

**HOUSEHOLD WILLINGNESS TO PAY FOR IMPROVED SOLID
WASTE MANAGEMENT SERVICES IN NJOMBE TOWN
COUNCIL, TANZANIA**

**HOUSEHOLD WILLINGNESS TO PAY FOR IMPROVED SOLID
WASTE MANAGEMENT SERVICES IN NJOMBE TOWN
COUNCIL, TANZANIA**

By

Emma Lunojo

**A Dissertation Submitted in Partial/Fulfillment of the requirements for the
Degree of Master of Science in Project Planning and Management (MPPM) of
Mzumbe University**

2016

CERTIFICATION

We, the undersigned, certify that we have read and hereby recommend for acceptance by the Mzumbe University, a dissertation entitled “**Household Willingness to pay for improved Solid Waste Management in Njombe Town Council, Tanzania**” in partial fulfillment of the requirements for award of the degree of Master of Science in Project Planning and Management of the Mzumbe University.

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ACKNOWLEDGEMENT

Above all, I heartfully express my sincere thanks to the Almighty God for his inexpressible gifts and love that were crucial to complete this dissertation.

My thanks and appreciation is to all people who have contributed to a great role in assisting to accomplish this dissertation. My deepest appreciation and special thanks go to my major supervisor Dr. Jennifer K. Sesabo for her sage advice, insightful criticisms, patient encouragement, being kind enough and guidance given to me that genuinely aided the writing of this dissertation in innumerable ways.

I convey my thanks to Njombe Town Council, street government officers and community for their high cooperation in conducting my study in their respective households. My special thanks also go to all the academic members of staff from the Mzumbe University for their advice during the entire period of the study.

My sincere word of thanks also, is extended to my parents, brothers, and relatives for providing me with unfailing support throughout my years of study. I am particularly grateful to my loving family, my husband Malimi L. Sitta and children Sylvia and twins (Nermina and Naomi) for their continuous encouragement and tolerance while I was away pursuing this study.

Finally, my truthful appreciations goes to all colleagues who encouraged as well as their contribution and good-natured support during my studies at Mzumbe University, especially, Edigar Bituro, Elieneza Mshana, Osea Mpasa and everyone who in one way or another supported me.

God bless you all.

DEDICATION

With love and sincere appreciation, this work is dedicated to my beloved family for their inspirational, unending love, prayers, moral and financial support. Absolutely, this success is ours.

ABBREVIATIONS AND ACRONYMS

CBOs	Community Based Organisations
CVM	Contingent Valuation Method
EPM	Environmental Planning Management
LR	Log likelihood Ratio
MLE	Maximum Likelihood Estimator
MSW	Municipal Solid Waste
MWTP	Maximum Willingness to Pay
NGOs	Non-Governmental Organisations
NID	Normally Independently Distributed
Njombe TC	Njombe Town Council
OLS	Ordinary Least Square
SDP	Sustainable Dar es Salaam city Project
SPSS	Statistical Package for Social Sciences
SW	Solid waste
SWM	Solid Waste Management
UNESCO	United Nations Educational Scientific and Cultural Organisations
UN-Habitat	United Nations Human Settlement Programme
WTP	Willingness to pay

ABSTRACT

This study investigated household willingness to pay (WTP) for improved solid waste management (SWM) services in Njombe Town Council, Njombe region in Tanzania. In Njombe TC, the rapidly increase in solid waste production ultimately creates a critical issue to SWM authorities in the council. Using cross-sectional data obtained from 110 households in 26 streets of Njombe TC, the study examined the household's participation, their attitudes towards SWM action and their WTP for improved SWM services. The study is centred on the threshold decision-making and utility theories. To elicit WTP, open-ended contingent valuation method (CVM) was employed. To determine factors influencing households WTP and maximum WTP value for improved SWM services Probit and Tobit regression models were used respectively. The results showed that 77.3% of respondents were ready to pay for improved SWM service whereas 57.3% were paying the waste collection fee in place. The Probit model shows that, age, level of education, income, time spent walking to the disposal site, household satisfaction on the current SWM services, household location and trust to the government on SWM services provision have significant effects on the WTP, while the MWTP value was influenced by level of education, income, satisfaction, location and time spent walking to the disposal site. Further, the result showed that the mean WTP value is TZS 1581.82 per household per month which is higher than the current garbage fee of TZS 1000 charged by the Town council. So, there is a chance of increasing garbage fee between TZS 1000 and TZS 1581.82. However, with other factors, the location of households should be taken into consideration while adding the charges. The mean WTP value may be a guide to Njombe TC authorities in determining appropriate garbage fee. It is further recommended that public awareness and private sector involvement in waste collection services in the council should be highly encouraged.

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CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter comprises a general introduction to the study. It gives the background to the study, problem statement, rationale of the study, objectives, research questions and organisation of the whole study.

1.2 Background to the Study

Urbanisation process and rapid population growth in cities and towns in the world have been reported as one of the reasons for the increase in solid waste (SW) generation in developing countries (Ali et al., 2012). According to Hagos, Mekonnen, and Gebreegziabher (2012), the rapid expansion and diversification of socio-economic activities in these urban areas have also accelerated a lot of environmental problems including poor solid waste disposal, poor liquid waste management, and air pollution in urban areas.

According to the World Bank report of 2012, the amount of municipal solid waste (MSW) produced in the world is expected to increase from 1.3 billion tons generated in 2012 per year to 2.2 billion tons per year by 2025 and it is expected that much of this increase will be coming from rapid growing towns and cities in developing countries. African total urban waste production was 169,119 tons per day and the estimates expect to reach an average of 441,840 tons per day by 2025. While in Tanzania the MSW generation is expected to increase from 2,425 tons generated in 2012 per day to 11,566 tons per day by 2025. Appendix II gives waste generation projections for 2025 by regions worldwide.

Insufficient and ineffective management of wastes worldwide leads to generating a lot of human and environmental problems like ozone layer depletion, acidic rains, greenhouse effects as well as land and epidemic diseases (Ali et al., 2012). Across the African continent, the rate of urbanisation is around 3.5% and the rate is expected to rise in the future (UNESCO, 2009).

This has significant negative environmental effects such as pollution and degradation to these urban which are growing very fast. Tanzania as one of developing countries with little technological advancement and financially constrained, it experiences severe impacts of poor waste management. The problems come from the little public awareness about the nature and impacts of these solid wastes they produce (Kassim & Ali, 2006).

The World Bank report of 2012 reported that Dar es Salaam produces solid waste of 4200 tons per day (0.93kg/capita/day) in 2011 and only 40% is collected while 60% are incorrectly disposed of. Poor waste management (characterised by waste burring, burning informal recyclers, road side dumping and drainage canal dumping) has led to flooded roads, ground water pollution, soil contamination and an outbreak of communicable diseases like cholera, diarrhoea and dysentery.

Solid waste management (SWM) is very crucial to households living in rural and urban areas because waste has reported to be directly linked to the development of human activities in terms of technologies and social aspects (Awuyo-Vitor, Ishak, & Jasaw, 2013). Wastes are the by-product generated by humans for their existence. The production of waste materials is associated with human activities, from preparations of meals to the manufacturing of goods. Since the waste materials produced cannot be used for other things, they needs to be disposed of effectively. It is therefore very important to analyse the socio-economic factors linked to SWM as well as the participation of the community and their attitudes towards the waste generation and management in a given locality.

There is a large number of researches conducted on SWM in municipalities worldwide and the willingness to pay (WTP) for an improved SWM. It is argued that information about households WTP for improved SWM and the determinants of WTP for it, is essential for policy makers to expand the improved sanitation coverage in a given population (Minh, Nguyen-Viet, Thanh, and Yang, 2013; Ezebilo, 2013,). The priority for establishing effective municipal SWM should be given to the emerging cities as a crucial role of protecting the environment and public health (Hagos et al., 2012).

A number of socio-economic factors that determining the WTP for improved SWM have also been examined. WTP rate and maximum willingness to pay (MWTP) value are strongly influenced by the economic status of the households such as age, sex, level of educational and income (Banga, Lokina and Mkenda, 2011; Hagos et al. 2012; Roy and Deb, 2013; Ezebilo, 2013; Seth, Cobbina, Asare, and Duwiejuah 2014; Minh et al. 2013; Subhan, Bashawir, Ghani, and Joarder, 2014; Ferreira and Marques, 2015; Weisheng, Peng, Webster and Zuo, 2015). According to Awuyo-Vitor et al. (2013) and Hagos et al. (2012), house ownership and environmental awareness influence household's WTP for improved SWM. Furthermore, Amfo-Out, Waife, Kwakwa, and Yeboah, (2012) reported that frequency of payment and Satisfaction determine the WTP for improved SWM.

Although there is a significant number of studies conducted in the past on SWM in some municipalities of Tanzania, yet, there is scant literature found that investigates the households' WTP for improved SWM. For instance, Kalwani (2009) analysed the effect of social economic, socio-cultural, policy and legal factors on the sustainability of effective community participation in municipal SWM strategy in Morogoro Municipality; Mlozi (2011), using Likert scale assessed the attitude of community towards SWM in Mbeya city and Cheng and Urpelainen (2015) undertook a study on "Who should take the garbage out?, Public opinion on waste management in Dar es Salaam, Tanzania." They recommended for future research in other urban settings focusing on more direct measures of public support for government participation in waste management, as well as studies that investigate WTP for improved sanitary service.

1.3 Problem Statement

In Tanzania, solid waste management (SWM) is one of the environmental challenges facing the households in urban areas (Chengula, Lucas and Mzula, 2015). Solid waste generated in Tanzania is estimated to 0.50kg/capita/day and this is said to be caused by an increase in population growth, urbanisation and expansion of socio-economic activities in urban areas (Guerrero, Maas and Hogland, 2013).

The main solid waste producers are households, schools, industries, agriculture, hotels, offices, health centres, construction and shops.

In order to improve SWM services in urban areas in Tanzania, in 1992 UN-Habitat Programme initiated the Sustainable Cities programmes that aimed to increase the magnitude of sanitary services, to establish sustainable income generating activities that supports environmental protection for the community based organisation and small enterprises in waste management activities such as collection and recycling. The Environmental Planning Management (EPM) process through Sustainable Dar es Salaam city project (SDP) in 1992 was introduced to support and promote the public-private partnership on waste management and environmental conservation in the city. In recent years, privatisation of municipal or town solid waste collection has become a key environmental policy in Tanzania as in other countries worldwide (Kaseva and Mbuligwe, 2003; Ndubuya, 2006). Therefore, the private sectors like private companies, Non-Governmental Organisations (NGOs) and, Community Based Organisations (CBOs) were facilitated and allowed to collect solid waste in urban areas (Kirama, 2013).

Despite the involvements carried out on SWM still, there are challenges on waste collection efficiency around the urban areas. A lot of waste left around the urban areas and the production increases every day; for instance, according to World report of 2012, in Dar es Salaam only 38.5% of 29,764 tons produced per day was collected and dumped. This shows that the problem of waste management still exists in the city and needs effective participation on it. According to Dhokhikah, Trihadiningrum, and Sunaryo (2015), household's participation is the other key to achieving the sustainable development. As the human resource is an important factor in development, various environmental clubs, crews, groups and organisations are formed to ensure environmental sustainability. These groups and organisations aim to develop households' awareness and actions in all environmental challenges.

Njombe TC is among of the fastest growing towns in Tanzania demographically and economically. The production of solid wastes in Njombe TC in particular has increased rapidly in terms of waste amount as well as composition, which ultimately

creates a critical issue to waste management authorities in the council. According to Njombe TC (2015), the town's annual solid waste generation is over 19,617.30 tons of solid waste per year. Overall collection coverage is only about 8,631.61 tons (44%) per year, leading to uncontrolled waste in the town and exposing residents to unsafe environment. This is likely to cause serious public health problems through possible eruption of diseases, including often fatal water-borne diseases, such as cholera, diarrhoea and dysentery.

Despite the critical problem on SWM service, little has been done to examine the households' WTP for improved SWM services in Njombe TC. There is a lack of information on household WTP for the services provided. Therefore, this study examined the households' WTP for improved SWM services in Njombe TC, by examining the extent of households' participation, their attitudes towards SWM action and the factors influencing households' WTP and the MWTP value. The output of this study will provide useful recommendations to policy makers and other stakeholders to improve SWM system in Njombe TC and the country at large.

1.4 Rationale of the Study

Establishing effective council SWM services is an important role in protecting the environment to improve sanitary and public health. Njombe Town Council is experiencing rapid urbanisation and increasing urban population due to territorial expansion, increased rural-urban migration rate and the increasing per capita incomes in the region. This has led to the increased production of solid waste in the council. The production has increased rapidly in terms of waste amount as well as composition, which ultimately creates a critical issue for waste management authority.

As one of the strategies to improve sanitary services in the town, the Njombe TC decided to outsource/contract a private firm which collects fees for SWM service from the community but have not been managed to provide SWM services satisfactorily. There is a presence of uncontrolled wastes on the streets, including market centres, and homes.

Therefore, the key question here is how much residents are willing to pay for efficient and cost-effective delivery of SWM services to their households. The aim of this study is therefore to examine the extent of households' participation, their attitudes towards SWM actions and factors influencing households' WTP and the MWTP value; and to suggest mechanisms for improving the participation of communities in SWM. The output of this study also provides useful recommendations for future studies to other regions in the country or to other national contexts of a similar set-up to test and extend the generalisations of the findings.

1.5 Objectives of the study

The primary objective of the study was to investigate household willingness to pay for improved solid waste management services in Njombe Town Council.

Specifically, the study aimed to:

- i. Examine the extent of household's participation in SWM services in Njombe TC.
- ii. Assess the Households' attitudes towards the SWM action in Njombe TC
- iii. Estimate the Households' WTP for improved SWM services in Njombe TC.
- iv. Determine the factors influencing Households' WTP and MWTP value for improved SWM services in Njombe TC.

1.6 Research Questions

- i. To what extent do households participate in SWM services in the study area?
- ii. What are the factors influencing households to participate in SWM services in the study area?
- iii. What is the attitude of households' towards improved SWM services in the study area?
- iv. What factors determine household's motivation to pay and the amount of money they are willing to pay for improved SWM services in the study area?

1.7 Organisation of the study

This dissertation is organised into six chapters. Chapter one comprises a general introduction to the study. It gives the background to the study, problem statement, rationale of the study, objectives, and research questions. Chapter two provides theoretical settings and empirical framework that guided the study. It reviews relevant literature on theoretical part, empirical studies that support the entire study design and methods of enquiry, conceptual framework, and models for analysis. Chapter three provides methodological description used in this study. It covers the study area, research design, data type and data collection methods, target population and sample selection, data analysis and reliability and validity. Chapter four presents the findings of the study. Both qualitative and quantitative findings are presented. Chapter five gives the discussion and arguments on the findings presented in chapter four (4) in relation to the study area and other findings from other similar studies. The final chapter six presents the summary and conclusions, policy implications and research limitations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This section provides theoretical settings and empirical framework that guided the study. Theoretical framework discusses relevant concepts, theories and assumptions of the research base. An empirical framework presents a review of relevant literature based on the contributions of previous researchers on the research topic and related concepts. Generally, the theoretical and empirical review focuses on households' WTP for improved environment conservation management.

2.2 Definition of key Concepts

2.2.1 Household

According to Ellis (1998), Household can be defined as a social unit characterized by sharing of the dwelling house, with resources that are pulled together for common use. For this study, household is defined as a social unit which consists of one or more people living in the same house; and that their wealth is pulled together for basic needs (food and shelter) and other social needs including solid waste management.

2.2.2 Solid Waste (SW)

Solid waste refers to any material with no direct value to the producer and so must be disposed of. Misra and Panday (2005) pointed that "a solid material becomes waste when it is discarded without expecting to be compensated for its inherent value". According to UN-HABITAT, (2010), solid waste (such as Garbage, trash, waste, rubbish) is viewed as an unwanted material generated from human and animal activities that are normally solid and are considered as useless or has no consumption value to the person disposing it. The possible sources of solid waste include households, commercial activities such as food markets and offices, and institutions such as schools, hospitals and transportation terminals.

2.2.3 Willingness to Pay (WTP)

Willingness to pay (WTP) is generally used to consider the evaluation of the potential benefits of an environment. According to Omonona and Fajimi, (2011), WTP is the sum of real expenditures at market prices plus the value of consumer surplus above market prices that the household would have been willing to pay or the maximum amount consumers are prepared to pay for a good or service.

2.2.4 Solid Waste Management (SWM)

Solid waste management (SWM) as defined by Othman (2002), is the control of waste generation, collection, storage, transfer and transport, processing and disposal consistent with the best practices of public health, economics, financial, engineering, administrative, legal and environmental considerations. The evolution of solid waste management is based from primitive origins through the development of open dumps in ancient civilizations of the world to the sophisticated collection and disposal systems that are common in use today.

2.3 Willingness to Pay for Environment Conservation: Theoretical Perspective

This study aimed at examining households' WTP for improved SWM services in Njombe TC. The rationale of this study is centred on the threshold decision-making theory proposed by Hill & Kau, (1981) and (Pindyck & Rubinfeld, 1981). The theory points out the fact that when the individual is faced with a situation to take a decision for instance to pay for improved SWM services or not to pay, the individual has a reaction threshold, which is dependent on a certain set of factors. As such, at a certain value of stimulus below the threshold, no reaction is observed while at the critical threshold value, a reaction is stimulated (Awunyo-Victor et al., 2013). This theory based on the consumer choice models and utility theory which uses proxy market values to directly eliciting consumers' preferences and WTP by using none merchandised markets conditions which offer potential improvements or damages. Using standard structural equation models, the threshold models transform binary choices to derive the conditional Probit model to represent discrete choices of individuals, households facing different discrete alternatives (Rungie, Coote, and

Louviere, 2011). Choice models are able to predict accurately on human decision-making behaviour.

The neoclassical microeconomic theory provides necessary elements to model the decision process of a household's WTP for improved environment conservation based on the specification of the utility function (Omonona and Fajimi, 2011) which is concerned with people's choices, decisions and preferences. However, Utility is unobservable, thus, difficult to quantify. Therefore, the discrete choice analysis is preferred (Breidert, Hahsler and Reutterer, 2006). Thus, an indication of consumer WTP to protect the environment (e.g. to reduce soil pollution) can be gained using the contingent valuation method (CVM), that is, through eliciting consumer preferences for certain goods by conducting surveys.

According to Joel et al. (2012), CVM is a survey-based technique of monetary valuation used to elicit people's preferences expressed in terms of WTP or to accept compensation in order to avoid an environmental damage. The underlying assumption is that a market for environmental goods and services exist. The fundamental idea of this method is that people have hidden preferences for environmental goods and services, but such preferences can be translated in monetary units. In that respect, this study used the threshold decision-making theory and CVM approach in its analysis.

Following Tadesse and Hadgu (2009), a representative individual household i willing to buy the waste collection service will have a utility function given by:

$$U_i = \theta x'_i + \varepsilon_i \quad (1)$$

Where, U_i is the utility derived by household i from purchasing the improved waste collection service, x'_i is the row vector of various household factors and characteristics of the alternatives that affect disposal, ε_i is the unobserved component, and θ is the vector of parameters of the model. Based on this utility function the Probit and Tobit models will be delivered to analyse factors influencing household's WTP and MWTP value respectively.

2.4 Empirical literature Review

The indiscriminate disposal of waste is not a new phenomenon worldwide and in developing countries in particular, which persist till date, despite the long realisation of the consequences. Research has been undertaken by scholars around understanding household's participation in SWM services, their attitudes towards the SWM action, their WTP for improved SWM and the factors influencing household's WTP value for improved SWM services.

In line with the threshold decision-making theory, several factors have been reported that influence household's WTP for improved SWM services. Education has reported having a positive relationship with a WTP for waste management services. With high education level, people are aware of environmental problems caused by poor sanitary services and therefore they are more likely to pay any additional cost of waste management so as to secure the environmental safety and their health. Addai and Danso-abbeam, (2014) using logit model analysed the determinants of WTP for improved SWM in Dunkwa-on-Offin, Ghana and found a positive and significant result of education on a WTP. Other studies by (Subhan et al. 2014; Banga et al. 2011; Niringiye and Douglasson, 2010; Afroz, Hanaki, & Hasegawa-Kurisa, 2009) have also reported similar findings. In contrast, Seth et al. (2014) examined household demand and WTP for SWM service in Tuobodom in the Techiman-North District, Ghana and reported an insignificant result of education on a WTP.

Age is another factor identified to influence households' WTP. Empirical evidence on the relationship between age and WTP are mixed. Some studies show the positive linkage between age and WTP and some not. For instance, Nkansah, Dafor, and Essel-Gaisey, (2015); Addai & Danso-abbeam, (2014) reported that age has a positive impact on WTP for improved waste management services. Older people are more likely to pay for improved waste management service than the younger people.

As people get older, they tend to understand the need to protect and keep a clean environment. On the other hand Seth et al. (2014) and Niringiye & Douglasson, (2010) found a negative correlation between age and the WTP for improved SWM

services. They suggested that old people may consider the service as government responsibility and could be less willing to pay for it while young people might be more familiar with cost sharing and their WTP is expected to be high. Therefore, this study further examined how age determines WTP for improved SWM services in their surroundings.

Households' income affects positively households willing to pay. Households with higher income are expected to be able to pay more and thus will have the WTP. Various empirical findings suggest the positive relationship between household income and WTP (Banga et al., 2011; Assa, 2013; Nkansah et al., 2015; Massito, 2009; Ezebilo, 2013; and Niringiye and Omortor, 2010). SWM service is considered as a normal good and therefore, as income increases its demand certainly increases. The studies demonstrate that people with higher income always are ready to pay for waste management services and are expected to pay more even for the improvement of the services unlike to people with low income. This was an important factor in this study to find the extent to which households' participate in waste management in Njombe TC.

Other studies proposed that the household size is another driving factor influencing the WTP for waste management in developing countries. According to Roy and Deb (2013) as the number of people in the household increases, production of solid waste also increases. Hence, the demand for waste management services increases and therefore, their WTP for the services increases. The bigger the family size the higher WTP for the improved SWM service will be (Nkansah et al., 2015; and Ojok, Koech, Tole, and Okot-Okumu, 2012). In contrast, Ezebilo (2013) proposed that in most of developing countries obviously households have only one dependant for the whole household. So, in this case, the individual WTP is low. Therefore, the household WTP for a large amount of waste produced by a number of people will be low as well. But other studies (Addai and Danso-abbeam, 2014; Afroz et al., 2009; and Niringiye and Douglasson, 2010) using logistic model suggested that the household size has no influence on WTP for waste management services.

Referring to demand theory in the real world, consumers are likely to face a time constraint (Awunyo-Victor, 2013). That is if the service required is time oriented, often time represents another constraint to the consumers. According to Tadesse (2009), households will be willing to pay for waste management service if the collection points are not located far away from their local areas of residences. People who use more time to travel to the waste collection or disposal points will be likely willing to pay for improved SWM services if the service will help to reduce the travel time to the disposal site (Ezebilo, 2013). Timely collection of waste adds incentives to households' involvement in effective waste management services (Alhasan and Mohamed, 2013). This study went further using probit model to see how timely waste collection relates to WTP and improvement of waste management services.

Always consumers objective is to maximise their satisfaction (utility) generated from goods or services offered. Households' satisfaction with the current waste management in a particular area has proposed to influence the WTP for improved SWM services (Assa, 2013). Household WTP for improved waste management goes together with the satisfaction of the current service offered (Afroz et al., 2009). Addai and Danso-abbeam (2014) also revealed that households that are satisfied with the current waste collection services are willing to pay more than unsatisfied one. In contrast, Amfo-Out et al. (2012) proposed that people who are satisfied with the current SWM services are not inspired to pay for any additional improvement of waste management services in their areas.

For policy-making purposes, it is important to explore the relationship between households' WTP and government credibility. The reliability and legitimacy of environmental policies and its implementation success depends on the extent to which the community trusts responsible authority. According to Marbuah (2016), the lower the level of trust, the lower the likely valuation individuals will consider to the good in question which eventually affects their WTP toward its provision. Previous studies by Sun, Yuan, and Xu, (2016), Marbuah, (2016) and Cheng and Urpelainen (2015) have shown positive and significant effect of peoples' trust in

government's work for improved SWM while Huang, Ban, Duan, Jun Bi and Yuan (2013) using tobit model on their study on Public demand for remediating a local ecosystem: comparing WTP and WTA at Hongze Lake, China reported insignificant result but negative impact on WTP.

The Location is another variable recently reported to have a positive relationship with WTP for improved SWM services. Waste generation is likely to be high in highly populated areas leading to a high demand for solid waste collection services. Sun et al. (2016) using probit model on their study on public perceptions and WTP for reducing air pollution in urban areas of China revealed a positive and significant result of location on WTP. Ojewale, (2014) using multinomial logistic model also, reported similar findings on his analysis of Intra-urban domestic solid waste disposal methods in Lagos metropolis, Nigeria.

Community's participation and their attitudes towards improved SWM services have reported as the key aspects to consider while examining WTP for improved waste management service. Several studies have reported the reasons of communities not to participate effectively in SWM process. For example, Minn, Srisontisuk and Laohasiriwon (2010) explored implementation strategies for fostering peoples' participation in SWM service in Myanmar and reported that lack of information (public awareness) considerably affects the quality of people's participation in SWM service. Alexander, Smaje, and Williams, (2009) argued that the effectiveness and sufficiency of solid waste services delivered affect households' participation in SWM. Other reasons reported include Shortage of time (Dhokhikah et al., 2015) laziness, scarcity of local waste facilities (Alexander et al. 2009; Hage, Soderholm, and Berglund, 2009), lack of knowledge about SWM activities (Singhirunnusorn, Donlakorn, and Kaewhanin, 2012; Subhan et al. 2014) and lack of enthusiasm and stimulus on environmental issues (Shaw, Lyas, Maynard, and van Vugt, 2007).

The attitudes of households towards SWM action have also noted by researchers as a key aspect to consider in analysing improved SWM services. In most developing countries the collection system of solid waste is not effective due to general ignorance about the health and environmental consequences of improper disposal

(Fearon & Adraki, 2014). The communities might perceive that waste management is the responsibility of government. According to Rahmaddin, Hidayat, Yanuwiadi, and Suyadi (2015), communities, as a waste producer, should also be responsible for protecting and keeping clean and healthy environment. Thus, there should be good cooperation between the government and communities in solving the sanitary problems. Mbeng, Phillips, & Fairweather (2009) portrayed that attitudes are hidden, not directly observable in themselves, but they influence actions and behaviours that are observable hence, expel environmental behaviour. Rahmaddin et al. (2015) using quantitative descriptive analysis assessed communities' knowledge, attitude, and action of a community towards waste management in River Bank of Martapura and reported a moderate level of an attitude of communities towards improved solid management. They analysed attitude considering indicators on receiving, responding, respecting and responsibility.

Legal SWM regulation instruments, supporting training programmes, information from mass media and environmental clubs are the key instruments in influencing public participation in waste management (Purbassari, 2014; Hotta & Aoki-Suzuki, 2014 and Sukhor, Mohammed, Sani, & Awang, 2011). They argued that the use of these strategies can improve the public awareness and pro-environmental actions which can ultimately change the household perceptions and attitudes towards SWM.

In that respect, various previous literatures examined on the issue of SWM in developing countries by looking at various factors influencing household participation and WTP for improved waste management services in their localities. Therefore, taking a case study of Njombe Town Council – Tanzania, this study examined the extent of people's participation in SWM activities and the factors influencing the WTP for improved SWM like household income, size, level of education, time, household's location, satisfaction and trust on current SWM services and individual age for the improvement of waste management services. The study further assessed household participation and their attitudes towards improved SWM services for the sustainable environmental development in the council.

2.5 Conceptual Framework

The conceptual framework summarises the concepts, assumptions, expectations and theories that support and inform the research design. According to Miles and Huberman (1994), a conceptual framework can be defined as a visual or written product that “explains, either graphically or in narrative form the main things to be studied, the key factors, concepts or variables and the presumed relationship among them”.

Following the review of the related literature as presented in section 2.3 above, a framework as depicted in Figure 2.1 has been adopted and modified from Larecho et al. (2011) to guide the formulation of the research design in examining household WTP for improved SWM services in Njombe TC. The conceptual framework summarises the variables derived from the theoretical and empirical literature review on households’ WTP for improved SWM services. According to this framework, three major components were delivered. These include Participation, attitude and influencing factors.

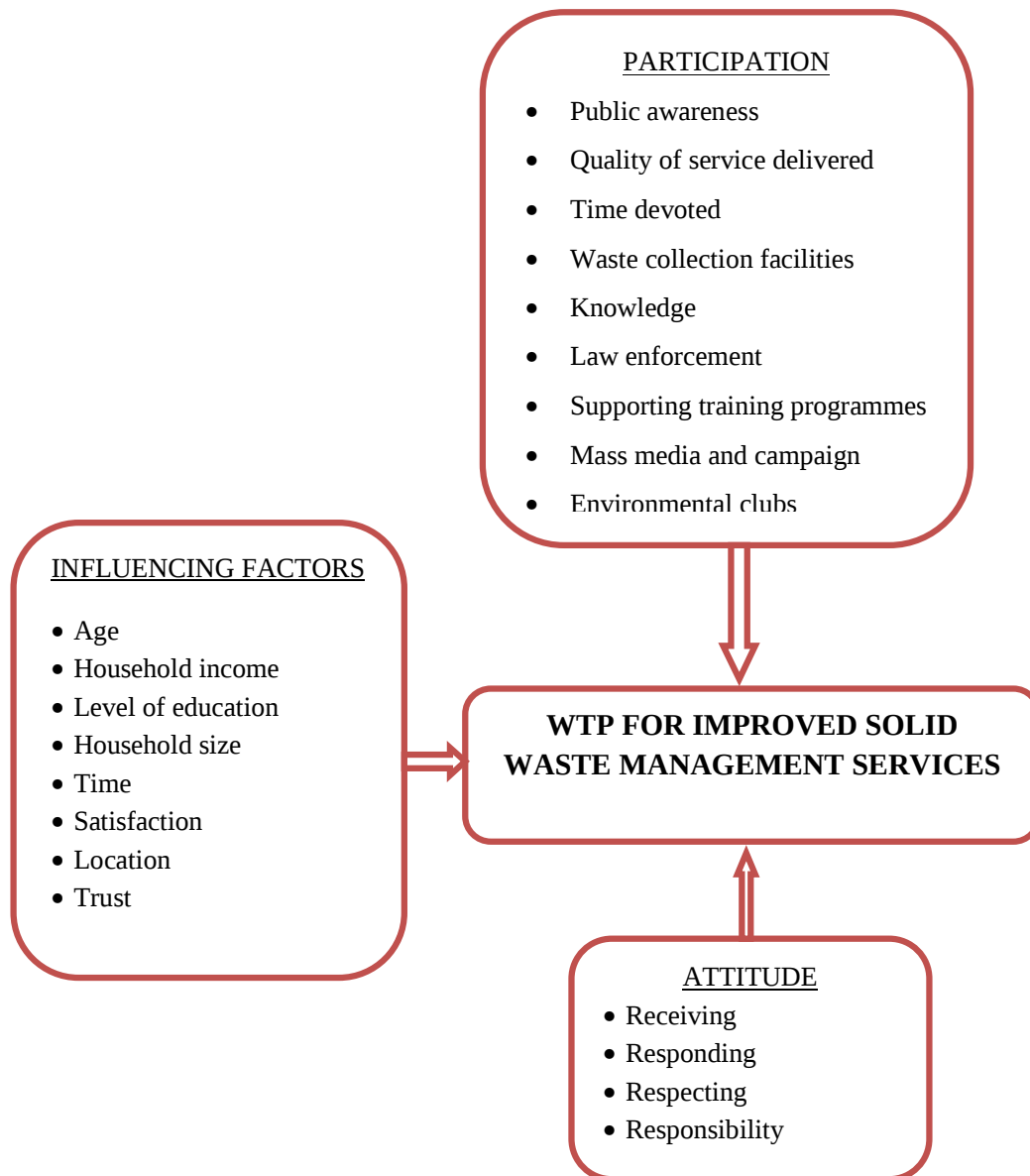


Figure 2.1 Conceptual Framework

Source: Adapted and modified from Laroche et al. (2001)

Participation: Since households are the primary producers of wastes, their participation in waste management activities is crucial for improved SWM in a particular area. Communities are expected to participate fully in SWM activities if they are aware of the current SWM system, they are satisfied with the quality of services delivered, there are availability and accessibility of improved waste collection facilities in the area, and that households understand SWM activities such as collection, sorting, compositing, recycling etc. It is expected that households who are satisfied with SWM services may be willing to participate in SWM activities. Households who understand the importance of SWM will devote time to participate in SWM activities. Households would participate effectively if improved collection facilities such as metal and plastic dustbins are in place. Also, Legal SWM regulation instruments, supporting training programmes, environmental clubs, and Mass media and campaign are expected to improve households' participation in SWM activities.

Attitude: Household attitude is expected to have an effect on WTP for improved SWM services. This includes household's a way of accepting government waste management policy and other instructions (receiving), household's way of reacting to waste management policy and other instructions from the government (responding), household's way of valuing on waste management policy and other instructions from the government (respecting) and households perception on who should manage waste collection and disposal (responsibility).

Variables for econometric analysis: These are the determinants of WTP for improved SWM services which include demographic factors (such as Age, the level of education, household size and income) and social economic factors (such as time, satisfaction, location, trust etc.). These factors are expected to affect households' WTP positively or negatively. Table 3.1 presents the description of variables used to analyse households WTP and MWTP value, their relationship and their expected effects.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This chapter offers methodological description used in this study. It covers the study area, research design, data type and data collection methods, target population and sample selection, Data analysis and reliability and validity.

3.2 Study area

Njombe Town Council is a rapidly growing urban settlement in Njombe Region. It is one of the six councils in the newly established Njombe region which is located in the southern highlands of Tanzania. It lies at the crossings of Longitudes 34⁰25' and 35⁰27' east of the Greenwich Meridian and Latitude 9⁰10' and 9⁰45' south of the Equator, where it borders with Njombe District Council to the north, Makete and Wanging'ombe District Councils to the west and Ludewa District Council and Ruvuma Region to the south. The council covers an area of 3212km², which is divided into 2 divisions, 13 wards, 26 streets, 44 villages and 232 hamlets. According to 2012 Population and Housing Census, Njombe Town Council had 130,223 people of whom 61,112 being males and 69,111 females (NBS, 2012). The main socio-economic activities carried out in the council are agriculture, forestry, trade and industry. A map showing the study area is attached (see appendix V).

Njombe TC was chosen as an area of research because it was found to be a place where refuse is generated on a larger scale and also very heavy heaps of refuse are easily observed. Also, from a socio-economic point of view; it is an important town in Njombe region being the headquarters of the region. Again, the town appears to be a pace setter for development activities carried out in the region. Thus, such a study towards WTP for improving the management of waste collected from households in the town, may serve as a driver for improvement of the same in other towns in the country.

Finally, most of studies have previously focused on the challenges of solid waste disposal in the country and little attention has been given to households' as the key actor in the sector. This study, therefore, examined household WTP for improved SWM services in Njombe TC to establish enough empirical evidence within the sector.

3.2 Research design

Research design is a plan for conducting research which usually includes specification of the elements to be surveyed and the procedure to be used (Boadi, 2016). It helps to seek information, analyse the evidence of research and answer the initial questions as explicitly as possible. This study employed a cross sectional study design, where data collection was confined to a single time period for each household head.

This research design was preferred as it gave a room to compare more than one variable at the same time with little or no additional cost, such as socio-demographic factors and WTP in relation to the study context. Also, it is capable of using data from a large number of subjects unlike other types of research designs which are geographically bound. However, the shortfall of this design is that the changes in phenomena of the study area cannot be measured as it offers a snapshot of a single moment in time (Gray, 2009)

3.4 Data Type and Data Collection Methods

3.4.1 Data Type

The study used primary data collected directly from respondents through a cross-sectional survey. Both qualitative and quantitative data were collected for analysis. Qualitative data were used to investigate households' participation and their attitudes towards improved SWM whereas quantitative data were used to analyse factors influencing households' WTP and the MWTP value for the improved SWM service.

3.4.2 Data Collection Methods

In this study, the main instrument for the collection of household data was a questionnaire survey. The study used primary data obtained directly from a sampling frame of 14,574 households through structured and semi-structured questionnaire interview and physical observations supported by digital photographs. The survey collected household demographic factors and socio-economic characteristics, household's participation and their attitudes towards improved SWM services, households WTP and the factors influencing their MWTP value.

The study employed contingent valuation method (CVM) to come up with precise analysis on a household decision whether or not to purchase the SWM service. The underlying principle idea to this method is that people have preferences for environmental goods and services and these preferences are hidden, but can be translated in monetary units. Continuous CVM was used to elicit the WTP values. During the interview, respondents were freely to answer the open-ended questions while indicating the maximum amount they are ready to pay (Song et al., 2012). The CVM technique despite the advantages to measuring total economic values, however, have been criticised for having many biases including strategic bias, hypothetical, design bias, and operational bias (Padi et al., 2015; Nkansah et al., 2015). Respondents may not provide information on their true WTP to please the interviewer. Despite its drawbacks, CVM was used in this study because of its ability to capture use and non-use values, unlike other environmental methods such as hedonic pricing and travel cost methods which have a tendency to underestimate satisfaction by considering use values only.

The method was also preferred because of easy data collection and the results obtained are relatively easy to understand, interpret, and to use for policy intervention purposes.

3.5 Target population and Sample Selection

3.5.1 Target population

(Ishach and Abubakar, 2014), defined the target population as the group of elements that must be finite and can be counted to which the researcher wants to make inference. The fundamental units of the population are elements such as persons, households, housing units, parts of an organization/institution, etc.

This study targeted adults representing households aged 18 years and above to make a meaningful contribution to improved SWM services in the study area. Njombe TC has 26 streets and 44 Villages. This study, however, did not cover villages because there are no established SWM systems. The study was therefore administered in 26 streets of Njombe TC.

3.5.2 Sampling Frame

A sampling frame as has been narrated by (Ishak and Abu-Bakar, 2014) is a listing of the population units from which a sample size is to be selected at any stage of sampling. The sampling frame of this study was 14,574 households obtained from 26 streets of Njombe Town Council through a street register where the sample size was drawn.

3.5.3 Sample size

Based on statistical principles, the survey sample size of households was sampled according to the stratified random sampling method (Dhokhikah et al., 2015). The nominated and interviewed households had various socio-economic levels and other characteristics including gender, age, household size, education background, occupation, marital status and household average monthly income.

Sample size determination formula was used to calculate the sample size for the stratified random sampling technique while putting clear some of the assumptions (Kothari, 2004).

Assumptions

Since there was no information about WTP for improved SWM in Njombe TC, then, it was not possible to estimate the proportion. Therefore, basing on personal judgment the initial estimate of proportion ‘p’ for the study is 90% (Fesseha and Bin 2015). Thus, 5 % degree of precision and 95% confidence interval was taken. Hence:

$$n = \frac{z^2 \cdot p \cdot q \cdot N}{e^2(N-1) + z^2 \cdot p \cdot q} \text{-----} (2)$$

Where;

n = Sample size to be drawn before reduced

N = Total number of population 14,574

Z = Confidence interval (1.96)

P = Estimate proportion (90% = 0.9)

q = degree of accuracy (1-p = 0.1)

$$n = \frac{1.96^2 * 0.9 * 0.1 * 14574}{0.05^2(14574 - 1) + 1.96^2 * 0.9 * 0.1} = 137$$

The calculated sample size was 137; however, this number is large to manage considering the availability of funds and time allocated for the study. Therefore, the sample size was reduced into 110 by 20% because the size of the study population is very large having homogenous items for the universe, the standard of accuracy and small level of precision.

3.5.4 Sampling technique

The study was designed to obtain a representative sample of households in the council. The list of households was first obtained from 26 streets of Njombe Town Council through a street register. A stratified random sampling method was used to select representative samples from every street. Since, the study population was very large (14,574 households) having homogenous items for the universe, hence the 26 streets were regarded as strata, therefore, households representatives from each street

were randomly selected. A total sample of 110 households from 26 streets was obtained to ensure consistency of results from Probit and Tobit regressions analysis.

3.6 Data Analysis

3.6.1 Descriptive Analysis

To obtain descriptive statistics (percentages and frequencies, means and standard deviations) a Statistical Package for Social Sciences (SPSS version 16.0) and excel programmes were used. Descriptive statistics were used to analyse data on selected socio-demographic factors, households' participation and their attitudes towards positive actions in SWM.

3.6.2 Econometric Data Analysis

STATA version 11.0 programme was used to run the Probit and Tobit binary regressions models to obtain the relationships between the variables as indicated in the table 3.1 below. The Probit output estimated the effects of factors influencing households' WTP for improved SWM services while the Tobit output estimated the effects of factors influencing the MWTP value for improved SWM.

Table 3.1: Description, measurement and a priori expectation of the explanatory variables used in the Probit and Tobit models

Variable	Description	Measurement	Expected sign
Age	Actual number of years of respondent's age	years	+/-
Level of Education	Number of years a respondent spent in formal school system	Years	+/-
Household size	The number of all members in the household	Number	+/-
Household Income	The average monthly income earned by the household head.	Tanzanian shillings (TZS)	+/-
Time	A walking time from a respondent's household to the waste collection points in minutes.	Minutes	+/-
Satisfaction	A dummy that tells whether respondents are satisfied with the present SWM system.	dummy: 1 if satisfied; 0 if otherwise	+/-
Location	A dummy that tells whether respondents are located in highly populated and polluted area or otherwise	dummy: 1 if Highly populated and polluted area; 0 if otherwise	+/-
Trust	A dummy that tells whether respondents trust the government on provision of SWM services or not	dummy: 1 if Trust local government ; 0 if otherwise	+/-

Source: Author's own constructs

3.7 Models for Analysis

In analysing the relationship between the selected socio-economic factors in determining the household WTP for improved SWM in Njombe TC choice models were used. Most studies on household's WTP cited in this study employed either a probit model (for instance Seth et al., 2014; Hagos et al., 2012; Sinha, 2014) or logit model (example see Ali et al., 2012; Addai & Danso-Abbeam and Danso-Abbeam, 2014; Dauda et al., 2015; Dhokhikah et al., 2015) in estimating the factors influencing WTP for improved SWM depending on whether a random component is normally or logarithmically distributed (Breidert et al., 2006).

To elicit the MWTP value, Tobit model is used (Hagos et al., 2012; Awunyo-Victor et al., 2013; Sinha, 2014; Nkansah et al., 2015; Padi, Addor, and Nunfam, 2015). To estimate the WTP in this study, the threshold decision-making theory was employed where respondents were asked ‘yes’ and ‘no’ questions on their WTP and elicit a specific monetary value for ‘yes’ responses.

3.7.1 The Probit Model

To analyse the WTP for improved SWM services, the conventional practice of using a discrete and limited dependent variable model was deliberated. Because the random preferences are unknown and we can only predict the probability statements about the binary responses on ‘yes’ and ‘no’, therefore a Probit model was employed to estimate the probability of WTP. The Probit model was preferred to Logit model in this study because of its normality assumption. Probit model gives a statistical fit to data that is equal or superior to that of the logit model. Thus, the error term is symmetrically distributed about zero (Wooldridge, 2009). The drawback of probit model is that the response probability will not have the probit form, if the error term does not have a standard normal distribution. Also, the model lacks flexibility as it does not easily incorporate more than one prediction variable. Nevertheless, of its drawbacks, the model was useful in this study as it was used to draw conclusions for policy makers on possible interventions derived from the findings.

The Probit mode is therefore modeled based on the utility function presented by equation (1) in section 2.2. Thus, we assume an individual household i has a WTP (price for the improved waste collection service) represented by:

$$WTP_i = \beta \chi_i + \varepsilon_i \quad (3)$$

Where WTP_i is households’ WTP, χ_i represents the vector of explanatory factors and ε_i signifies the systematic random error with zero mean and unit variance that arises from the unobserved factors about i ’s WTP.

Households may or may not be willing to pay for the service. In such cases, the dependent variable assumes a latent (unobserved) status as represented by the following equation:

$$y_i^* = x_i\beta + \varepsilon_i \quad (4)$$

in which y_i^* is the unobserved dependent variable.

β is a parameter of the model (the intercept and coefficients),

X_i is an exogenous set (independent) explanatory variables and

ε_i is the error term, whereby; $\varepsilon_i \sim N[0, \sigma^2]$

If an individual household i is willing to pay, $y_i = 1$ and otherwise $y_i = 0$ (zero).

Mathematically, this is given by

$$y_i = \begin{cases} 1 & \text{if } y_i^* = 1 (\text{household willingness to pay}) \\ 0 & \text{Otherwise} \end{cases} \quad (5)$$

When $y_i^* = 1$, then $y_i = 1$ implying the specific household is willing to pay a positive price for the service. This probability that a household would be willing to pay can be estimated by the Probit model below:

$$Prob(y_i = 1|X) = (2\pi)^{-1/2} \exp(-(\beta X_i)^2/2) \quad (6)$$

Where;

y_i is the dependent Variable (willingness to pay) taking a value of 0 or 1;

X_i is the vector of explanatory variables of Age, Household income, level of education, household size, time spent walking to the disposal site, service satisfaction, location and trust; and

β is the coefficient vector.

Therefore, the regression equation that incorporates all the identified factors above is as follows;

$$y = \beta_0 + \beta_1 Age + \beta_2 Income + \beta_3 Education + \beta_4 Household\ size + \beta_5 Time \\ + \beta_6 Satisfaction + \beta_7 Location + \beta_8 Trust + \mu \quad (7)$$

3.7.2 The Tobit Model

The study used Tobit model which was developed by Tobin in 1958. The model estimates limited dependent variable with a corner solution response. Such a variable is zero for a nontrivial function of the population but is roughly continuously distributed over positive values (Wooldridge, 2009).

This study estimated the Maximum Willingness to Pay (MWTP) Value of respondents which involved zero values and roughly continuously distributed positive values. Respondents who were not satisfied with the current SWM services, who considered that SWM is the responsibility of the government authority and those respondents with low income were expected to offer zero value for improved SWM. On the other side, respondents who were satisfied with the current SWM services, those who were aware of the SWM system in place and those with high income were expected to offer positive roughly distributed values. Since, the dependent variable (MWTP value), is not totally observed (it is censored at zero) and that an OLS (ordinary least squares) estimator cannot be applied, a Tobit model for the observed MWTP was employed.

The underlying assumptions of this model are that the error term is normally distributed with standard deviation and it assumes homoskedasticity. Its variables take on a wide range of values (0 to infinity), thus it is roughly continuously distributed over strictly positive values. The weakness of Tobit model as identified by Maddala (1999) and Sigelman and Zeng (1999) reported by Nkansah et al. (2015), is that “if the zeros in the data are the result of non-observability (strictly a nonnegative distribution) rather than true censoring at zero (some of the zeros representing negative value), then the application of the Tobit estimator is inappropriate”. According to Woodridge (2009), the Tobit model relies significantly on normality and homoskedasticity in the underlying latent model. Thus, failure on any of the assumptions stated above, it is hard to know what a Tobit maximum likelihood estimation technique (MLE) is estimating. In spite of its weaknesses, Tobit model is likely to produce good estimates of the partial effects on the conditional means.

Therefore, Tobit model was used for this study to estimate the factors that determine households' MWTP value for improved SWM services.

Following the work of Hagos et al. (2012), the Tobit model for estimating MWTP value is modeled as follow:

$$MWTP_i^* = \alpha + \beta X_i' + \varepsilon_i \quad (8)$$

$$MWTP_i = \begin{cases} MWTP_i^* & \text{If } MWTP_i^* > 0 \\ 0 & \text{If } MWTP_i^* \leq 0 \end{cases} \quad (9)$$

Where; $MWTP_i^*$ is a household's unobserved MWT value for improved SWM; $MWTP_i$ is a household's actual MWTP value for improved SWM; X' is vector of independent variables; β is vector of coefficients; α is the intercept; and ε_i is disturbance term, which is assumed to be normally independently distributed [NID (0, σ^2)] and independent of X_i . Assuming that censoring point is zero, then:

$$\begin{aligned} MWTP &= \alpha + \beta_1 Age + \beta_2 Income + \beta_3 Education + \beta_4 Household\ size + \\ &\beta_5 Time + \beta_6 Satisfaction + \beta_7 Location + \beta_8 Trust + \varepsilon_i, \text{ (If } MWTP_i^* > 0) \\ &= 0 \text{ Otherwise (if } MWTP_i^* \leq 0) \end{aligned} \quad (10)$$

3.8 Data Reliability and Validity

3.8.1 Data Reliability

Data reliability as has been defined by Joppe, (2000) referred to as the degree to which results are consistent over time and depict a precise representation of the total population under the study phenomenon. Therefore, in order to ensure that the quality of data is maintained, the following measures were taken into account from the pre-testing stage to data analysis. First, questionnaires pre-testing were carried out to 5 households which were not among the survey sample. The problems encountered, time spent and other suggestions for improvement were taken into consideration. Second, the questionnaires for data collection were structured in such a way that some questions were designed to ask similar information in different way to ensure internal consistency.

The questionnaires were also administered into local language (Swahili). The introduction in every questionnaire was very clear and all respondents were equally treated with no bias. To maintain consistency of responses from respondents, questionnaires were coded in excel on daily bases before going to the field the next day.

3.8.2 Data Validity

Data validity determines whether the research instrument truly measures the planned research results (Joppe, 2000). It tries to measure the strength of our results in drawing conclusions and inferences or propositions. To ensure content validity, the study was designed to collect information from households in the study area and not otherwise. The research also employed continuous contingent valuation method to ensure both convergent and divergent validity. To ensure internal validity, the study applied a random sampling technique to collect information from the population and further applied statistical measurements and principles to combine both quantitative and qualitative methods of data analysis for consistency in drawing inferences. The study was also designed to collect information at one point in time (single contact with respondents) to ensure external validity such as to avoid behavioral change of the respondent in giving study information (Hawthorne effects). Furthermore, econometric models were used to estimate the empirical regression models and draw conclusions and implications on the relationships between the variables.

CHAPTER FOUR

PRESENTATION OF FINDINGS

4.1 Overview

The chapter presents the findings on households willingness to pay (WTP) for improved SWM services in Njombe Town Council. Both qualitative and quantitative findings are presented. Descriptive statistics gives the demographic data and the results on households' participation and attitudes towards improved SWM service. Econometric results present quantitative findings where the factors influencing households WTP and MWTP value are examined. The major findings of this study, has been summarised at the end of this chapter.

4.2 Descriptive Statistics

4.2.1 Basic information on the households

The basic information of households (socio-economic characteristics) is shown in Table 4.1 and its correlation with WTP in appendix III. This comprises the age, gender, marital status, level of education, a size of the household, occupation and monthly income. The result showed that the minimum and maximum age of the respondents was 18 and 75 years respectively averaged at the mean of 41 years. Whereby, 32.7 % of the respondents fall within 31 – 40 years and 30.9% of the respondents were between 41 – 50 years, whereas 22.7%, 8.2% and 5.5% of the respondents falls within 18-30, 54-60 and above 61 years respectively. Considering the entire sample the results show that there is a positive correlation between age of respondents and household WTP for improved SWM. This implies that holding all other variables constant, adult are ready to pay for SWM service more than younger people. This suggests that elderly make more mature decisions relating to evaluating health and environmental issues.

The results revealed that of the interviewed respondents, 51.8% were male and 48.2% were female. Concerning the marital status, 70% of the respondents were

married, 18.2% were single, and 10% reported that they were widow while 1.8% of respondents were divorced. Considering the entire sample, gender found negatively correlated with WTP for improved SWM services due to the fact that 51.8% of household heads were men. This may be due to the fact that being a male has a negative perception to participate in SWM activities as women traditionally have been responsible for SWM in the household compared to men.

In terms of educational level, only 7.3% of respondents reported not have been to school, 40% completed primary education while 27.3 % and 25.4% completed secondary education and college/university levels respectively. The results show that household level of education has positive correlation with the WTP for improved SWM service. This implies that higher education enhances consciousness on environment among people. Therefore, education may increase awareness of environmental issues and change people's views towards WTP for improved SWM service.

Further, the results indicated that the average members per household is 5, whereas families with a household size of 4 – 6 members were 54.5% and families with 1-3 members were 25.5% whereas the rest; 7-10 members and with more than 10 members were 18.2% and 1.8% respectively. Household size has negative correlation with household WTP for improved SWM service. This implies that increasing the number of members in the family decreases the WTP. This could be because their disposable income may only fulfill their day to day needs and they do not have enough money to pay for the SWM service.

With regard to the occupation of respondents, the findings showed that 33.6% were self-employed in agriculture, 27.3% were self-employed as traders, and 16.4% of respondents were government employee while the rest were self-employed as labour (10.9%), private company (8.2%), professional consultants (1.8%) and retired (1.8%). About 60% of respondents falls within the monthly income of less than 0.5 Million TZS, 24.5% received between 0.5 and 1Million TZS while 10%, 4.6 % and 0.9% of the respondents claimed that they received 1-2Million, 2-3 Million and greater than 3 Million TZS respectively.

However, there was big difference on the household monthly average income among households from minimum TZS 50,000.0 per month to the maximum TZS 4,000,000.0 per month.

Table 4.1: Descriptive statistics of households' socio-economic characteristics

S/N	Socio-economic characteristic	Criteria	Number of respondent	Percentage (%)
1	Age	18 – 30	25	22.7
		31 – 40	36	32.7
		41 – 50	34	30.9
		54 – 60	9	8.2
		61+	6	5.5
		Total	110	100
	The average household age	Average: 41 years (Minimum 18years Maximum75yeas)		
2	Gender	Male	57	51.8
		Female	53	48.2
3	Marital status	Single	20	18.2
		Married	77	70.0
		Widow	11	10.0
		Divorced	2	1.8
4	Education background	Never been to school	8	7.3
		Primary education	44	40.0
		Secondary education	30	27.3
		College/university	28	25.4
5	Household size	1 – 3	28	25.5
		4 – 6	60	54.5
		7 – 10	20	18.2
		10+	2	1.8
6	Occupation	Average household size = 5		
		Self-employed as labour	12	10.9
		Self-employed in agriculture	37	33.6
		Self-employed as trader	30	27.3
		Self-employed as consultant/professional	2	1.8
		Employee of a private company	9	8.2
		Employee of government (public sector)	18	16.4
7	Average monthly income	Retired	2	1.8
		< 0.5Mn	66	60.0
		0.5 - 1Mn	27	24.5
		1 - 2Mn	11	10.0
		2 - 3Mn	5	4.6
		>3Mn	1	0.9
		(Minimum 50,000 Maximum4,000,000)TZS		
8	Sources of income	Income from farming	41	37.3
		Income from wages	38	34.5
		Income from business profit	44	40.0
		Income from government i.e Pension	3	2.7
		Income from relative remittances	6	5.5

4.2.2 Sources of income

The result on the income of the interviewed respondents showed that the major source of income was business (40%) followed by farming activities (37.3%) and wage (34.5%) as indicated in Figure 4.1.

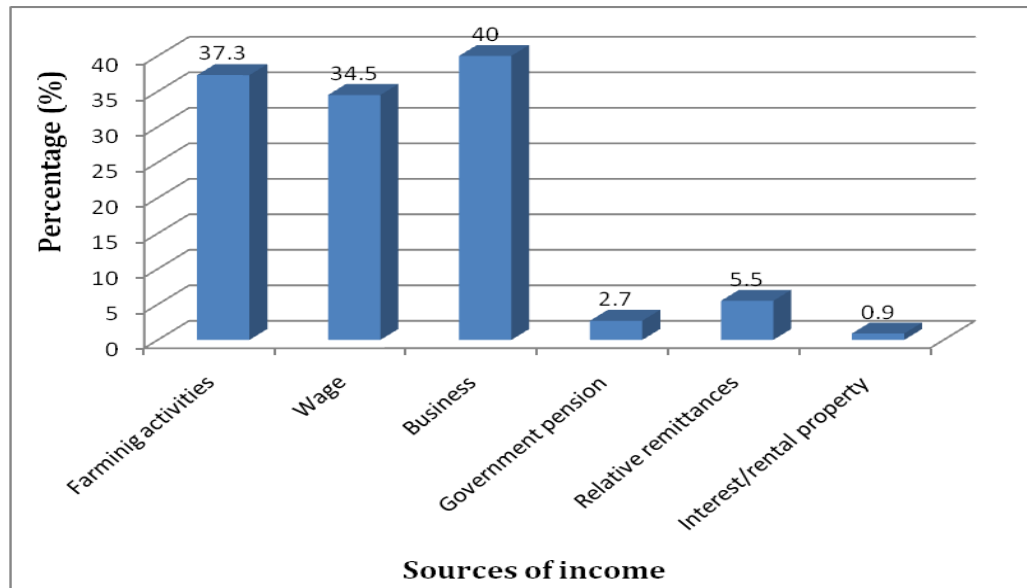


Figure 4.1: Sources of income

4.2.3 Extent of Households' Awareness and their Participation in the Current SWM system

Table 4.2 presents the variables used to examine the extent of household's awareness and their participation in the current SWM system in Njombe TC. The results revealed that 70.9% of the respondents were aware of the current SWM system in Njombe TC whereas 29.1% of respondents were not aware of the current SWM system. However, all of the interviewed respondents (100%) were aware of the harmful effects of poor SWM such as pollution (land, air and water), diseases (Cholera, Diarrhea, Typhoid, Malaria etc.) and breeding of diseases vectors (mosquitoes, worms, flies etc.). Communal container collection was reported to be the only SWM system applied in the council.

The results also showed that 72.7% of respondent participate in SWM activities while 27.3 % of respondents do not participate in SWM activities. The Collection, sorting, transportation and compositing/deposing were the major SWM activities known and practised by most of the respondents, whereas re-use and recycling were less known and practised SWM activities by respondents. The findings further showed that 57.3% of the interviewed respondents were paying the monthly waste fee charged by Njombe TC, whereas 42.7% of respondents were not paying the established waste fee.

In examining the reasons for respondents' participation in SWM in Njombe TC, it was found that 84.9% of respondent participate because of personal interest while 47.1%, 10.3%, 4.6% and 2.3% of respondents participate because of strict follow-up of street government, law enforcement, penalties and strict bylaws respectively. Furthermore, scarcity of local solid waste collection facilities (37%), lack of interest & public awareness (34.8%), lack of technical know-how (34.8%) and SWM system being not in place (21.7%) were the major reasons of respondents not participating on SWM activities in Njombe TC.

Table 4.2: Extent of Households' Awareness and their Participation in the Current SWM system

S/N	Variables	Criteria	Number of respondent	Percentage (%)
1	Public awareness	Aware of the current SWM system	78	70.9
		Not aware of the current SWM system	32	29.1
		Aware of the harmful effects of poor SWM	110	100.0
		Not aware of the harmful effects of poor SWM	0	0.0
2	SWM system applied in the council	Scheduled door to door vehicle collection	0	0.0
		Scheduled neighbourhood vehicle collection	0	0.0
		Communal container collection	78	70.9
3	Household participation in SWM	Participate/Practises SWM	80	72.7
		Not participate/Practises SWM	30	27.3
4	Households SWM activities	Collection	106	94.6
		Sorting	48	43.6
		Transportation	74	67.3
		Composting/deposing	69	62.7
		Recycling	21	19.1
		Re-use	22	20
5	SWM activities practised by household	Collection	106	96.4
		Sorting	16	14.5
		Transportation	11	10.0
		Composting/deposing	23	20.9
		Recycling	1	0.9
		Re-use	7	6.4
6	Households currently pay fee for SWM	Pays fee for SWM	63	57.3
		Don't pay fee for SWM	47	42.7
7	Reason for participation in SWM	Law enforcement	9	10.3
		Strict follow-up of street government	41	47.1
		Strict by-laws	2	2.3
		Penalties	4	4.6
		Personal interest	73	84.9
8	Reason for not participating in SWM activities	Lack of interest and public awareness	16	34.8
		Lack of time	5	10.9
		lack of technical know-how (Not knowing the procedures)	16	34.8
		Scarcity of local facilities	17	37.0
		Lack of incentives	7	15.2
		Laziness	0	0.0
		SWM system not in place	10	21.7

4.2.4 Quality of SWM services delivered

In evaluating the quality of SWM services delivered, the findings as presented in Table 4.3 showed that household SWM storage facilities used in Njombe TC is durable metal/plastic container (68.2%). Few respondents reported the use of Basket or carton container (17.3%) and plastic bags (14.5%). With respect to satisfaction with the quality of service delivered, 28.2% of respondents were not satisfied at all with the current SWM services provided. Only 6.4% of the respondents were very satisfied with the service and 50% were reasonably satisfied. The reported SWM services satisfaction influencing factors were health issues (80.6%), social inclusive services (17.6%) and economic provided (23.5%). Of the interviewed respondents, 78.9% reported not to be satisfied with the current SWM services because of too long interval between collection of solid waste, 65.8% because of lack of clean appearance of the neighbourhood, 57.9% because of lack of clean appearance, which cause availability of flies, odours, or fires at the communal container and 56.6% was because of unreliable service (see figure 4.2).

Table 4.3: Quality of SWM services delivered

S/N	Variables	Criteria	Number of respondent	Percentage (%)
1	Household SWM facilities used	Durable metal/plastic container	75	68.2
		Basket or carton container	19	17.3
		Plastic bags	16	14.5
2	Households' SW disposal area	Pit within the homestead	36	30.9
		Into a communal container in the neighbourhood	60	54.6
		Onto an open pile of waste in the neighbourhood	12	10.9
		At the final disposal, and the waste stays there	4	3.6
3	Satisfaction on Quality of service delivered	Very satisfied	7	6.4
		Reasonably satisfied	55	50.0
		Not satisfied at all	31	28.2
		Don't know	17	15.5
4	SWM service satisfaction	Healthier	54	80.6
		Social inclusive service	12	17.6
	influencing factors	Economic provided	16	23.5
5	Reasons for not being satisfied with the current SWM service	Unreliable service	43	56.6
		The frequency of service – too long interval between waste collection	60	78.9
		The location of the communal container or pick-up point is unsatisfactory	31	40.8
		Lack of clean appearance, odours, flies or fires at the communal container	44	57.9
		Lack of clean appearance of the neighbourhood	50	65.8



Open dumping area in Njombe Town



Communal container collection point (refuse bay)

Figure 4.2: Current SWM situation in Njombe TC

4.2.5 Households' attitudes towards solid waste management

Community's attitudes towards SWM services in Njombe TC was assessed in terms of respondents' receiving, respecting and responding to government policies and other instructions on SWM; their perception of who is responsible for SWM as well as their trust to the entity rendering SWM services in the Council.

4.2.5.1 Receiving, respecting and responding

The results as depicted in Figure 4.3 indicates that 77.3% of respondents accepted SWM policies and other instructions from the government, 58.2% of respondents respected SWM policies and other instructions from the government whereas 57.3% responded on SWM policies and other instructions.

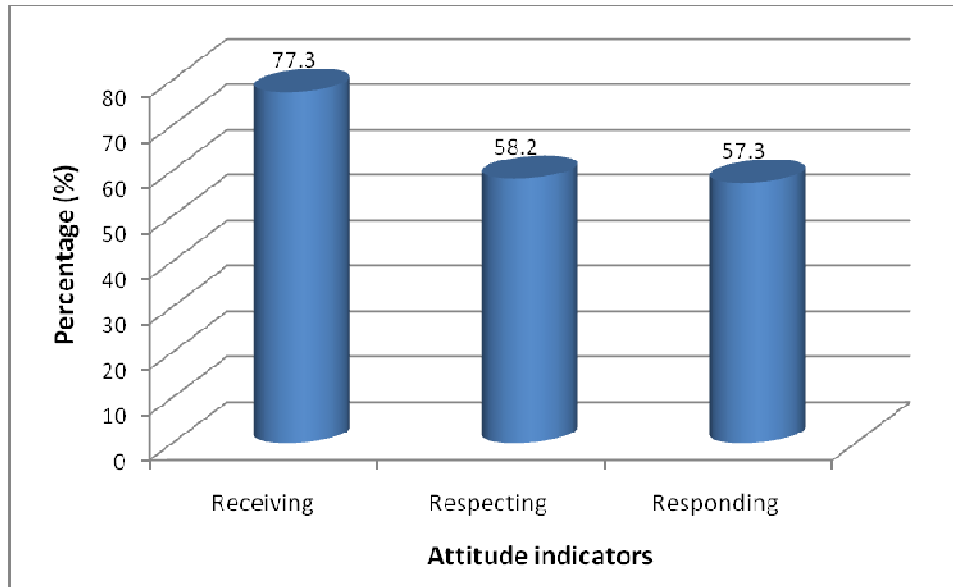


Figure 4.3: Respondents' receiving, accepting and responding to government SWM policies and other instructions

4.2.5.2 Respondent's perception of who is responsible for SWM

The analysis of respondents attitudes towards responsibility on SWM services as indicated in Table 4.4 revealed that 70% of the interviewed respondents considered local government as a responsible entity for SWM while 89.1% of respondents reported that community has responsibility for SWM. Few respondents reported on other responsible entity for SWM such as neighbourhood group (8.2%) and a private company (12.7%). Only 0.9% of the respondent had no idea on who is responsible for SWM in Njombe TC.

Table 4.4: Respondents perception on who is responsible for SWM service

Name of the entity	Frequency	Respondents' percentage (%)
Local government	77	70
Neighbourhood group	9	8.2
Private	14	12.7
community	98	89.1
I don't know	1	0.9

4.2.5.3 Respondents trust to the entity rendering SWM services

The study further investigated on households trust and preference to the entity that can provide quality SWM services in the council. The results presented in Figure 4.4 showed that 45.5% of respondents prefer and trust the local government on SWM services provision and 31.8% prefer and trust the private company while 20% of respondents were indifference, they neither trust the local government nor the private company. Of the interviewed respondents, only 2.7% were undecided to which entity they trust for improved SWM services in the council.

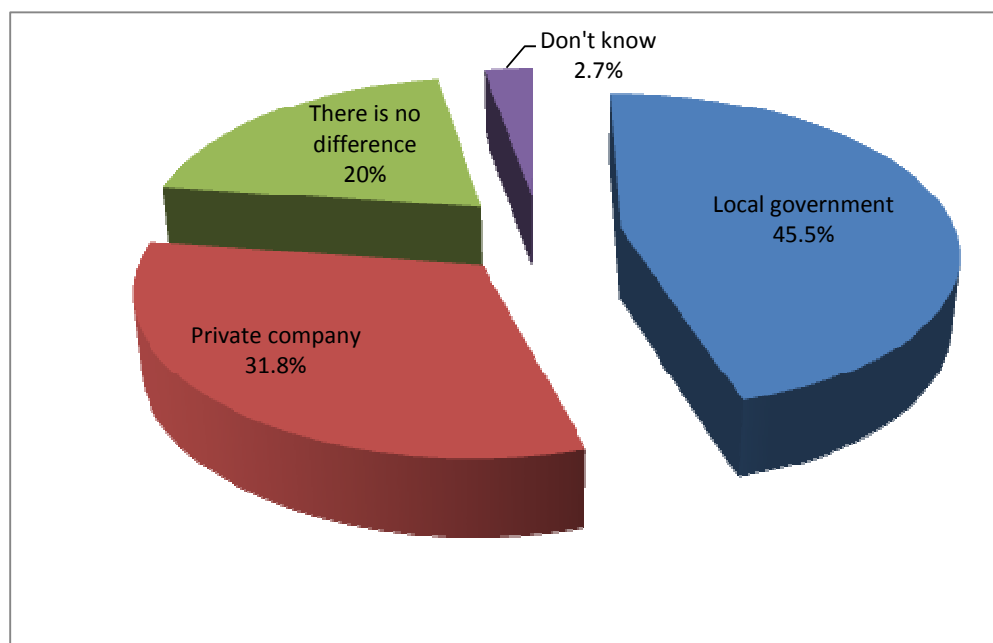


Figure 4.4: Respondents trust to the entity rendering SWM services

4.2.6 Households' WTP for Improved Solid Waste Management

In examining respondent's WTP for improved SWM services, the result in table 4.5 showed that 77.3% of respondents were willing to pay for improved SWM while 22.7% were unwilling to pay for improved SWM services. The major reason for respondent's unwillingness to pay was SWM system being not in place/lack of information about SWMs (54.7%), not satisfied with the current services (29%) and belief that the general taxes should cover the cost of the service (24.2%).

Table 4.5: Willingness to Pay for Solid Waste Management

Variables	Criteria	Number of respondent	Percentage (%)
WTP for improved SWM services	Yes	85	77.3
	No	25	22.7
Reasons for unwillingness to pay	Not satisfied with the current services	18	29.0
	Can't afford to pay for the full cost	2	3.2
	Believe that the general taxes should cover the cost of this service	15	24.2
	SWM system not in place/lack of information about SWMs	35	54.7

4.2.6.1 Estimated Willingness to Pay Value

Through the use of the continuous open-bounded question, the mean monthly WTP in Njombe Town Council is estimated at TZS 1,581.82 as presented in Table 4.6. Comparing to the present sanitary fees of TZS 1000, this WTP is far higher.

Table 4.6: Estimated Willingness to Pay Value

Descriptive Statistics				
A Number of observation	Minimum	Maximum	Mean	Std. Deviation
110	0	5000	1581.82	1107.79

4.3 Econometric Results

This section summarises the estimation results of the Probit regression model in equation (4) and the Tobit regression model in equation (8) presented in chapter two on the factors influencing WTP and the MWTP value for improved SWM services in Njombe TC respectively. Sections 4.3.1 present the results on the factors influencing households' WTP, whereas section 4.3.2 provides the results on the factors influencing the MWTP value.

4.3.1 Factors influencing households' WTP for improved SWM services

In estimating the factors influencing households WTP, the respondents were asked for a 'yes' or 'no' response on their WTP for improved SWM. Because the random preferences are unknown and we can only predict the probability statements about the binary responses on 'yes' and 'no', therefore, a Probit model was employed to estimate the probability of WTP. The Probit regression results of factors influencing households' WTP for improved SWM showing the coefficients, standard errors, significance levels, marginal effects and the constant together with the log likelihood value, Chi-Square, Pseudo R-square and the overall significance of the model is presented in Table 4.7.

The estimation result in Table 4.7 showed the likelihood ratio chi-square of 89.34(df=8) with a p-value of 0.0000 meaning that the joint significance test of all variables in the model is significant at 1% level, implying that the variables correctly predict the model. This further implies that the null hypothesis that households' WTP for improved SWM is not determined by Age, the level of education, household size, monthly income, time, satisfaction, location and trust is rejected. The Probit regression gave a Pseudo R-squared of about 0.7577, suggesting that approximately 76% of the variation in WTP is explained by the explanatory variables. This is an indication that the estimated Probit model has integrity; it is appropriate and is generally good. The validity of the Probit model in estimating households' WTP is in line with related studies by Hagos et al., (2012), Seth et al., (2014), Alhassan and Mohammed, (2013) and Sun et al., (2016).

From the results, Age, level of education, average monthly income, satisfaction level, location, time and trust, were found to be significant and hence influenced households' WTP for improved SWM services. Satisfaction level was statistically significant at 1% as $P < 0.05$ (0.012) with a marginal effect of 0.1722683 and has a positive impact on the WTP. Education, average monthly income and time have a positive impact on households' WTP and were statistically significant at 5% as

P<0.05 with the marginal effects of 0.0159988, 0.0736363 and 0.018051 respectively.

Age, location and trust have a positive effect on households' WTP and were statistically significant at 10% level as P>0.05 with the marginal effect of 0.1536008, 0.1042318 and 0.0905162 respectively. The results further showed that size of the household has a positive impact on households' WTP and statistically insignificant.

The 'linktest' for joint model specification as indicated in Table 4.8 was executed and it was found that the probability of 'hatsq' is 0.711 equivalent to 71% which is good for model specification error. Therefore, this indicates that Probit model used has integrity and is appropriate.

Table 4.7: Results of Probit regression model: Dependent variable: WTP

Independent variables	Coefficient	Std. errors	z	P> z	Marginal Effect
Age	2.184425	1.277841	1.71	0.087*	0.1536008
Level of Education	0.2275253	0.1068324	2.13	0.033**	0.0159988
Household Size	0.0614401	0.137825	0.59	0.555	0.0057266
Monthly Income	1.047215	0.4886276	2.14	0.032**	0.0736363
Time	0.2567116	0.1318891	1.95	0.052**	0.018051
Satisfaction	2.449904	0.9718127	2.52	0.012***	0.1722683
Location	1.482327	0.8201326	1.81	0.071*	0.1042318
Trust	1.287272	0.6958281	1.85	0.064*	0.0905162
Constant	-25.86849	9.466352	-2.73	0.006***	
Number of observations					110
LR chi2(8)					89.34
Prob > chi2					0.0000
Log-likelihood value					-14.284908
Pseudo R-squared					0.7577

***represents significant at 1%; **represents significant at 5%; *represents significant at 10%.

Table 4.8: Specification Test for Probit Statistical model

. linktest						
Iteration 0:	log likelihood =	-58.955588				
Iteration 1:	log likelihood =	-19.172429				
Iteration 2:	log likelihood =	-14.939496				
Iteration 3:	log likelihood =	-14.370266				
Iteration 4:	log likelihood =	-14.358597				
Iteration 5:	log likelihood =	-14.349946				
Iteration 6:	log likelihood =	-14.234979				
Iteration 7:	log likelihood =	-14.227017				
Iteration 8:	log likelihood =	-14.226997				
Iteration 9:	log likelihood =	-14.226997				
Probit regression			Number of obs		= 110	
			LR chi2(2)		= 89.46	
			Prob > chi2		= 0.0000	
Log likelihood = -14.226997			Pseudo R2		= 0.7587	
wtpswm	Coef.	Std. Err.	z	P> z 	[95% Conf. Interval]	
_hat	.9994397	.2544149	3.93	0.000	.5007957	1.498084
_hatsq	.0628495	.169386	0.37	0.711	-.269141	.3948399
_cons	-.069471	.327639	-0.21	0.832	-.7116316	.5726896

Note: 0 failures and 49 successes completely determined.

4.3.2 Factors influencing households' MWTP Value for SWM services

Using continuous CVM, respondents were asked to give the maximum amount of money they are willing to pay for improved SWM. Since the dependent variable (MWTP value) cannot be fully observed (it is censored at zero) and that an OLS (ordinary least squares) estimator cannot be applied, a Tobit model for the observed MWTP value was employed. The Tobit regression results of factors influencing MWTP value for improved SWM showing the coefficients, standard errors, significance levels, marginal effects and the constant together with the log likelihood value, Chi-Square, Pseudo R-square and the overall significance of the model is presented in Table 4.9. In order to test for the goodness of fit, the Pseudo R-squared was used. The Tobit regression gave a Pseudo R-squared of 0.0823. As the value of the calculated R^2 result approaches 1, the explanatory power of the model increases by 0.0823, suggesting that approximately 8% of the variation in MWTP value is explained by the explanatory variables. The likelihood ratio chi-square of 125.44 (df=8) with a p-value of 0.00001 means that the joint significance test of all variables in the model is significant at 1% level as $P < 0.05$, implying that the variables correctly predict the model.

Therefore, the null hypothesis that MWTP value for improved SWM is not determined by Age, level of education, household size, monthly income, time, satisfaction, location and trust is rejected

From the results, level of education, average monthly income, satisfaction level, location, and time were found to be significant and hence influenced MWTP value for improved SWM services. Age, household size and trust were found to be insignificant; thus, have no significant effect on MWTP value.

Level of education, income, time, and satisfaction of respondents have a positive impact on the MWTP value and were statistically significant at 1% level as $P < 0.05$ (0.001) with the marginal effects of 52.50821, 425.5902, 19.42833 and 593.6455 respectively. The Location has a positive impact on the MWTP value and statistically significant at 5% level as $P < 0.05$ with a marginal effect of 294.3139. Age and trust have a positive impact on MWTP value and statistically insignificant while household size has a negative impact on the MWTP value and statistically insignificant.

To test homoscedasticity and normality of the disturbance term in the Tobit model, the bctobit STATA command was used to test the Tobit assumptions. The critical values are found from the bootstrap null distribution of Lagrange Multiplier (LM) test statistic by repeating the sampling from the parametric bootstrap Data Generating Process. The results of LM statistic test as presented in Table 4.10 indicate that the LM value is less than the bootstrap critical value at all levels of significance. The LM test statistic is 0.819 which imply that the Tobit model is correctly specified at all level of significance hence no one or more of the Tobit assumptions are violated.

Table 4.9: Results of Tobit regression model: Dependent variable: MWTP

Independent variables	Coefficient	Std. errors	t	P> t	Marginal Effect
Age	70.57935	298.834	0.24	0.814	55.09694
Level of Education	67.26318	19.55375	3.44	0.001***	52.50821
Household size	-34.95609	35.03135	-1.00	0.321	-27.28806
Income	545.1824	93.28888	5.84	0.000***	425.5902
Time	24.88775	5.978129	4.16	0.000***	19.42833
Satisfaction	760.4617	163.6246	4.65	0.000***	593.6455
Location	377.017	156.1066	2.42	0.018**	294.3139
Trust	143.8846	150.5914	0.96	0.342	112.3218
Constant	-7365.233	1339.093	-5.50	0.000***	
Number of observations					110
LR chi2(8)					125.44
Prob > chi2					0.000
Log-likelihood value					699.70388
Pseudo R-squared					0.0823

***represents significant at 1%; **represents significant at 5%; *represents significant at 10%.

Table 4.10: Specification Test for Tobit Statistical Model

```
. bctobit
Bootstrap replications (499)
-----+----- 1 -----+----- 2 -----+----- 3 -----+----- 4 -----+----- 5
.....
..... 50
..... 100
..... 150
..... 200
..... 250
..... 300
..... 350
..... 400
..... 450
.....
LM test of Tobit specification
              Bootstrap critical values
              %10      %5      %1
lm      .819      3.94895      5.5652452      8.1996794
```

To sum-up, this study results revealed that majority of respondents (77.3%) were willing to pay for improved SWM. The result further showed that a proportion of interviewed respondents (21.7%) claimed not to have SWM system in their place. Thus, there are no local waste collection facilities such as refuse bays, metal bins for solid waste disposals and therefore they do not pay the monthly sanitary fee, leading to uncontrolled waste disposals on unauthorised areas such as open spaces, river banks, water streams, valleys etc. In the areas where SWM system exists, it was found that solid waste collection and disposal facilities were insufficient, hence uncontrolled dumping occurs around the refuse bays and other unauthorised areas. This lowers the satisfaction of communities (63.1%) on the service delivered hence less incentive to participate on SWM. Although the majority of communities (89%) recognise that waste management is not only for the government responsibilities, few households voluntarily respect (58.2%) and respond (57.3%) on the implementation of SWM policies and other instructions from the government.

The econometric results show that all variables included in the Probit model have a significant effect on WTP for improved SWM except household size which has a positive relationship with WTP but insignificant. Likewise, in estimating the factors influencing MWTP value, all variables in the Tobit model revealed significant effects on the MWTP value except household size, age and trust which have an insignificant effect.

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.1 Overview

This chapter discusses the findings on households' WTP for improved SWM services in Njombe TC. The chapter gives the discussion and arguments on the findings presented in chapter four (4) in relation to the study area and other findings from other similar studies and derive conclusions of the study. The chapter provide detailed discussion on the extent of household's participation and their attitudes towards SWM. Furthermore, the influencing factors on households' WTP for improved SWM services are also discussed.

5.2 Extent of Households' Awareness and their Participation in the Current SWM system

The findings in Table 4.2 have confirmed that the SWM system of Njombe TC has not fully motivated the people to participate effectively in SWM activities. The study show that a significant percentage of the study population was not aware of SWM system in the council and some claimed that there is no SWM system in place. Lack of information on SWM to the community is likely to lead to poor sanitary practices in the town council. Public awareness is paramount to stimulate people in participating in all forms of SWM activities. People require access to information about what is being implemented in SWM activity and how they can get involved. These result confirmed the previous study by Dhokhikah et al. (2015), Subhan et al. (2014), Singhirunnusorn et al. (2012), and Alexander et al. (2009). Also, consistency with Minn et al. (2010) who argued that communication is vital element to enhance participatory practices on SWM.

5.3 Quality of SWM services delivered

Based on Table 4.3, the findings revealed that the main waste collection system in Njombe TC is communal containers (refuse bay) where households collect and

dispose solid waste from their houses and have to pay a monthly fee of TZS 1000 for such waste disposal services. There is no scheduled door to door or neighbourhood vehicle collection of waste.

The frequency of service provision is poor; the interval between collections is too long hence, uncontrolled dumping occurs around the refuse bay and other unauthorised waste disposal areas such as open space, along water streams etc.

This lowers the satisfaction of communities on the service delivered hence less incentive to participate on SWM. The results suggest that, although waste collection and transportation from refuse bays to the main disposal sites is outsourced to a private service provider, the public prefers a more aggressive government response. The government should, therefore, take responsibility to ensure quality SWM service delivery as satisfaction level of the community determines the WTP for the service. This is in line with the argument by Afroz et al. (2009) that households were motivated to pay their fees effectively, if they were satisfied with the service being provided. A similar situation was observed and reported by Chengula, et al. (2015) in Morogoro Municipality. The study also agrees with Seth et al. (2014), who reported that unavailability of vehicles for waste collection in rural areas and small towns lead to uncontrolled dumping which occurs within the built up hence, health hazards and negative environmental impact.

5.4 Households' attitudes towards SWM action

The findings as reported in Figure 4.3 confirm that community positively accepts SWM policies and other instructions from the government but few households voluntarily respect and respond on the implementation of SWM policies and other instructions from the government such as respecting the established SWM system and responding through paying the sanitary fee. This result supports the findings by Rahmaddin et al. (2015) who showed that receiving was the highest indicator of community's attitude towards SWM in Maratapura River Banks in Indonesia followed by respecting and responding.

Table 4.4 further indicate that majority of communities in the study area recognize that SWM service is not only for the government responsibilities. Communities as the primary waste producer understand the harmful effects of solid waste and the importance of protecting and keeping the environment neat and healthy.

The possible argument on this result it could be that given a SWM policy in Njombe TC, there might be cooperation between the government and communities in implementing such a policy. The results comply with the findings by Awunyo-Victor et al. (2013) who reported that the communities of the metropolis in Ghana see waste management as a collective responsibility and not the sole role of the government.

The empirical results as presented in Figure 4.4, further recommend that the community perceive government's involvement in SWM as compulsory. This is due to the fact that the government has clearly defined reporting system (chain of command) and it is the major public service provider, therefore, it can provide SWM services at an affordable fee by households compared to a private service provider. The government can also enforce law and bylaws to change people's behaviour towards SWM. This result comply with Cheng and Urpelainen (2015) who reported that community considers the municipal government more important for waste management, but do not support the findings by Sun et al. (2016) who found that communities less trust the China government's effort in air pollution reduction.

5.5 Households' WTP for improved SWM

5.5.1 Estimated value of Households WTP

Based on Table 4.6, the findings suggest that Njombe TC may increase the sanitary monthly fee from the current fees of TZS 1000 to TZS1581.82. Since the Citizens are ready for improved SWM service, therefore, there is an opportunity for Njombe TC to increase the service fee and acquire sufficient funds to greatly improve and modernise SWM services in Njombe Town. This study proposes a starting point for Njombe TC officials in determining a more the right sanitation fee.

5.5.2 Factors influencing Households' WTP for improved SWM services

Based on table 4.7, the findings confirmed that age, level of education, household average monthly income, location, satisfaction on current SWM services, time spent walking to the dump site and trust in Government are the influencing factors on WTP for improved SWM

The age of respondent has a statistically significant and positive effect on the WTP. The positive sign of the age coefficient implies that holding all other variables constant, elderly are willing to pay more than younger people. This suggests that elderly make more mature decisions related to evaluating health and environmental issues, possibly due to their age. The marginal effect revealed that as the age of household respondent's increases by one year, the amount of money an individual would be willing to pay would increase by 15.36%. This result is consistent with findings of Addai & Danso-Abbeam (2014), Mary and Adelayo (2014), Afroz et al. (2009) but contradicts the findings of Seth et al. (2014), Awunyo-victor et al. (2013) and Niringiye & Douglason (2010). Since, the rate of urbanization in the emerging cities in developing countries is increasing, and the fact that high percentage of immigrants from rural to urban areas is young people, therefore local urban authorities responsible for SWM services should develop special SWM programs that motivates youths to make rational decisions associated to valuing health and environmental matters thereby achieving improved sanitary services in urban areas.

The monthly average household income has the expected positive sign on WTP and is statistically significant. This indicates that the amount of money a household is willing to pay for improved solid waste collection service increases with household income. The reported marginal effect of 0.0736363 means that one unit increase in household average monthly income is likely to increase the amount of money an individual would be willing to pay for improved SWM by 7.36%. This result is in accordance with the findings of Sun et al. (2016), Mary and Adelayo (2014), Awunyo-victor et al. (2013) and Banga et al. (2011). The result is also consistent with the environmental economics literature having positive relationship between

income and the demand for improved environmental value (Alhasan and Mohammed, 2013).

Education level is significant and has a positive effect on WTP. Holding all other variables constant, educated people are willing to pay for improved SWM than less educated people. This means that education is a strong predictor for change; therefore, increasing number of years of schooling, the higher the probability of the person's WTP for improved SWM services.

This might be attributed to the facts that as individuals receive more education; the understanding level on the importance of proper waste management also increases. The education level marginal effect of the respondents' showed that the likelihood of a person's WTP for improved SWM services increase with the increase in additional year of schooling by about 0.0159988 equivalents to 1.6%. This result is in line with the findings of Nkansah et al. (2015), Addai & Danso-Abbeam (2014), Awunyo-victor et al. (2013), Roy & Deb (2013), Banga et al. (2011) and Afroz (2009). However, the results contrast Niringiye & Douglason (2010) who reported insignificant result in the study of Kampala City in Uganda.

Location of households in the study area has a positive impact on the WTP for improved SWM services and statistically significant. This means those households located in the highly populated and polluted areas are ready to pay for improved SWM service than households in less polluted areas. This is due to the facts that households located in the highly populated and polluted areas feel the health hazard of uncontrolled solid waste. Therefore, would be eager to pay for improved sanitary to keep their environment clean. These results comply with the finding of Sun et al. (2016) in their study on public perceptions and WTP from the perspective of the smog crisis in China. They found that those who live in a severely polluted area were ready to pay more to cover the cost. The result is also in accordance with Ojewale (2014).

Similarly, household's satisfaction on SWM services was positive and significant showing that WTP goes together with the satisfaction of household on current SWM services provided. This conforms to a prior expectation which can be explained by the fact that satisfied respondents with the current SWM service will be more likely to trust the improvement in SWM service. The possible argument is that the more quality of SWM services provided to the households the more the WTP is realised by households. Another possible concern is that satisfaction with the current SWM service delivered is related with demand for any kind of action. That is, households could be made to agree to pay for improved SWM services once the required conditions are abide.

This result could be in line with the utility maximisation theory that indicates satisfaction as a primary driver of demand for the WTP for improved SWM. The marginal effect of respondents' satisfaction showed that one unit's increase in satisfaction on the current SWM services will increase WTP by 17.23%. The result is consistency with Cheng and Urpelainen (2015) that conducted a similar research in Dar es Salaam city in Tanzania and reported a significant result but negative relationship with WTP. The result also supports the findings of Assa (2013), Afroz (2009) but is in contrast with Addai & Danso-Abbeam (2014) who reported the insignificant result.

Time spent walking to the dump site is another determinant which has a positive relationship and significant effect on WTP for improved SWM services. This means that respondents who spend more time walking to dispose of refuse have a higher WTP than respondents who spend less time. The possible explanation for this result is that households who spend more time walking to the disposal area would be eager to pay for improved SWM that may bring the services near their neighbourhood, thereby reducing the time spent to dispose of refuse. Also, an increase in time walking from household to the dumping site increases the cost of resources such as time and money for waste disposal. A unit increase in time to the waste collection point increases the likelihood of a household WTP for improved SWM by 1.8%.

This confirms the earlier findings of Nkansah et al. (2015), and Awunyo-Vitor et al. (2013).

Trust has also a positive impact on the WTP for improved SWM services and is statistically significant at 10% level. This implies that an increasing trust in government contributes to a higher probability of households having a positive WTP for the improved SWM. Thus, in the study area households trust the government as a public service provider this could be due to the facts stated earlier that the government has a clearly defined chain of command, can enforce law and bylaws and it can provide SWM services at an affordable sanitary fee by households compared to a private service provider. Also, based on the principle analysis people's preferences for government involvement in SWM service reveals their satisfaction with the current SWM service provided. This result is in accordance with the findings of Sun et al. (2016), Marbuah (2016) and Cheng & Urpelainen (2015).

Based in Table 4.7 results further propose that the number of members in the household has no significant effect on WTP although it does have a positive relationship. The positive coefficient for the size of household indicates that at *ceteris paribus*, a unit increase in size of the household even though insignificant will increase WTP by 0.0057266 approximately 0.6%, because its increase may have reduced the ability to self-manage the solid waste. The inconsistency result might be due to the reason that large household sizes are also related to low-income. Also for larger households, it is likely that there would not be agreement among household members and an individual would be evading the responsibility of paying for the SWM service. This result is in line with the findings of Afroz et al. (2009) and Niringiye & Douglasson (2010) but contrast the study of Bhattarai (2015), Mary & Adelayo (2014), Addai & Danso-Abbeam (2014), Roy & Deb 2013 and Ojok et al. (2012). They argued that the additional number of people in the household the more the waste is generated, thus disposal becomes a problem. Households are therefore, more eager to pay in order to keep the environment healthy and clean.

5.5.3.Factors influencing the MWTP Value for improved SWM services

Based on table 4.9, the findings further confirmed that level of education, household income, time spent walking to the dump site; satisfaction and location are the influencing factors on MWTP value for improved SWM services.

The level of education of respondents was found to be positively associated with the MWTP value for improved SWM services and statistically significant. This means that attaining higher level of education, the higher the probability of the person's WTP for improved waste disposal services. The possible explanation for this result is that as individuals receive higher education, the more likely to access information about the environment and health more easily, hence, they understand the necessary requirements for proper waste management to protect their health. Educated people are more likely to read newspapers and magazines and, therefore, have a higher awareness of risks caused by poor waste management and the advantages of right waste disposal. The marginal effect of respondents' education level showed that an increase in a year of education would increase the likelihood of a person's MWTP value for improved SWM services by about TZS 52.5 per month. This result conform the findings of Nkansah et al. (2015) and Hagos et al. (2012).

Monthly average household income is statistically significant and has a positive impact on MWTP value. An additional unit increase in income will increase the MWTP value by about TZS 425.59. This implies that households who earn more income would be ready to pay more than households with less income. The results comply with economic theory which indicates that income is positively related to the theory of demand, and the environmental demand. This is in conformity with the work of Nkansah et al. (2015), Padi et al. (2015), Awunyo-victor et al. (2013), and Hagos et al. (2012).

The time spent walking to waste collection point or disposal site revealed a significant result and positively relate to MWTP value. This implies that respondents who spend much time walking to dispose of refuse are ready to pay more for the SWM service than those who spend less time.

Thus, they will be willing to pay to have their waste collected for them rather than having to spend much time walking to the disposal site. The marginal effect shows that increase of one minute walking time to the disposal site will increase in MWTP value by TZS 19.43 per month. This confirms the earlier findings of Nkansah et al. (2015), Alhasan and Mohammed (2013) Awunyo-victor et al. (2013) and Tadesse (2009).

Household's satisfaction on current SWM services provided has also a positive relationship on MWTP value and significant. The marginal effect of respondents' satisfaction showed that one unit increase in satisfaction on the current SWM services will increase MWTP value by about TZS 593.65 more per month. This means that the more satisfied households with the current SW collection services were eager to pay more than dis-satisfied households. The additional explanation is that households' WTP for improved SWM services would depend on the quality of services currently provided by the waste collectors.

The result supports the findings of Cheng and Urpelainen (2015), Assa (2013) and Afroz (2009) but is in contrast with Addai & Danso-Abbeam (2014) who reported the insignificant result.

Likewise, location of households has a positive effect on the MWTP for improved SWM services and is statistically significant. This means that households located in the highly populated and polluted areas have high MWTP value for improved SWM service than households in less polluted areas. The possible argument is that households located in the highly populated areas experience the health hazard of uncontrolled solid waste. Therefore, would be ready to pay for improved sanitary to preserve their environment. The marginal effect on households' location showed that households located in highly populated and polluted areas are willing to pay TZS294.31 more per month. The results comply with the finding of Sun et al. (2016).

However, the findings in Table 4.9 indicated that age, household size and trust in Government have an insignificant effect on MWTP value for improved SWM services. Age of respondents has a positive impact as expected but statistically

insignificant. The positive sign suggests that as the age of a person increases, the person make mature decisions patterning waste management. The insignificant result could be explained that most of the interviewed respondents (86%) were of the age between 18 and 50 years old which are considered to represent young group. Therefore this confirmed the argument that elderly is ready to pay more than younger people. This is due to the fact that younger generation could consider SWM as a responsibility of the government and could be less willing to pay for it, unlike the old people who might be more aware of public services cost sharing. The insignificant result confirms the study by Hagos et al. (2012) who undertook a study on households' WTP for improved urban waste management in Mekelle city, Ethiopia. This result contradicts the previous studies of Nkansah et al. (2015), Padi et al. (2015), Awunyo-Vitor et al. (2013), Assa (2013) and Huang et al. (2013) who reported positive effect and significant results.

The findings reported that the size of the household has a negative relationship with MWTP value for improved SWM services and statistically insignificant. This means that as the family size increases, the MWTP value for improved SWM service is likely to decrease. The possible argument on this result it could be that given a large number of members of the household, there would not be agreement among household members and an individual would be dodging an accountability of paying for the waste they generate. However, this result contradicts the finding of Nkansah et al. (2015) who reported that as the number of members in a given household increases, the household will try to keep the environment clean in order to avert any disease outbreak which may potentially harm the members of the household.

Furthermore, the findings showed that the coefficient of trust had a positive influence on the MWTP value but statistically insignificant. The positive sign suggests that a trust in government can contributes to a higher probability of having a positive MWTP value. The possible explanation for the insignificant result might be due to the fact that the current SWM system in Njombe TC does not satisfy the majority of households. The council is accountable for collection and disposal of waste but the uncollected wastes were seen at the refuse bays and open spaces. Therefore, this is

likely to decrease public's trust in government. The results comply with Huang et al. (2013) but contrast the findings of Sun et al. (2016) and Cheng and Urpelainen (2015) who reported positive effect and significant results of trust on WTP.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Overview

This chapter presents the summary, conclusions and policy implication of the study. The chapter is divided into three sections. The first section summarises the results and conclusions of the entire study, the second section presents the implications of the study, where policy implications and areas for further study are presented; while the third section gives the limitations of the study.

6.2 Summary and conclusions

This study purposely investigated household WTP for improved SWM services. Specifically, the study aimed to examine the extent of household's participation in SWM services, to assess the households' attitudes towards the SWM actions, to estimate households' WTP and to determine the factors influencing households' WTP and the MWTP value for improved SWM services in Njombe TC

The study used cross-sectional data obtained from 110 households from 26 streets in Njombe TC through the use of structured questionnaire. The dichotomous continuous contingent valuation method was used to elicit the WTP and MWTP value for improved SWM services. Data was analysed using descriptive statistics on household's participation and their attitudes towards SWM action, Probit and Tobit regression models to obtain the casual relationships and effects of the variables on households' WTP and households' MWTP value for improved SWM services.

The results on household's participation in SWM activities show that a significant portion of the population (29.1%) was not aware of SWM system in the council and 21.7% claimed that there is no SWM system in place. The main waste collection system in Njombe TC is communal containers (refuse bay) which are poorly managed, where household collects and dispose solid waste from their houses and have to pay a monthly fee of TZS 1000 for such waste disposal services. The findings also revealed that 72.7% of respondents participate in SWM activities

mainly in the collection and composting. The reported reasons of respondents not participating on SWM activities were a lack of technical know-how, SWM system being not in place, Scarcity of local facilities, Lack of interest and public awareness, Lack of time and incentives.

The study revealed that attitudes of households towards SWM actions were high on receiving (77.3%) of SWM policies and other instructions from the government. However, few households voluntarily respects (58.2%) and responds (57.3%) on the implementation of SWM policies and other instructions from the government such as respecting the established SWM system and responding through payment of TZS 1000 per month as a sanitary fee.

The study further showed that Communities as a primary waste producer they understand the harmful effects of improper SWM and the importance of protecting and keeping the environment neat and healthy, and that waste management is not only the responsibility of the government. The empirical results recommend that government's involvement on SWM is perceived as compulsory by the community because of its clearly defined reporting system (chain of command), it is the major public service provider, therefore, it can provide SWM services at affordable fee by households compared to private service providers, and that the government can enforce law and bylaws to change people's behaviour towards SWM.

The findings revealed that 77.3% of respondents were eager to pay for improved SWM while 22.7% were not ready to pay for improved SWM services. The estimated mean monthly WTP value in Njombe Town Council is TZS1581.82 which is higher than the current sanitary fees of TZS 1000.

The findings from the Probit regression model show that age, level of education, household average monthly income, location, satisfaction on current SWM services, time spent walking to the dump site and trust in Government are the influencing factors on WTP for improved SWM; while the Tobit regression model confirmed that level of education, household income, time spent walking to the dump site;

satisfaction and location are the influencing factors on MWTP value for improved SWM services.

Age of respondent has a positive relationship on both WTP and MWTP value for improved SWM services, leading to similar conclusion of Addai & Danso-Abbeam (2014), Mary and Adelayo (2014) and Afroz et al. (2009) that elderly make more mature decisions related to evaluating health and environmental matters, possibly due to their oldness. Education of respondent, average household income and time spent walking to the disposal site have a positive influence on households WTP and MWTP value for improved SWM services and statistically significant at 5% and 1% levels respectively.

Households' satisfaction has a positive relationship on both WTP and MWTP value and statistically significant at 1% levels. The location of households and trust on the government on SWM services provision were also found to have positive impacts on households WTP and MWTP value for improved SWM services. Both variables are statistically significant at 10% on WTP. Location is also statistically significant at 5% on MWTP value while trust is statistically insignificant on MWTP value.

6.3 Implications

6.3.1 Policy Implication

The study results indicated that most of the respondents (77.3%) were ready to pay for improved SWM. So, people are interested in the improved SWM service. The mean WTP value of households was TZS 1581.82 per month while the current garbage fee charged by the Njombe TC is TZS1000 per household per month. Thus, present solid waste collection fee is far below the calculated household mean WTP value. So, there is the chance of increasing solid waste collection fee.

However, it is recommended that, while charging for the service, it is not mandatory to charge as per calculated household WTP mean value. For this, a socially acceptable fee should be determined. The reported mean WTP value may be a guide to Njombe TC authorities in setting an appropriate solid waste collection fee.

Njombe TC can charge higher solid waste collection fee for households located in highly populated and polluted streets as the study show that households located in highly populated and polluted areas have a positive and significant effect on WTP and MWTP value. However, different provisions should be considered in setting up waste collection fee so that more and more households would take the improved solid waste collection service.

The study revealed that 29.1% of respondents were not aware of the current SWM system in Njombe TC and 21.7% of the respondents declared that there was no SWM system in place. Njombe TC should therefore, facilitate awareness to improve SWM service in the town through the mass media and campaign. Information through mass media, electronic media or training programs can play a key role in changing of the attitude of community toward SWM actions. Njombe TC should also ensure that there is a combined effort of citizens and the council. Thus, there is the responsibility of both residents of Njombe TC as the primary waste producers as well as the council authorities as a public service provider. Properly designed and well operated solid waste refuse bays are needed in the council. Strict payment regulations should be used to enforce households to pay for improvement of solid waste collection services.

Effective Public – Private Partnerships (PPP) should be structured where households which are the primary producers of solid waste and suffer the effects of poor sanitary services directly should participate in SWM to ensure delivery of such services satisfactorily. Needs assessment by the service provider (whether the council or private firm) is crucial to better understand households' demands and their motivation for improved SWM services.

The study further suggests that age of respondent, level of education of respondent, household income; time spent walking to the disposal site, household satisfaction on the current SWM services, location of household and trust of household to the government on SWM services provision are the factors influencing households' WTP and the MWTP value for improved SWM in Njombe TC.

The study also provides contributions to the existing literature on household's participation, their attitudes towards SWM and the factors influencing households' WTP for improved waste collection services. Hence, the results of this study would enrich our understanding of household WTP for waste collection services in the emerging town/municipals in developing countries and is a guide to policy makers.

6.3.2 Areas of further Studies

This survey was conducted in Njombe TC and might not be a representative of the whole country. Therefore, for future it is recommended to extend the study to other parts of the country.

Furthermore, the study provides important insight to households SWM in Njombe TC and how improvements can be made. Nevertheless, further studies of similar nature is needed with a significantly higher number of interviewees extending to all key actor groups (households, hotels, restaurants, markets, hospitals, NGOs/CBOs etc.). Data from such studies would give more in-depth knowledge of SWM services in Njombe TC and would provide valuable and helpful details needed for sustainable development and implementation of improved SWM programmes and policies that are most appropriate for the council.

6.4 Research Limitations

Firstly, this study is mainly based on cross-sectional data. Such kind of data limits the analysis of the dynamics. For this reason, use of panel data for future research is recommended.

Secondly, this study was carried out from a sample of households depicted randomly from 26 streets of Njombe TC in Njombe region, Tanzania. Thus, the findings might be region-specific. Future studies could use samples of households from other regions in the country or from other national contexts of a similar set-up to test and extend the generalisations of the findings.

Thirdly, the inconsistency of some results may be contributed by the limited sample size. The sample size to this study was limited to 110 respondents that could limit the generalisation of the study. Future study should consider large sample size as much as possible.

Fourthly, The CVM technique employed for this study, however, suffers from one major drawback despite its ability to measure total economic values. The hypothetical nature of the questions used in CVM surveys may pose problems since respondents may have little incentive to provide information on their true WTP. Despite this limitation which is well acknowledged in this dissertation, CVM was used because of its ease of data collection and requirement compared to other valuation methods.

Fifth, some of the information provided by the respondents might be inaccurate because some of them do not keep a record, hence may give estimates, for instance, data on household monthly income.

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APPENDICES

Appendix I: Questionnaire for Households Willingness to Pay for Improved Solid Waste Management in Njombe Town Council

Questionnaire Number: _____

Date: _____

Name of interviewer: _____ (Optional)

Location/Street: _____

Telephone number (if available) _____

A. Identification

First of all, I would like to thank you for taking the time for this interview. Before I start, I would like to introduce myself. My name is Emma Lunojo and I am collecting data for a master thesis on Improved SWM. I study at Mzumbe University in Morogoro. The purpose of the master thesis is to investigate households' WTP for improved SWM service in Njombe Town Council. In total, we will talk to at least 100 households in Njombe Town Council. The results of the study will be translated into recommendations that would assist Njombe Town Council in determining how to improve the solid waste collection service to your area. So your input is considered very valuable to this survey. I would like to mention that the interview data will only be used for data analysis. All data published in reports will be made anonymous, that is, there will be no reference to specific households or names of persons.

B. General Information

Now I would like to start with the questionnaire. First of all, I would like to ask you a couple of general questions about you and your household.

1	Age	Years
2	Gender	☐ Male ☐ Female
3	Marital status	☐ Single ☐ Married ☐ Widow ☐ Divorced
4	How many years of formal education did you have?	 Years
5	What kind of formal education have you received? [Please tick 'received' at highest level of education only]	☐ Never been to school ☐ Primary education ☐ Secondary education ☐ College/University
6	How many members are in your household?	members
7	What is your main occupation	☐ Self-employed as laborer ☐ Self-employed in agriculture (as a farmer/livestock keeper) ☐ Self-employed as trader ☐ Self-employed as consultant or professional ☐ Employee of a private company ☐ Employee of government (public sector)

		☐ Retired ☐ Other (please specify).....	
8	What are your source of income	Source of income	Estimate amount (TZS)
		Farming activities	
		Worker wages	
		Profit from business	
		Government income, such as pension	
		Remittances from relatives	
		Income from interest or rental property	
		Other cash income (specify)	
		Total Monthly income (TZS)	

C. Current Solid Waste Practices and Households Participation

“I would like to ask you some questions regarding your knowledge, participation and your view towards the current solid waste management system in Njombe Town Council.

9	Are you aware about the current solid waste management system in Njombe Town Council?	☐ Yes (Go to question 10) ☐ No (Go to question 11)
10	If “Yes” which solid waste management system is applied in the council?	☐ Scheduled door to door vehicle collection ☐ Scheduled neighborhood vehicle collection ☐ Communal container collection ☐ Others (Please specify).....
11	Do you participate/practice solid waste management in your areas?	☐ Yes (Go to question 12) ☐ No (Go to question 13)
12	If yes, what are the reasons for participating in solid waste management	☐ law enforcement ☐ strict follow-up of street government ☐ strict by-laws ☐ penalties ☐ my personal interest ☐ others (please specify)

13	If not practicing on any SWM activity, what are the reasons?	☐ Lack of interest and public awareness ☐ Lack of time ☐ Not knowing the procedures (lack of technical know-how) ☐ Scarcity of local facilities ☐ Lack of incentive ☐ Laziness ☐ SWM system not in place ☐ Others (please specify).....
14	What are the activities that involve household Solid waste Management (SWM)?	☐ collection ☐ sorting ☐ Transportation ☐ compositing/depositing ☐ recycling ☐ re-use ☐ Others (please specify)
15	What are the SWM activities do you practice at your household?	☐ collection ☐ sorting ☐ Transportation ☐ compositing/depositing ☐ recycling ☐ re-use ☐ Others (please specify)

16	What kind of facilities does your household use for collection and storing solid waste?	☐ durable metal/plastic container ☐ basket or carton container ☐ plastic bags ☐ Others (please specify).....
17	a) Does the local government make follow-up on solid waste management in your areas?	☐ Yes(Go to question 17b) ☐ No(Go to question 17c)
	b) If “Yes” which strategies they use	☐ Street government follow-up ☐ law enforcement ☐ door to door inspection ☐ others (please specify)
	c) If “No” who enforce the waste management in your areas	☐ Private company ☐ NGO/CBO ☐ Local organised group ☐ others (please Specify)
18	Where is your solid waste taken to be disposed?	☐ Pit within the homestead ☐ into a larger container in the same building ☐ into a communal container in the neighbourhood. ☐ onto an open pile of waste in the neighbourhood. ☐ at the final disposal, and the waste stays there ☐ Others (please specify).....

19	Approximately how far or how many minutes walking time one-way is it to empty your container/dispose your waste?	 minutes walking one-way meters one-way [] Don't know
20	Are you happy with the distance?	[] Yes [] No (if No, Why?) please briefly explain
21	In your point of view, what are the effects of uncollected and mismanagement of solid waste in your area?	Please mention i)..... ii)..... iii).....
22	Who collects the waste from your household neighbourhood?	[] Local government [] Neighbourhood group [] Private company [] Don't know
23	Has the same organisation been collecting the waste for the past five years, or has there been a change in who has been collecting your waste?	[] The same organisation for the last five years [] There has been a change in the last five years. [] Don't know If there has been a change, please give more details

24	What is your quality/satisfaction level on the service that you are receiving for collection of solid waste from your neighborhood?	☐ Very satisfied. ☐ Reasonably satisfied. ☐ Not satisfied at all. ☐ Don't know
	a) If you are satisfied with the SWM services, what is the influencing factors	☐ Healthier ☐ Social inclusive service ☐ Economical provided ☐ Others (please specify)
	b) If you are not satisfied with service, would you state your primary reason?	☐ The service is not reliable ☐ Frequency of service – the interval between collections is too long. ☐ The location of the communal container or pick-up point is unsatisfactory ☐ Lack of clean appearance, odors, flies or fires at the communal container. ☐ Lack of clean appearance of the neighborhood ☐ Other problem. Please explain.....

25	In your view, who is responsible for SWM in your neighborhood?	☐ Local government ☐ Neighbourhood group ☐ Private company ☐ Community ☐ Don't know Please briefly explain why?
26	Does your household currently pay any fee for SWM services?	☐ Yes (Go to question 27) ☐ No (Go to question 28)
27	How much do your household pay per month as a fee for SWM services?	TZS
28	What is your reason(s) for not paying SWM service fee?	☐ Not satisfied with the current services ☐ Can't afford to pay for the full cost ☐ Don't consider the service is important ☐ Believe that general taxes should cover the cost of this service ☐ SWM system not in place/lack of information on SWM services ☐ Other. Please explain

		
29	If Njombe town council improves Solid waste collection services, would you be willing to pay for the service?	☐ Yes (Go to question 30) ☐ No (Please explain.....
30	What is the maximum fee per month that your household would be willing to pay for improved SWM services?	TZS
31	If you are willing to pay for improved collection service, whom would you trust and prefer to provide the service to you? And why?	☐ The local government ☐ A private company ☐ There is no difference ☐ Don't know Why? (Please State)

D. End of interview

This is the end of the interview. I would like to thank you very much for your time and the information you gave us.

32. Do you have any questions or is there anything else you would like to tell me with regard to SWM services in Njombe Town Council?

.....

.....

.....

Thank you again for your time.

Appendix II: Waste Generation Projections for 2025 by Regions Worldwide

Region	Current Available Data			Projections for 2025			
	Total Urban Population (millions)	Urban Waste Generation		Projected Population		Projected Urban Waste	
		Per Capita (kg/capita/day)	Total (tons/day)	Total Population (millions)	Urban Population (millions)	Per Capita (kg/capita/day)	Total (tons/day)
AFR	260	0.65	169,119	1,152	518	0.85	441,840
EAP	777	0.95	738,958	2,124	1,229	1.5	1,855,379
ECA	227	1.1	254,389	339	239	1.5	354,810
LCR	399	1.1	437,545	681	466	1.6	728,392
MENA	162	1.1	173,545	379	257	1.43	369,320
OECD	729	2.2	1,566,286	1,031	842	2.1	1,742,417
SAR	426	0.45	192,410	1,938	734	0.77	567,545
Total	2,580	1.2	3,532,252	7,644	4,285	1.4	6,069,703

Source: World Bank (2012)

Appendix III: Probit and Tobit Binary Regression Models outputs

```

STATA (R)
Statistics/Data Analysis 11.0 Copyright 1984-2009
Special Edition StataCorp
4905 Lakeway Drive
College Station, Texas 77845 USA
800-STATA-PC http://www.stata.com
979-696-4600 stata@stata.com
979-696-4601 (Fax)

Single-user Stata license expires 31 Dec 9999:
Serial number: 71606281563
Licensed to: STATAForAll
STATA

Notes:
1. (/mp option or -set memory-) 50.00 MB allocated to data
2. (/vp option or -set maxvar-) 5000 maximum variables
3. New update available; type update all

. use "G:\3rd Draft\Emma2 with log and dummy.dta", clear
. do "G:\3rd Draft\emma new do file.do"
. probit wtpswm lnAGE elevel hsize lnINCOME time Dsatsf DLOCH Dtrust

Iteration 0: log likelihood = -58.955588
Iteration 1: log likelihood = -22.350612
Iteration 2: log likelihood = -16.853252
Iteration 3: log likelihood = -14.552425
Iteration 4: log likelihood = -14.286844
Iteration 5: log likelihood = -14.284908
Iteration 6: log likelihood = -14.284908

Probit regression
Log likelihood = -14.284908

Number of obs = 110
LR chi2(8) = 89.34
Prob > chi2 = 0.0000
Pseudo R2 = 0.7577

+-----+-----+-----+-----+-----+-----+
| wtpswm | Coef. | Std. Err. | z | P>|z| | [95% Conf. Interval] |
+-----+-----+-----+-----+-----+-----+
| lnAGE | 2.184425 | 1.277841 | 1.71 | 0.087 | -3.200968 | 4.688946 |
| elevel | .2275253 | .1068324 | 2.13 | 0.033 | -.0181377 | .4369129 |
| hsize | .0814401 | .137825 | 0.59 | 0.555 | -.1886919 | .3515721 |
| lnINCOME | 1.047215 | .4886276 | 2.14 | 0.032 | -.0895225 | 2.004908 |
| time | .2567116 | .1318891 | 1.95 | 0.052 | -.0017863 | .5152096 |
| Dsatsf | 2.449904 | .9718127 | 2.52 | 0.012 | .5451861 | 4.354622 |
| DLOCH | 1.482327 | .8201326 | 1.81 | 0.071 | -.1251035 | 3.089757 |
| Dtrust | 1.287272 | .6958281 | 1.85 | 0.064 | -.0765264 | 2.65107 |
| _cons | -25.86849 | 9.466352 | -2.73 | 0.006 | -44.4222 | -7.314784 |

```

```

. linktest

Iteration 0: log likelihood = -58.955588
Iteration 1: log likelihood = -19.172429
Iteration 2: log likelihood = -14.939496
Iteration 3: log likelihood = -14.370266
Iteration 4: log likelihood = -14.358597
Iteration 5: log likelihood = -14.349946
Iteration 6: log likelihood = -14.234979
Iteration 7: log likelihood = -14.227017
Iteration 8: log likelihood = -14.226997
Iteration 9: log likelihood = -14.226997

Probit regression
Log likelihood = -14.226997

Number of obs = 110
LR chi2(2) = 89.46
Prob > chi2 = 0.0000
Pseudo R2 = 0.7587

+-----+-----+-----+-----+-----+-----+
| wtpswm | Coef. | Std. Err. | z | P>|z| | [95% Conf. Interval] |
+-----+-----+-----+-----+-----+-----+
| _hat | .9994397 | .2544149 | 3.93 | 0.000 | .5007957 | 1.498084 |
| _hatsq | .0628495 | .169386 | 0.37 | 0.711 | -.269141 | .3948399 |
| _cons | -.069471 | .327639 | -0.21 | 0.832 | -.7116316 | .5726896 |

```

Note: 0 failures and 49 successes completely determined.


```

. bctobit
Bootstrap replications (499)
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
..... 50
..... 100
..... 150
..... 200
..... 250
..... 300
..... 350
..... 400
..... 450
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
LM test of Tobit specification
          Bootstrap critical values
          %10      %5      %1
lm      .819      3.94895  5.5652452  8.1996794

```

Correlation results of basic information

```
. corr wtpswm age gender mstatus elevel hsize Occptn aincome
(obs=110)
```

	wtpswm	age	gender	mstatus	elevel	hsize	Occptn	aincome
wtpswm	1.0000							
age	0.1130	1.0000						
gender	-0.1283	-0.0216	1.0000					
mstatus	-0.1146	0.5453	0.1351	1.0000				
elevel	0.4936	-0.1635	-0.1003	-0.1314	1.0000			
hsize	-0.0691	0.1104	-0.0362	0.1211	0.0895	1.0000		
Occptn	0.3057	0.1496	0.0311	0.0813	0.4078	-0.0945	1.0000	
aincome	0.3480	0.1492	-0.3118	-0.0241	0.3821	0.1860	0.0630	1.0000

```
. ttest wtpswm, (by gender)
```

```
option ( not allowed
```

```
r(198);
```

```
. ttest wtpswm, by (gender)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.
[95% Conf. Interval]				
-----+-----				
Male	57	.8245614	.0508253	.3837227
.7227461	.9263767			
Female	53	.7169811	.0624683	.4547763
.5916293	.842333			
-----+-----				
combined	110	.7727273	.0401396	.4209882
.6931718	.8522827			
-----+-----				
diff		.1075803	.0800368	
-.0510665	.2662271			

```
diff = mean(Male) - mean(Female)
```

```
t = 1.3441
```

```
Ho: diff = 0
```

degrees

```
of freedom = 108
```

```
Ha: diff < 0
```

```
Ha: diff != 0
```

```
Ha: diff > 0
```

```
Pr(T < t) = 0.9091
```

```
Pr(|T| > |t|) = 0.1817
```

```
Pr(T > t) = 0.0909
```

Appendix IV: Photos Showing the Current Solid Waste Management Situation in Njombe Town Council



Above are some of the commonly household's local SW facilities used in Njombe TC





Refuse bay in High density - Idundilanga street



Refuse bay in low density street - Kambarage



Melinze street refuse bay (High density area)



Posta kati street open pile (High density area)



Matalawe SW decomposing/deposing



Kwivaha Street open pile (high density)

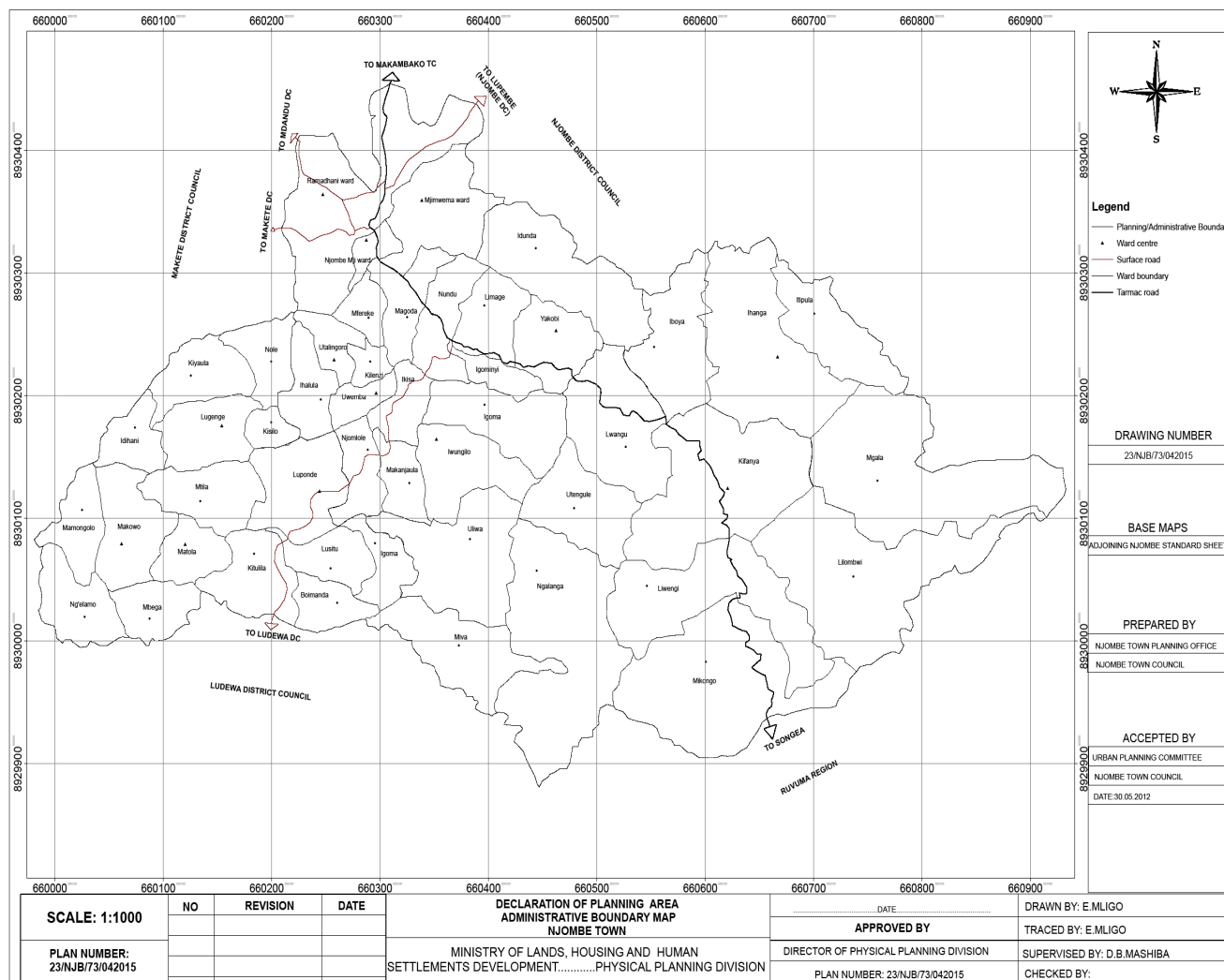


NHC Street dumping along the valley - near water stream (High density area)



Main dumping site - Maheve

Appendix V: Njombe Town Council Map



Source: Njombe TC Land and Urban planning department