WATER, SANITATION, ENVIRONMENT and DEVELOPMENT

Wastes generation in multi-tenanted accommodation

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Introduction

The efficiency of any solid wastes management programme rests on the accuracy of data on which it was based. Waste generation rates is a vital data upon which several management decisions are based, among which are sizing of storage containers, frequency of collection and estimates of the lives of landfills. Under-estimation of wastes generation rates can result in undersized storage containers is financially wasteful and an unnecessary strain on the collection crew. The need for accuracy in the estimates of waste generation cannot therefore be over-emphasised.

The traditional approach to the estimation of waste generation assumes that the population size is the absolute determinant. In this approach, a per capita generation (say Y kg./cap/day) is determined from a preliminary survey and this is used to estimate total waste generated from each dwelling as

$$W = Y \times P \text{ kg/day}$$

where W = daily solid wastes generated from dwelling

P = total population resident in dwelling

This may be a valid approach if similar tenancy structure of one family per dwelling applies in all dwellings. However, due to economic hardships and inadequacy of housing units, the tenancy structure in most high density sub-urban communities is usually of a multi-household type whereby two or more families share accommodation designed originally for a single family. In the area studied for this paper (Glen View 3, Harare, Zimbabwe), the number of families per dwelling varies between one and eleven with an average of four. For the purpose of this research a family is defined as a person or group of person (father, wife and children) who is autonomous in his/her domestic wastes generation activities. Thus a single person who does his/her cooking independently is a 'family' just as a father with his wife and children constitute a family.

The use of total household population in a community with multi-family tenancy appears to me to be of a questionable validity. In such a situation, it is considered more appropriate to base waste generation estimates on the number of families. The objective of this research is to compare the strengths of 'population size' and 'number of families' as predictors of waste generation.

Research procedure

A multi-household tenancy structure tends to be more prevalent in high density sub-urban communities of developing countries. Glen View 3, a high-density southern suburb of Harare, Zimbabwe, was chosen for study. Thirty-eight houses with the following for study. Thirty-eight houses with the following characteristics were studied:

Number of residents   =   422

Number of families   =   135

For each house, the wastes generated over a period of one week was collected and weighed. The volume and composition were also noted. For this paper, the measure of waste generation adopted is the weight per week, kg/week.

Results and conclusions

The field data obtained are summarised in Tables 1 and 2. Statistical regression analysis was done to test the strengths of 'population size' and 'number of families' respectively as predictors of waste generation with the results as shown in Table 3.

Even though neither of the variables is well correlated with wastes generation, it is quit clear that 'number of families' is a superior variable being twenty times more correlated (based on averages) with weight of wastes generated than population size. Population size which includes children cannot give an accurate measure of wastes generation as children often have no say as to the timing or manner of disposal of 'weighty' items such as clothing, old furniture, etc. It is the conclusion of this paper that estimation of wastes generation should be based on 'number of families' rather than on ' population size'. For the study area, the average rate of waste generation was found to range between 0.14 to 1.71 kg/family/week with an average of 0.52 kg/family/week.

Acknowledgement

Table 1

Average weight (kg/week) of wastes by
number of families in dwelling

Number of families	Number of dwellings	Av. wt kg/week
1	2	11.0
2	10	10.6
3	11	8.7
4	6	10.5
5	4	7.5
6	3	12.7
7	1	10.0
11	1	16.0

Table 2

Average weight of wastes by population in dwelling

Population in dwelling	Number of dwellings	Av. wt kg/week
2	1	8.0
3	1	10.0
6	3	9.0
7	3	8.7
8	4	11.5
9	1	13.0
10	2	9.5
11	3	12.7
12	5	9.8
13	6	11.7
14	3	8.3
15	2	5.0
18	3	10.0
20	1	10.0

Table 3

Correlation between weight of wastes and the variables

Variable	Correlation coefficients%	
	Using raw data	Using averages
Population	2	3
Number of families	20	62