Impact of Socioeconomic Factors on Solid Waste Management in Matale Municipal Council area

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Introduction

Solid waste management refers to the supervised handling of waste material from generation at the source through the recovery processes to disposal (Glossary of Environmental Statistics, 1997). Urban solid waste management is considered to be one of the most serious environmental problems confronting urban areas in developing countries. At present, solid waste is being dumped in environmentally very sensitive places. Haphazard throwaway and dumping of solid waste reduce aesthetic value and scenic beauty of the environment thereby creating negative visible impacts to human beings and adverse effects on tourism. The current waste production levels on a global scale amount to 1.3 billion tons per year with 3 billion residents producing approximately 1.2 kg per person per day (World Bank, 2012). However with rapid urbanization urban populations are anticipated to increase further by 1.3 billion to 4.3 billion residents by 2025. Consequently waste generation trends will also increase from 1.2 kg to 1.42 kg per person per day by 2025 while annual waste generation levels increase to 2.2 billion tons respectively (World Bank, 2012). Ranathunga et al. (2016) carried out a research on socio economic determinants of household solid waste management in Kandy Municipal area.

Municipal solid waste is a growing problem in Sri Lanka, especially in the urban areas. This problem is aggravated due to the absence of a proper solid waste management system in the country. As a result, solid waste is openly dumped in a few chosen locations in the towns. The Matale city struggles with a number of challenges linked to solid waste management, which is a core responsibility of the Matale Municipal Council. Approximately 30–32 tons of wastes are generated per day in the city. Waste collection tends to be low,

although 20 percent of the municipal budget is spent on solid waste management. Collecting 1 ton of waste costs around 30 US $. The generated solid wastes from the Matale Municipal Council are dumped at the Wariyapola solid waste dumping site (Annual Report, MMC). Practices in Sri Lanka reflect a lack of knowledge of sustainable solid waste management practices. This study is an attempt to address this gap by focusing on the socioeconomic factors which influence waste mangment practices in the Matale Municipality limits.

Objective

The objective of the research is to identify the socio economic factors affecting solid waste management in Matale Municipal Council area.

Methodology

This study uses both primary and secondary data. The primary data is mainly used to measure the impact of socio economic factors on solid waste management. Matale Municipal Council (MMC) area was selected as the study area based on the purposive sampling method. Matale is a medium-sized town in the Central Province of Sri Lanka, with an annual population growth rate of 1.5 percent in 2015 (MMC report, 2016). Secondary data was collected from the MMC waste management database and Matale Divisional Secretariat Reports. In this study, two regression analyses were carried out separately as suggested by Sankoh et al. (2012), and Ranathunga and Sri Ranjith (2016). Accordingly the OLS multiple regression model and a logit regression model were used to analyze the data. Nearly 1,500 families live in the MMC area and approximately 500 families supply garbage to the MMC. Out of this, 50 families were selected as the sample by using the stratified random sampling method. We first used a multiple regression model to study the solid waste management practices of household (Wi) against the weight of the solid waste per day (Wei_i), household income (Inc_i) family size ($fams_i$) working hours (ws_i) and the size of the land (ls_i) to help identify the factors affecting solid waste management. The model is given below.

$$W_i = \beta_0 + \beta_1 Wei_i + \beta_2 Inc_i + \beta_3 fams_i + \beta_4 ws_i + \beta_5 ls_i + u_i$$

Second, a logit model was used to study Willingness to Pay of the households for a better solid waste management system. Willingness to pay (WTP) was

regressed against household income (Inc_i), family size ($fams_i$), educational level of matriarch (edu_i), Working hours per week (ws_i) and the size of the land (ls_i).

$$WTP_i = \beta_0 + \beta_1 Inc_i + \beta_2 fams_i + \beta_3 edu_i + \beta_4 ws_i + \beta_6 ls_i + u_i$$

According to the MMC report a household should pay Rs. 2,700/= per month to implement better solid waste management practices. This research uses 'willingness to pay' for solid waste management and it uses the contingent valuation method. Correlation coefficient analysis and regression analysis are used for the evaluation.

Results and Discussion

It was clearly identified that the weight of solid waste, income of household and family size are significant under the 5% significance level and which positively affect solid waste management practices. This model explains 88% of the variation in the dependent variable. The results of the estimated logit model explains that income of household and family size are significant under the 5% significance level and positively affect the willingness to pay.

Table 1: Results of multiple regression model (OLS)

variables	Coef.	t	P>|t|
Wei	0.11747 (0.022)	5.23	0.000**
Inc	0.00002 (9.40e-06)	2.96	0.005**
Fams	0.29480 (0.116)	2.53	0.015**
Ws	-0.01818 (0.018)	-0.97	0.336
Ls	0.12132 (0.079)	1.54	0.132
Cons	-0.94688 (0.282)	-3.37	0.002

**,* denotes significance at 5%, 10% level R^2 = 0.8837 No of observations= 50

Table 2: Results of Logit Model

WTP	Coef.	P>|z|	dy/dx	Average	Odds ratio
Income	0.0002 (0.00)	0.046**	3.48e-06	37660	1.00
Family size	3.33 (1.54)	0.031**	0.0627	4.42	17.40
Working hours	-0.15 (0.185)	0.396	-0.0062	6.32	0.75
Land size D1*	0.94 (0.95)	0.323	-0.0031	2.1	0.86
Constant	-18.7123 (8.12)	0.021	0.022	0.7	2.30

(*) dy /dx is for discrete change of dummy variable from 0 to 1.

Therefore, Household Income, Weight of Solid Waste and Family Size are the factors impacting on solid waste management. The odds ratio of household income and family size is 1.000158, 1740154 respectively. It is greater than 1. This implies that these two variables have a positive relationship with willingness to pay

Conclusion

In researching the Matale Municipal Council area, most of the people are found to be unaware of the "3Rs". By conducting proper solid waste management practices among the people the excess amount of garbage disposed to the municipal council can be reduced. This research emphasises the importance of people maintaining good solid waste management practices. The research found that 75% of the people are not satisfied with the services provided by the MMC and they are willing to pay for the better solid waste management services. So the government should provide some facilities for the betterment of the MMC and improve the solid waste management system; e.g. introducing recycling procedures for man-made waste. The Municipality has to be provided with adequate education and develop an awareness of how to handle solid wastes at homes and about the consequences of disposing solid wastes everywhere illegally and not placing of solid wastes properly in the disposal sites.

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