



ORION
SCHOLAR JOURNALS

International Journal of Scientific Research Updates

Journal homepage: <https://orionjournals.com/ijrsu/>

ISSN: 2783-0160 (Online)



(RESEARCH ARTICLE)



Factors influencing generation of domestic solid wastes in Kisii Town, Kenya

Naftal Omonywa Mecheo *

PhD Fellow, Environmental Governance and Management; University of Nairobi Kenya.

International Journal of Scientific Research Updates, 2022, 04(01), 322–328

Publication history: Received on 22 July 2022; revised on 07 September 2022; accepted on 09 September 2022

Article DOI: <https://doi.org/10.53430/ijrsu.2022.4.1.0057>

Abstract

Domestic solid waste management (DSW) has been a critical problem in many urban centres in developing countries, including in middle sized towns. This paper investigates the factors influencing the generation of domestic solid waste in residential estates of Kisii town. The specific objective of the study included: to investigate the factors influencing the generation of DSW in residential estates in Kisii town. A mixed methodology approach was taken into consideration. A data sample of 110 households was obtained using the multi stage stratified sampling method from a target population of 20,000 households. Data collection methods of the sampled size involved the use of questionnaires to the householders and direct interviews to county officers in charge of DSW and observation integrated with photography. Data analysis was carried out using methods such as use of tables, use of graphs through SPSS, and other descriptive statistics such as the use of the measures of central tendency were taken into consideration. The results found that various factors including the size of the family 83.7% and the level of income 9.7% influenced the generation of domestic solid waste in the residential areas. In conclusion various factors influence the generation of DSW and the major one is family size. It is therefore recommended that, residents should be sensitized to purchase and cook what they can consume to reduce the excesses which surmount to DSW especially food remains.

Keywords: Factors; Influencing; Generation; Domestic waste; Kisii town; Kenya

1 Introduction

Solid waste is produced in all residential areas with human inhabitation. The management of the waste thus has become a critical problem to different counties and towns especially in developing countries (1). Domestic solid waste management in middle-sized towns such as Kisii has become a vital problem to local authorities and municipal authorities especially in developing countries. Consequently, (10) observed that the impact of solid wastes in urban environments has become more and more intractable. For example it's estimated that more than 5 million people die annually in urban areas worldwide from diseases related to inadequate waste management systems (11).

The quantities and characteristics of domestic solid waste are on the increase resulting from increase in the population. This has resulted in varying quantities of domestic solid waste and varying characteristics depending on the following factors: the average level of income of the household, the sources of the waste, re- use not taking place, the population's social behavior, climate of the area and the industrial production and the market for the waste materials. Also, (1) argue that increasing population, changing consumption patterns, economic development, changing income; urbanization and industrialization result in increased generation of waste.

These factors have caused variations in the quantities and types of domestic solid waste generated in different parts of towns thus causing the need to manage the solid waste in the towns (3). This study sought to identify the particular factors that influence the generation of DSW in middle sized town the case study of Kisii town. This is there is less

* Corresponding author: Mecheo O Naftal
PhD Fellow, Environmental Governance and Management; University of Nairobi Kenya.

industrialization and urbanization in such towns unlike developed large towns/cities whose factors have been identified in previous studies (7). Therefore, the factors influencing generation of DSW varies from town to another depending on the level of development of the town since the towns are not in the same level of development in developing countries.

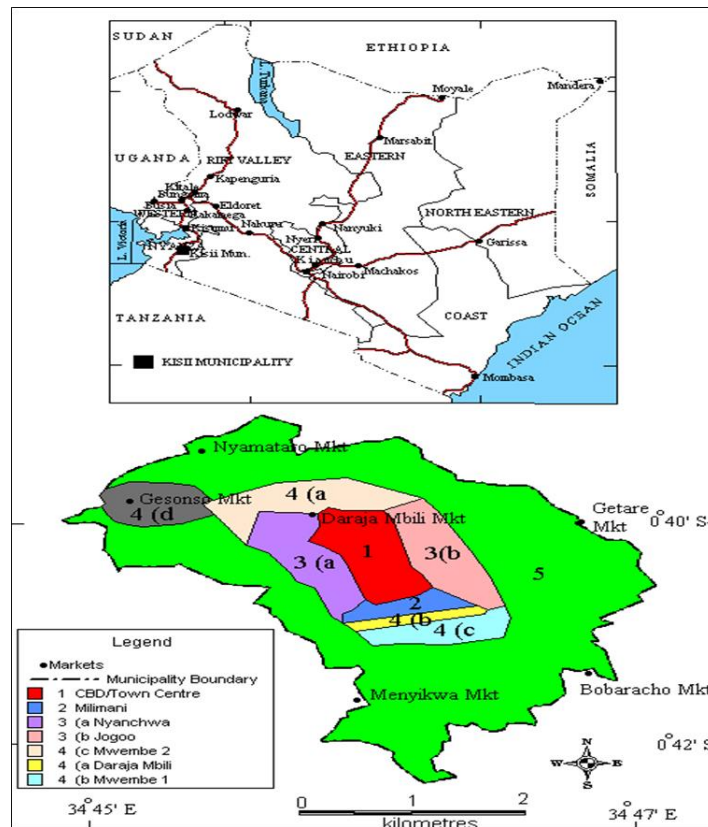
Therefore, this study sought to establish the factors that influence the generation of DSW in Kisii town being a middle sized town where not all the investigated factors above apply. The study also sought to evaluate the specific factors attributed to Kisii town and their variance between the different estates represented in the town.

2 Methodology

2.1 The study area

Kisii town is geographically located on Latitude: 0° 41' 0 S and Longitude: 34° 46' 0 E. The town is a driving distance of 309 km (192 mi) from Kenya's capital city of Nairobi, located east-southeast, on Class B3 all-weather road. Other major urban Centre's proximity distances from Kisii town are; Kisumu City which is 114 km (71 mi) to the northwest, Nyamira at 23 km (14 mi) to the immediate north; Keroka at 25 km (16 mi) to the east; Kericho at 101 km (63 mi) to the northeast, Kilgoris at 46 km (29 mi) to the southeast; Narok at 165 km (103 mi) to the east, and Migori to the south-west 67 km (42 mi) which otherwise connects the town to the Kenya /Tanzania border at Isebania town located a further 31 km (19 mi) south.

Figure 1 A map showing location of Kisii town in Kenya and its various estates.



Source: Kisii Topographical Sheet 130/2 G.O.K (5).

Figure 1 Map of Kisii Municipality

It lies at an altitude of 1,700 m (5,577 ft) above sea level on the slopes of Kisii highlands. Kisii town is the county headquarters of Kisii County in the Nyanza region western Kenya. The town covers 8 km² (3 sq mi) and it has recently expanded rapidly to cover a peripheral extent of 29 km² (11 sq mi), a total of 37 km² (14 sq mi). Kisii receives frequent convectional rains and enjoys a highland climate. The location of Kisii town on the highlands facilitates the growth of a vast vegetation cover making the region produce a lot of food crops and vegetation which form the large part of the domestic solid waste generated in the varied residential areas of the town. The rapid expansion of the town has resulted

in the creation of more residential estates such as Ufanisi, Getare, Milimani and Nyanchwa which have enhanced the stratification of the residential areas and also contribute tremendously to the generation of domestic solid waste putting pressure to the existing solid waste management systems.

2.2 Research Design

For the study to meet the set objectives, the researcher took into consideration a household descriptive survey design, which covered selected residential estates within Kisii town. Kisii town has been chosen as one of the rapidly growing county headquarters in Kenya.

In order to carry out the design effectively, the researcher recognizes the need to classify the town's residential areas into distinct environmental neighborhoods according to income levels of the residents. This catered for differential respondents' perceptions and activities on the research subject. Therefore, this entailed the division of the area into different major zones of residential/environmental areas using the multi-stage sampling method (8).

The researcher issued questionnaires to the residents in the sampled estates in Kisii town and in depth interviews were conducted to county officers in charge of public health, town planning, refuse collection and environmental management with a view to making the survey design in depth in its findings. This facilitated investigations into the role played by the county in household solid waste management in Kisii town. The officers that interviewed were randomly picked from different county and municipal departments especially the public health office in charge of solid waste management in the town to minimize cases of biases on the responses and improve on the level of accuracy of the information.

2.3 Study population/ Sampling criteria

Kisii town has more than 20,000 households in all estates currently (6). Using the multi-stage sampling three estates were chosen by dividing the entire study area into different major residential areas based on the environmental indicators as the structures of the existing households; the assumed level of income and the prevailing environmental conditions (8).

Consequently, the residential zones were stratified as high income residential (HIR), middle income residential zones (MIR), and low-income residential zones (LIR) (6). This was done in collaboration with the county and municipal authorities who helped in this classification since their determination was more precise. This facilitated the selection of the households that were interviewed. The household population in the three estates is not uniform such that Nyanchwa, Jogoo and Mwembe have more than 300, 600 and 800 households respectively.

From the three residential classifications, estates were selected through stratified sampling criteria from the existing estates namely: Menyinkwa, Gekomu, Nyanchwa, Jogoo, Mwembe, Campus, Gesonso, Daraja Mbili, Nyamataro, Bonubi, Egesa, Bochura, Omosocho, Milimani and Getare among others. The table below shows the selection of the estates according to the income levels.

Table 1 Sampled estates in Kisii town

Low Income Residential Estates	Middle Income Residential Estates	High Income Residential Estates
Mwembe	Menyinkwa	Milimani
Daraja Mbili	Jogoo	Nyamataro
Bonubi	Gekomu	Nyanchwa
Bochura	Getare	Gensonso
	Egesa	
	Omosocho	
	Campus	

★ Sampled Estate.

Different number of households were systematically selected after a K^{th} household has been randomly selected based on each estate’s total number of households according to the county statistics which were provided by the county and town administration statistics department.

Figure 2 A map showing the sampled estates (7).

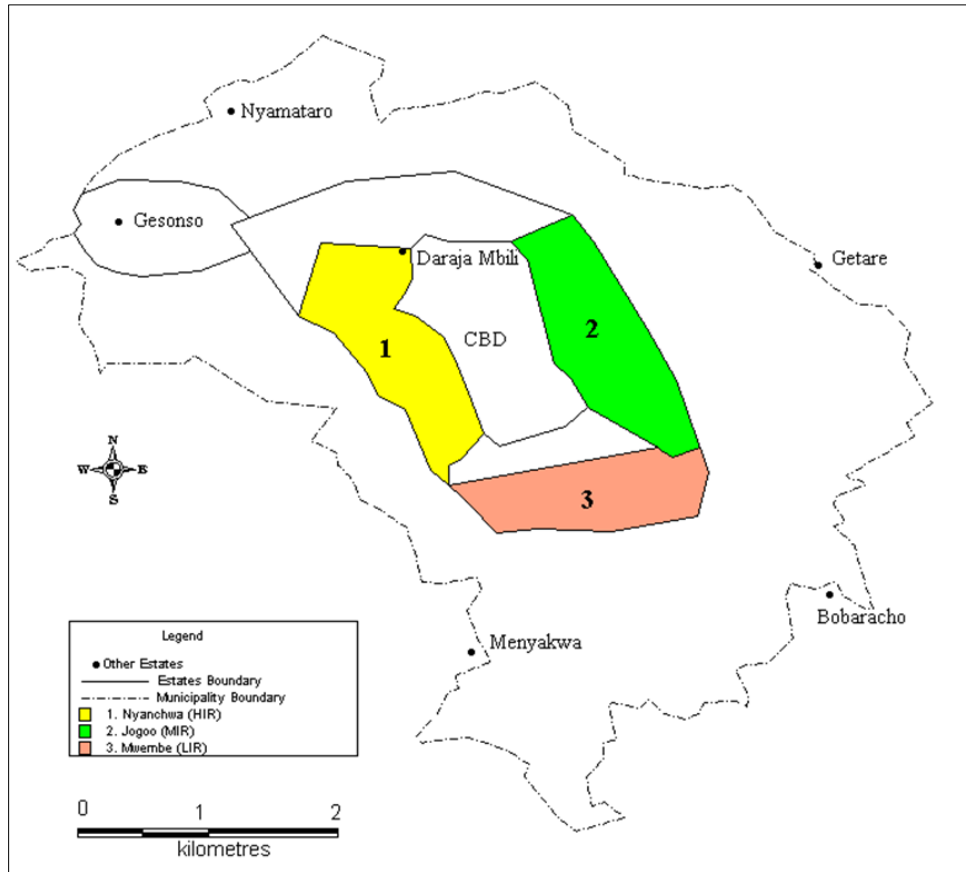


Figure 2 Map of Kisii Municipality showing the three sampled Estates

2.4 Sampling procedure

The sampling procedure used by the researcher largely depended on the research design. Whereby, questionnaires were issued to the residents in the identified areas and estates, also interviews targeted Kisii county staff as in depth informants.

The sample size was 110. This was calculated according to Yamane’s (12) formula $n = N / (1 + N(e)^2)$,

Where n- is the required sample size

N- is the population size

e- is the error margin

In this case N was 1700 and e was 0.09

$$\text{Hence } n = 1700 / (1 + 1700(0.09)^2) \quad n = 110$$

The sample size of 110 made up 6.5% of the households of the sampled estates. The sample size was differentiated in the sampled Mwembe, Jogoo and Nyanchwa estates based on the 7% according to the stratified method.

Table 2 Sampling procedure of the questionnaires used

Estate Class	Estate Name	Target household population	Sample size
LIR	Mwembe	800 *0.65	52
MIR	Jogoo	600*0.65	39
HIR	Nyanchwa	300*0.65	19
TOTAL		1700*0.65	110

2.5 Methods of data collection

Both primary and secondary data collection methods were employed for the research study. Primary methods of data collection used involved the collection of raw data from the field. Questionnaires, interviews, measurement, use of photographs and direct observation were used ⁽⁶⁾.

The use of multiple techniques was aimed at ensuring that accurate and reliable data was collected. Since the major consideration in the research was to obtain data; that would allow accurate descriptions of situations or relationships between certain variables, information adequacy and efficiency (8). The reliance on multiple data techniques usually provides better results.

Questionnaires were the preferred data collection tool since they gave a close analysis of research objectives, research questions and the research hypotheses. A questionnaire covering a wide range of issues on household solid waste management was administered to respondents at household level as shown in appendix I, and another to the county/ municipal authorities as shown in appendix II. Babbie (2).

2.6 Data Analysis

After data had been collected, the raw data was systematically organized through coding to facilitate analysis. This was done by converting data to numerical codes representing attributed or measurements of variables. Statistical Package for Social Sciences (SPSS) program was used as an analytical tool to produce the result required for the interpretation. However, some data obtained from interview schedules, observation and photographs were presented directly. Various inferences were made from the analysis for the purposes of verifying and testing to confirm the research question.

In analyzing the data, descriptive and inferential statistics were employed, where the measure of central tendency such as mean was used to summarize the scores of variables of solid waste generated in the varied residential estates, percentages were also used to gauge the proportions of waste generated and the responses given.

2.7 Methods of data presentation

The data was presented using tables, figures, photographs and calculated percentages and frequencies/means. The data was also presented by means of discussions and explanations of the study finding so as to make valid conclusions.

3 Results and discussion

3.1 Factors that influence the generation of DSW in Kisii town

The key contributing factors for the quantity of DSW generated per day in the households include: the family size, level of income of the household, and whether re-use is taking place. In LIR the major contributing factor is the size of the family where 86% of the respondents cited the family size as the main contributing factor influencing the generation of DSW in their estate, 9.7% cited re-use not taking place as the factor influencing the generation of DSW and 4.3% of the residents in LIR cited the level of income of the households as a contributing factor to their generation of DSW.

In MIR 75.1% of the respondents cited the family size as the contributing factor that influence the generation of DSW, 21.7% highlighted re-use not taking place and 3.2% attributed the level of income as the contributing factor that influence their generation of DSW.

In HIR also, the family size was the major attribute influencing the generation of DSW at 53.8%, closely followed by the income levels of the households at 38.6% and the least factor that influence the generation of DSW in the HIR was re-use not taking place at 7.6%. Table 3 summarizes the factors that influence the generation of DSW in Kisii town.

Table 3 Factors that Influence the Generation of DSW in Kisii Town

Factor	% in HIR	% in MIR	% in LIR
Family size	53.8	75.1	86.0
Income levels	38.6	3.2	4.3
Re-use not taking place	7.6	21.7	9.7
Total	100	100	100

Source: Field Survey by Author (2015)

The disparity in types of wastes generated in the low income, middle income and high income residential areas is mainly attributed to level of education of the residents, the family sizes, the level of income of the residents and re-use not taking place. Technological advancement also plays a role in the generation of different types of wastes. For instance, the HIR areas such as Nyanchwa has low generation of food remains due to the use of refrigerators which preserve food, and use of microwaves, minimizing the food wastes unlike the residents of Jogoo and Mwembe.

The following factors according to the interviews were identified to influence generation of DSW: Lack of initiative by the county to provide sensitization/create public awareness to educate the residents on proper waste management policies/methods, laziness of the workers who don't do their work effectively such as leaving behind some waste during collection which become wastes generated for another day, wastes falling off while being transported, a rapidly increasing population in the town thus increasing the generation of DSW, and rapid expansion of the town have all led to development of new estates whose wastes management has not been captured by the county administration.

From these findings, the factors influencing DSW generated from the residents according to the questionnaire respondents were three: mainly family size, the income levels and re-use not taking place. In major towns in the HIR one family with only a single child but generates a lot of wastes due to presence of house helps, workers in their compounds, dogs. This case is different in Kisii where the generation of DSW is influenced by relatives in the houses with minimal workers; an indication that the HIR estates are still developing. Also, in HIR consciousness in waste management is high in HIR in Kisii such that the resident's burn combustible wastes reducing the wastes generated.

4 Conclusion

The key contributing factors for the quantity of DSW generated per day in the households include: the family size, level of income of the household, and whether re-use is taking place. Whereby, family size is the major factor in the following percentages: 86.0% in LIR, 75.1% in MIR, and 53.8% in HIR. The level of income of the residents was also a common factor in the following percentages: 38.6% in the HIR, 3.2% in MIR and 4.3% in LIR. Further, re-use not taking place was a factor influencing generation in the following percentages: 21.7% in MIR, 9.7% in LIR and 7.6% in HIR.

The disparity in types of wastes generated in the low income, middle income and high income residential areas is mainly attributed to level of education of the residents, the family sizes, the level of income of the residents and re-use not taking place. Technological advancement also plays a role in the generation of different types of wastes.

Recommendations

The study also, found out that the family size and the level of income are the major factors that influence the DSW generated. It is therefore recommended that residents should be sensitized to purchase and cook what they can consume to reduce the excesses which surmount to DSW especially food remains.

Compliance with ethical standards

Acknowledgments

I acknowledge Prof Paul Omondi an Associate Professor in the Department of Geography for his guidance in processing this article to publication.

Disclosure of conflict of interest

No conflict of interest.

References

- [1] Aseem I. (2005). Planning for the Unplanned: Recovering from Crises in Megacities, Routledge: USA,).
- [2] Babbie E. (2004), The Practice of social research. (10th ed.). Belmont, CA: Thomson Wadsworth.
- [3] Baud I. and Hans S. (1994), Solid Waste Management in Urban Context Raising issues, modes, assessments, appraisals and linkages in Bangalore. New Delhi: Manohar publishers and distributors.
- [4] Busha C.H. and Harter S.P. (1990). Research Methods in Librarianship: Technology and information interpretations. New York academic press.
- [5] G.O.K (1991). Atlas of the Government of Kenya.
- [6] Mugenda O. (1999). Research Methods, Analysing quantitative data. Nairobi: Act press.
- [7] Omondi .O. (1998). Assessment of the Generation and Management of Household Solid waste in Eldoret municipality. Mphil thesis, Moi University Eldoret.
- [8] Otieno.S. O. (2010).Urban planning and management in small and medium-size towns In Supplementary Issue,
- [9] UNDP (1991). Effects of Urban Waste, Diseases and related deaths. Environmental report 1991.
- [10] UNEP (2006). "Environmentally Sound Management of Solid Wastes and Sewage-Related Issues". United Nations Environment Programme.Retrieved 2011-02-23. 26, Issue 1, 2006, pp. 92-100.
- [11] UNEP. (2015). Managing Urban Waste.International Environmental Technology Centre,
- [12] Yamane T. (1967). Statistics; An introductory analysis, 2nd edition Harper and Row New York.