi estates; Majengo is a slum area of the

Municipality. The correct solid waste management was shown to be better with a gross income of above Kshs (6000).

Household Factors

Households in the urban Municipality were generally small in size; a mean of three (3) persons per household. This could be associated with urban lifestyle men leave their spouses in the rural areas and work in urban areas where the cost of living is high. On average 58.8% of households live more than 40 metres away from the nearest garbage chamber. The recommended distance is 30 metres from the house (UNEP 2009); this was one of contributing factors to incorrect household solid waste management. This finding is similar to a study which was done in Ethiopia by Tadesse (2006). The study found out that long distances from households to garbage chambers encouraged residents resort to dumping their waste on the nearby roads and in open spaces. On average spouses of household heads were the ones who carried the generated household solid waste to the designated disposal point (52.1 %); in the study, these were females while 35.5% were males.

Methods of Solid Waste Management

The study established that only 26.2% of the households practised correct methods of solid waste management. A small percentage practised separation of the solid waste they generated into categories before primary storage (24.6). Separation of solid waste by generators is a regulation (Nema 2007) which when followed makes it easy to manage and utilize the waste in a profitable manner. The finding tally with a study by Mugisho (2009) in Uganda which established that solid waste separation was not a common household practise.

The study also established that households across the estates stored the generated solid waste in some form of receptor before disposal. The commonly used receptor was the self-provided bins (63.5%). The findings on the use of bins as major storage facilities are similar to those of Afullo and Odhiambo, (2009) in their study in Nairobi which established that (60%) of households stored the generated solid waste in plastic bins. The results further established that the commonest households' solid waste disposal methods were deposit into the garbage chamber (53%) and compost pit (33.2%).The estate with the highest utilization of the garbage chamber was

King'ong'o (87.5%). A small percentage (2.2%) had the kerbside Collection system; this was in two upmarket estates namely Pembe Tatu and Ruring'u Central. Previous studies elsewhere have shown that households do not deposit all their solid waste into the designated deposit points; Afullo and Odhiambo (2009), Nairobi. According to the results depositing in an empty space was on average common in Kiganjo town estate (40%). Burying was practiced more by households in Majengo estate while burning was practiced in all states except Police College Kiganjo.

Knowledge, Attitude and Practice

The results indicated that majority of the respondents were aware about the health hazards associated with incorrect solid waste management (94.2%).The level of awareness was high in all the estates. However there was a discrepancy between knowledge and correct practice, only 26.2% of households practiced correct methods of solid waste disposal (separated, stored into a receptor, deposited into a garbage chamber/compost pit or used kerbside services). Some of the reasons given for incorrect practice were carelessness and socialization, one participant in the women focus group discussion had this to say. *"Household solid waste management in this area is the work of women; so culture dictates; however women find themselves busy with other priorities making it difficult to attend adequately to hygiene matters and again we tend to practise what we saw our mothers do; the socialization was such that dirt was not a big issue"*.

Conclusion and Recommendation

Results from this research provided some background information on household solid waste management in urban Nyeri Municipality. Overall the respondents had good knowledge on health hazards associated with incorrect solid waste management and were also aware about the polluter pays law but the practice of correct solid waste management was low; only 26.2% households practiced correct methods of solid waste management. This level of Incorrect solid waste management poses health and environmental problems in urban Nyeri In order to improve this situations household solid waste management options that involves the residents in the planning process has to be implemented. The respondents suggested that health promotion

messages on proper handling of household solid waste be done repeatedly, for example every three-month until correct standards of practice are achieved. Secondly the polluter pays fine is implemented aggressively; if done it will force the polluters to do what is correct because of frequent fine payments.

Acknowledgement

The author is grateful to Dr. Afullo Augustine for his supervisory role and mentoring; Mr Shadrack Oyes who took time and interest to guide me through all the steps and Dr. Beatrice Mugendi for critiquing the manuscript.

Table 1 Solid Waste Separation by Gender

Gender		Do you separate the solid waste before disposal?			df	p-value
		Yes	No			
Male	% within Gender	17.1%	82.9%	1	0.100	
Female	% within Gender	26.7%	73.3%			

Table 2 Deposit of Solid Waste into a garbage chamber by Household.

Deposit of HH Solid Waste Into a garbage chamber		Yes	No	df	p-value
Estate				1	0.002
	% within Estate	57.7%	42.3%		
Majengo	% within Estate	87.5%	12.5%		
King'ong'o	% within Estate	.0%	100.0%		
Nganarithi	% within Estate	51.7%	48.3%		
Kamakwa	% within Estate	56.5%	43.5%		
St. Jude	% within Estate	76.7%	23.3%		
Ruring'u Central	% within Estate	.0%	100.0%		
Kiganjo Town	% within Estate	50.0%	50.0%		
Police College	% within Estate	53.0%	47.0%		
Total	% within Estate				

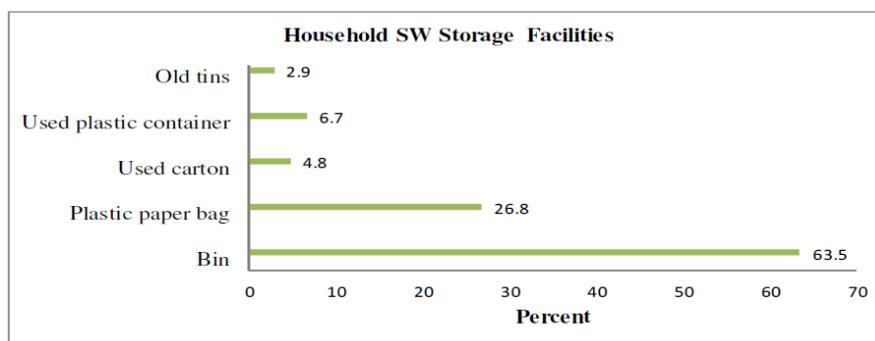


Figure 1 Type of household storage facilities for the solid waste generated

