

## **Socio Economic Determinants of Solid Waste Generation at Household Level within the Urban Council (Uc) Limits of Vavuniya**

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### **Introduction**

Solid waste is defined as the biomass which is neglected by human for consumption and use. Solid waste is one of the sources in polluting air, water and land. Solid wastes are the materials which arise from various activities from human and animals discarded as unwanted and useless. It consists of highly heterogeneous mass of discarded materials from urban community as well as more homogenous accumulation of rural community.

Solid Waste Management (SWM) is an alarming challenge in developing countries mainly due to the increasing generation of solid waste (SW) and the lack of efficient and modern technology for the management (Lilliana Abarca Guerrero, 2013). The essential preliminary step in SWM associated with the determination of quantities and composition of waste is important for SWM planning.

18 Municipalities and 41 Urban Councils are available in Sri Lanka. The municipal and urban SW are mainly from households, commercial establishments, wholesale and retail markets, hotels, guest house, institutions, industries and road cleaning. The household waste is one of the primary sources of SW within the UC limit of Vavuniya.

The study area of UC of Vavuniya comes under Wannu electoral district. There are 5 Local Bodies functioning in this district. They are one UC and four Pradeshiya Sabha. The Vavuniya UC area is subdivided into 11 ward places as Vellikulam, Kovilkulam, Thonikal, Rampaikulam, Pandarikulam, Thandikulam, Vairavapulliyankulam, Paddanichoodu, Vavuniya town, Vavuniya North and Moontrumuripu consisting 20,047 households with 1,42,000 inhabitants (Department of Census and Statistics Sri Lanka, 2016).

### **Research Problem**

Rapid increase in population after the year 2000 was occurred due to unrest situation in the country. During this period most of the households were displaced and settled in Vavuniya especially within the UC limits to access better facilities. In addition to this the change in lifestyle too has resulted in a dramatic increase in SW generation. At present the SWM becomes a serious problem within the UC limit of Vavuniya. SW generation and accumulation varied from one location to another and they are influenced by the socio

economic factors. Identifying the socio economic determinants would help to draw a solid waste management plan.

## Objectives

The objectives of the study were to assess the quantity and composition of SW generation at household level within the UC limit of Vavuniya and to identify the socioeconomic factors determining the household SW generation.

## Methodology

Thonikkal and Pandarikkulam with 4900 households were selected for this study since these two wards were highly populated among those wards in Vavuniya. A constructed questionnaire was used to collect the primary data of location, age, education level, occupation and monthly income for SW generation at the household level.

130 households were selected randomly for this study from the sample frame obtained from GSN of those respective wards. Each household was given five different colour bags such as green, red, blue, brown and orange to collect food waste, broken glass waste, paper and card board waste, e-waste and polythene and plastic waste respectively and separately. Solid wastes generated by those households were quantified separately on weekly basis for one month. Solid waste collection was started on 1<sup>st</sup> to 31<sup>st</sup> October, 2017 after giving proper instruction to the households regarding separation of waste and disposing them of which waste in which colour bag.

The multiple linear regression model was used to identify the factors influencing the household SW generation by using minitab 15 software.

## Conclusion and Recommendations

The five major components of SW were evaluated in this study namely food waste, paper and cardboard, plastic and polythene, glasses and e-waste. The composition of average SW generated in the study area was given in Table 1. It consists of high amount of food waste and the least amount of electronic waste (e-waste)

**Table 1: Average Composition of Residential Solid Waste in Vavuniya UC Area**

| Type of waste         | Average Waste Generation/ Household/<br>week (g) | Composition% |
|-----------------------|--|--------------|
| Food waste            | 3715.9   | 85.9         |
| Paper and cardboard   | 229.95   | 5.32         |
| Plastic and Polythene | 330.3  | 7.63         |
| Glasses               | 36.3   | 0.84         |
| E-waste               | 13.2   | 0.31         |
| <b>Total</b>          | <b>4325.65</b>                                   | <b>100.0</b> |

Source: Field Survey 2016

Table 1 showed that nearly 86 percent of total solid waste generated was food waste whereas the remaining 16 percent waste was paper and cardboard, plastic and polythene, glasses and e-waste. This study found out that approximately 12 metric tons per day of waste was generated in the households within the Vavuniya UC limits with the mean of total waste of 620g/ day/ household. The unpublished report at Vavuniya UC reported that the total waste generated was nearly 15 metric tons per day within the UC limits of Vavuniya in 2016. It revealed that nearly 80 percent of the total waste generated in the UC limits of Vavuniya was from household wastes.

**Table 2: Socio Economic Determinants of Solid Waste Generation in UC Limits of Vavuniya**

| Type of waste | family size  |         | Income level |         | Education level |         | R-sq |
|---------------|--------------|---------|--------------|---------|-----------------|---------|------|
|               | Co-efficient | p-value | Co-efficient | p-value | Co-efficient    | p-value |      |
| Food waste    | 0.599        | 0.002   | 0.221        | 0.001   | 0.198           | 0.343   | 62.6 |
| Total waste   | 0.571        | 0.003   | 0.209        | 0.001   | 0.175           | 0.404   | 60.4 |

Source: Analysis of Survey Date 2016

The results of the regression analysis indicate that family size and income level were significantly influencing the food and total solid waste generation. Though the education level showed the positive response on waste generation, it was not significant. When the family size and the income level of the household were increased the food and total solid waste generation were also increased significantly. The R-squared values indicated that the model fitted using the variables of family size, income level and education level explained the 62.6 percent and 60.4 percent of the variation in food and total solid waste generation in the study area.

Based on these results, it could be concluded that the family size and the income level of the households are the significant socio economic determinants of the solid waste generation in the study area.

Since 80 percent of the total waste generated within the UC limits of Vavuniya was from the households, this study recommends that the waste segregation at household level could reduce the burden of waste management faced by UC. Since 86 percent of the total waste composed of food waste, appropriate plan could be developed for piggery farming.

Referring the recommendation of Charles J.Banks (2011) planning a biogas production with selective food waste could be recommended to UC limits of Vavuniya

**Keywords:** Food Waste; Quantification of Solid Waste; Questionnaire Survey; Socio Economic Determinants; Solid Waste Generation

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