WOLKITE UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTEMENT OF ECONOMICS

HOUSHOLD WILLINGNESS TO PAY FOR IMPROVED SOLID WASTE MANAGEMENT SERVICE IN CASE OF AMBO TOWN

A RESEARCH SUBMITTED TO DEPARTEMENT OF ECONOMICS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BA IN ECONOMICS

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WOLKITE, ETHIOPIA

DECLARATION

I, Bayisa, declare that this research entitled: *"Household willingness to pay for improved solid waste management service in case of Ambo town"* is outcome of my own effort, and that all sources of materials used for the study have been appropriately acknowledged. To the best of my knowledge, this study has not been submitted for any degree in this University or any other University. It is offered for the partial fulfillment of the Bachelor degree in economics.

By: Bayisa Dabare.

Signature----------

Date----------

ADVISORS' APPROVAL PAPER

This is to certify that the research entitled "household willingness to pay for improved solid waste management service in case of Ambo town*"* submitted in partial fulfillment of the requirements for the Bachelor degree in Economics, of the Department of Economics, and has been carried out by Id. No 097/09 under my/our supervision. To the best of my knowledge, is an original work and not submitted earlier for any degree either at this University or any other University.

Therefore I recommend that the student has fulfilled the requirements and hence here by can submit the research to the department.

Advisor: Tesfaye Etensa (Ass. Prof)

Signature:_____

Date: June 20, 2019

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ACRONYMS AND LIST OF ABBRIVATIONS

A – Addis Ababa.

CSA- Central statistical analysis.

ETB – Ethiopian Birr.

KM – Kilo Metter.

LGAs – Low Government Administrative.

MSW – Municipal Solid Waste.

MASL – Matter above Sea Level.

MSEs – Micro and Small Enterprises.

NGO – Non Governmental Organization.

SWM – Solid Waste Management.

VIF – Variance Inflation Factors.

WTP – Willingness to Pay.

UNEPA- united nation environmental protection agency.

UNESCO- united nation environmental, social, and cultural organization.

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ABSTRACT

The provision of solid waste management service has always been the major environmental problem for the town of Ambo. The introduction of service charges in the area of solid waste management is getting much attention due to continuous financial shortage of the town municipality to provide this service at an acceptable level. The pricing of this service is believed to not bring efficiency and sustainability in this area. In line with this, this study was undertaken to examine the extent of solid waste management service problem and households' willingness to pay for improved solid waste management services. For this 100 sample selected households were used. The probit models are used for the empirical analysis. The study found that among the variables such as household age, weekly solid waste generation, education level, distance from dump area, income, house ownership and family size of households are affect the willingness to pay for improved solid waste management service statistically significantly. The other affects statistically insignificantly. In fact from those variables such as household age, education level, sex, marital status, house ownership and household incomes are positively affect WTP. The remaining is negatively affecting WTP.

Keywords: solid waste, WTP, Probit, Ambo

CHAPTER ONE

INTRODUCTION

1.1 Back Ground of the Study

Human and the act of production and consumption are always inseparable. In the process of utility maximization procedure there is unexpected externalities, which is waste. The wastes could be both solid and liquid types; and the way they are going to be handled, stored, and disposed can expose the environment and public health to risks (Zhu et al., 2008).

Rouse (2012) noted that "Solid waste is defined as material which no longer has any value to its original owner, and which is discarded. The main constituents of solid waste in urban areas are organic waste (including kitchen waste and garden trimmings), paper, glass, metals and plastics. Ash, dust and street sweepings can also form a significant portion of the waste". Hundred and thousand years ago, the solid waste management system was not a big deal in the globe. One of the studies related to this stated that "The first humans did not worry much about waste management; rather they simply left their garbage where it dropped" (Net Industries, 2013). This implies that solid waste management task is becoming a serious concern due to the alarmingly increasing rate of population growth and the development of urbanization in the world.

This is also supported by Smith (2003). He stated that as far as humans have been living in settled communities, solid waste become an issue, and modern people generate by far more wastes than early humans ever did. Therefore, the urbanization and population growth rate of a particular city/ nation is positively related with the generation rate of solid wastes. Hence, the city which shows increasing population growth and its urbanization should take the question of how to manage solid wastes without scarifying environmental and human health as an agenda.

According to Rouse (2012) *"*Solid waste management (SWM) involves the collection, storage, transportation, processing, treatment, recycling and final disposal of waste. Systems need to be simple, affordable, and sustainable (financially, environmentally and socially) and should be two equitable, providing collection services to poor as well as wealthy households". To achieve the above stated means of management, household members of a given geographical territory, as one of the stakeholders, have their own responsibility. But the extent of their responsibility is varies

depending on the approach that the town follows: either conventional based approach or community based approach (World Bank, 2014); Rahman, 2015); i.e. collection of wastes on temporary storage at the source and dump it on the given municipality material (conventional approach) or handover to the waste collectors (community based approach) is the responsibility of the households of a given area.

Hence, this solid waste management (SWM) service has an advantage to protect the environment from the risk of ineffective disposal system of solid wastes. Moreover, the primary objective of solid waste management activity is to make the environment protected and safe in human health via disposed wastes in a well-organized manner. However, through process the stakeholders of the management system, especially in the developed nations, did not stop on disposed of waste in open dump or landfill only; rather they tried to convert the trash/solid wastes/ to cash and make strong their economy in addition to environmental aspect.

In line with this view, Smith (2003) also stated about the benefit of properly managed solid wastes beyond securing the environment and human health. It is very much worthy to directly quote the finding of Smith: "For most industrialized nations today, solid waste management is a multibillion
dollar business which is also crucial to survival. Garbage collection agencies remove tons of garbage
yearly and sort it for recycling or ultimate disposal" (Smith, 2003, p: 1). In addition, Rouse (2008) also noted that, besides the above benefit of well managed solid wastes, it surely is important to produce Methane gas for the purpose of electric power generation. However, let alone getting the above stated benefits, Solid waste management (SWM) is one of the critical challenges of developing countries including Ethiopia because of the social, economic and environmental implications once not properly managed. One of the studies show that only 30-50% of the waste generated in developing countries is collected and managed properly (Dawit and Alebel, 2013). The rest is either burned or left to decompose in open space or dumped in unregulated landfills, which is damaging the environment. In addition, the study by sandecs municipal solid waste group(SMSWG 2008) stated that mostly observed serious problems especially in low and middle income level countries are inadequate collection, storage, treatment and uncontrolled disposal of solid wastes in open dumps which easily expose to harsh hazards,

Like environmental pollution and health problem in recent years, urbanization is increasing in most developing countries including Ethiopia. In addition to the above evidences for the relation of solid waste and urbanization, Studies like Solomon (2006) also showed that a positive relationship between solid waste generation and urban growth. Due to this, the low and middle income countries are really suffering from imbalance between the amount of waste generation and the capacity which need to properly manage their wastes

According to CSA (1994) census Ambo had a total population of 27,636 which is grown in to a total population of 48,267 (CSA, 2007/2015). This implies that Ambo is also one of the fast growing towns in the country, with increasing solid waste generation. Moreover, according to preliminary survey conducted by the researcher (August 2010) household solid wastes in Ambo town are observed on the road, burning inside the village and disposed in sewerage. This clearly indicated that, Ambo town population rate and the waste generation rate per household is increasing. But the solid waste management, particularly at household level, is not managed in a well- organized manner. This implies that like other developing country cities, Ambo has also problems that prevent the municipality/ responsible body from doing its task for environmental sound with economic efficiency. So that, this research is intended to identify and analyze the main determinants of solid waste management practice at household level.

1.2 Statement of the Problem

Urbanization with inadequate waste management practices, specifically, widespread disposal of waste in water bodies, dumping inside the road and uncontrolled dump sites severe the problems of low sanitation levels across the African countries including Ethiopia (UNESC, 2009).

According to UNESC (2009), the population growth and the rate of urbanization are alarmingly increasing throughout the African continent. But the technology, technical knowhow, financial capacity, culture, and understanding of the community required to properly manage solid wastes are not adequately available. As stated in background of the study, solid waste generation rate in Ambo is increasing along with its population growth rate over time.

Related to this; Ali (2011) noted that with the increase of population, solid waste management would be the main challenges for the responsible body. So that, preventive measure should be

taken in order to have remedial action at least on biodegradable materials. Otherwise, if the present trend of solid waste generation and disposal practices continues, the area would be a place of unhygienic living condition. As per the result of preliminary survey (pilot study) conducted by the researcher, August 2010, SWM practices of Ambo is under the control of the town municipality. This municipality has a single old truck and also allowing jobless youths to participate in waste management system via door to door collection by their push cart. Then the households are expected to store wastes on their plastic bags or other temporary storage inside the home and hand over to these private waste collectors; (i.e. community based approach). But what is actually observed is different; i.e. there are wastes which are dumped on the road, burning inside the village and throwing in sewerages by the households. It implies that, household solid wastes are not properly managed at source by its generator.

Most studies conducted so far in line with this research give more emphasis to the issues like; "willingness to pay" (Aklilu, 2002), "generation rate of the waste" (Lemma, 2007; Melaku, 2008) and even special emphasis given to the "determinants of recycling of solid wastes"; which is revolving on developed nations (Sterner and Bartelings, 1999). But such assessments do not guarantee to conclude about the determining factors of effective solid waste management at household level. In addition, even though there are some studies which directly or indirectly assessed the constraints of solid waste management, they have reached to different conclusions for similar research issue (Tewodros, 2007; Gebrie, 2009), which necessitated to have further study. It implies that, the studies conducted in other specific area do not guarantee to conclude about the picture of the rest parts of the world, especially at household level. Hence, whether the identified factors are significant or not depend on the existing situation of the given particular area. In other words, the poor performance of each town or nation solid waste management has its own main contextual factors or causes. Therefore, this study is intended to fill the current literature gap related to the motive why the households dispose their wastes improperly, context specific factors of the study area. In addition, most of the studies have been conducted at the regional level and sub cities of Addis Ababa - Ethiopia.

So that, this work was contributed to fill the research gap on SWM existed at zonal level and what factors mostly affecting at this micro level and this studies add new variable, which is not

used by previous researcher. The new variable is distance of household from dump area. Hence, this study will be timely to find the real constraints of the household SWM service of the town and tried to provide feasible solution for the identified problems.

1.3 Research Questions

What is the general existing solid waste management?

What are those factors that influence WTP of household for improved solid waste management?

How many amount the households will pay for improved solid waste management in the study area?

1.3 Objective of the Study

1.3.1 General Objective

The general objective of the study is to estimate the households willingness to pay for improve solid waste disposal services and its determinant in Ambo.

1.3.2 Specific objective

To assess the general features of the existing solid waste management

To identify the factors that affect the WTP for improve waste disposal services

To estimate households mean willingness to pay for improved waste disposal

1.4 Hypothesis of the Study

After collecting reliable data and making discussions about the household's willingness to pay for solid waste management. The researcher expect:-

Household income, education level, amount of solid waste generated by households, marital status age of households, sex and house ownership would e positively relate to the willingness to pay for improved solid waste management service.

Family size, and distance from dump area would be negatively related to the willingness to pay for improved solid waste management.

1.5 Significance of the Study

The conducted study benefits the researchers, university, urban residents and potential researcher in this area and the region as well as nation at large. It also contributes to the literature to the literature stock place of the study area. The university benefit from having additional researcher paper for shelves. It initials other interested researcher to undertake a better and detail study in the area. The finding of this research would be input policy makers. Finally this paper is used to know whether households are willing to pay for improve solid waste management service or not and determine WTP for improved environment quality.

1.6 Scope of the Study

This paper focuses on identify the major factors that affect household willingness to pay for improve solid waste management in Ambo town. The respondents will only household that livable hood lived in the Ambo town.

1.7 Limitation of the study

While doing this paper the researcher face various problem the main problem were as followed;

Since the researcher faced the problem of data analysis and their prating. Lack of time with academic running. Lack of adequate and annual re-posts. Financial problems are the major one through one the doing the paper. Unwillingness of some target population to conduct an interview.

1.8 Organization of the paper

The study is comprises five chapter: the first chapter introduces the back ground of the study, the research objective and questions, significant of the study, and hypothesis of the study, the scope and limitation of the study, and out of the study while the second chapter deals with literature review of the study the third chapter deals with methodology of the study and data source, and four chapter also deals the descriptive analysis and econometrics analysis and the final chapter present the conclusion and recommendation drawn on the basis of finding of the data.

CHAPTER TWO

2. LITRATURE REVIEW

2.1 Theoretical Literature Review

According to Tchongbanglons (1993) all wastes arising from human and animal activities that are normal solid and are discarded as use less or an wanted are broadly defined as solid waste it includes municipals girl age, industrial and commercial wastes, sewerage slag, waste of agriculture and animal husbandry, demolition waste and meaning residue. Different individuals have defined municipal solid waste (MSW) differently, Medina 2002 defines MSW as…."The materials discarded in the urban area for which municipalities are usually held responsible for collection, transport and final disposes. It in composed household refuse, institutional wastes, street sweeping, commercial wastes as well as construction and demolition debris, for Cointreau (1982), MSW is material for which the primary generator or user abounding the material within the urban area requires no composition after abandonment. Contrail argues, to be qualifies as an urban solid waste it should generally be per saved by society as being in the responsibility of the municipality to collect and dispose of.

Based on the sector of the economic responsible for generating them, Enter and smith (2006), categorized solid waste in to four broader kinds as meaning agriculture, industrial, and municipalities solid waste. Municipal waste are which are no longer needed by peoples because they are break spoiled or have no longer use including waste from households, commercial establishment, institutions and some industries are classified under, municipal solid waste can further classified in different ways, vise-avers the point of origin of west materials nature of material, kind of materials and heat consist of the materials. Based on point of the materials there are six types of municipal solid wastes namely "domestic waste, commercial waste, industries waste, institutional waste, street sweeping, and constructional and demolition waste (Rand et al: 2000), based on the nature of waste materials MSW can be classified as organic in organic, combustible, peter scribble and non peter sable function (Cornwel, 1998), Cornwel regarded waste classification based on the kind and heat content of the waste materials as the most the full

domestic wastes or household waste derived from residential may have neigh in the largest component of municipal solid.

waste management (SWM), is define as the control, generation storage collection and transported processing and disposal of solid waste consistent with the best practices and public health, economics and financial engineering administrator legal and environmental consideration (Outman , 2002), solid waste management has three main components collection and transportation: recycling it reuse and treatment or disposal (SIDA, 2006), USEPA recommended using integrated hierarchical approach to waste management with four component; stores reducing recycling, combination and lands failing to address the increasing volume of municipal solid waste its ranks source reduction including reuse as the most referred method followed by recycling and in posting and lastly, disposal in combination afflicted and land full.

Developing countries have peculiar solid waste management problems different than those observed in the industrialization countries. Although low-income countries solid waste generation rates average only 0.4 to 0.6 kb person /day as opposed to 0.7 to 1.8 kg/person/day in the industrialization countries in deed, the very composition of their waste is different than that of developed, nations coin trash (1982), Blight and Mbande (1996) and Arlosoroff (1982) noted developing countries waste are 2-3 times greater than in waste density at the same time 2-3 times greater than in moisture consent than that of industrialization nations developing countries nests also involve large amount of origin waste (Vegetable matter, etc…) large quantities of dust, dirt (street sweeping , etc…) and smaller particles on average than in industrialized nations.

Although three might be some potential opportunities which arises from their waste composition, these peculiarities from industrializes nations present additional problems (Contreau 1982, Zerbock, 2003), firstly a higher solid waste density has many implications for the traditional methods, of collections and disposal, the collection and transfer truces which are able to achieve compression rates of up to 4:1 in industrialization nation may achieve only 1.5:1 developing countries and land fill compression technology which average volume reduction of up to 6:1 in industrial nations may only achieve 2:1 compaction with these increased waste industries, secondary, the high moisture content and organic composition of waste in developing World may lead to problems of increased decompositions rates particularly in areas with high average daily temperatures, a high seasonal or year round rain fall would also compound those

problems, presenting additional challenges with in sect population and condition conductive to diseases in order to mitigate these problem developing countries in hot human areas must to much more frequency collection, than would be needed in color drier climates, to remove organic wastes before they are able to do compose, perhaps be weekly collection of organic materials (possibly in conjunction with a municipal composting operations), would be needed to reduce decomposition if not daily collection.

Collecting, transporting and disposing of MSW presents formidable challenges too many third cities waste management represents a large expenditure of these cities and usually accounts for 30-50 percent of municipals operational budgets. (Medina, Martin, 2002).

In addition, despite these high expanses cities collect only 50-80 percent of these refuse generated (Medina: 2002), residents in area that lack reuses collection usually low-income community, tend to either dump their garbage at the nearest vacant 10t, public space, creak, river or simply burn it in their back yards. Uncollected waste many accumulate on the street and clog drains when it rains, which may cause flooding, waste can also be carried away by runoff water to rivers, lacks and seas, affecting those ecosystem. Alternatively, wastes may end up in open dumps-legal the most common disposal methods in the third world, open dumping of solid wastes generates various environmental and health a hazards,, for example, methods and carbon dioxide are green household gases that contribution to global warning methane is 20x time more effective at trapping than carbon dioxide, and more persistent in the environment (USEPR, 1995), leach ate from the land lad folds can enter ground water system leading to the increase nutrient levels that case hector privation(EL, fad let al, 1997) moreover, bio communications of focusing and heavy metal an occur.

During the last two decades rapid urban infrastructure and service contributed to decrease implementing urban environmental pollution in regarding solid waste management. Currently, or global has been in calcified with the production new technology which emanate gas and other solid water, (Plastic bags, contributions materials packet food items clothes and the like), in connection with this we increase our demand and presence and buying more nether food items. Nondurable housing encampment for living as the result we have created our service a major environment problems.

As urbanization continued to take place the management of solid water is becoming a major pubic or health and environmental concerning urban areas of many developing countries the concern is serious. Particularly in the capital cities which are often get ways to the countries for foreign diplomatist, business man, and Tories, for visual appraise of those cities well have negative impacts on official and Tourist visited and foreign investment .

Majority of the developing countries have suffered by lack of financial resources to expand infrastructure and service provision. it is the general truth that growing population and low level of financial technical and managerial capabilities for infrastructural, and services development have further contributed to the developing crisis in solid waste management service. as a result many Town administration have not been able to solve the rapid growth of the solid problem and continuously many cities municipalities have collected less than half of the waste generated every day.

According to the 1996, UNCHS global report on human settlement, between on third and more than one half of the solid waste generated is most cities in middle and low-income countries are not collected respectively. They usually and up as legal dump on street open space and waste lands for instance Darussalam or (Tanzania) about 25% of the total generated collected and disposed off 40% and 60% of the total solid waste generated collected and disposed off Pakistan and Indonesia respectively while in many African countries particularly in sub-Saharan Africa countries solid waste collected and disposed of less than 20% the waste generated (UNCHS, 1996).

Majority of those areas where characterized by slum and squatter settlement, which are left with no service to solid water disposal. They are usually used on compound brining and disposing on street; ditches and playing ground that are exposed to air pollution to the surrounding areas.

Solid waste today contains many materials such as plastic that are, not readily degradable and toxic materials, primary various types of chemical waste produced by industries. Similarly the amount of around as waste generated has been undergoing dramatic change. In additions industries increase their annual discharges of toxic chemical directly in to the environment. Early civilization and did not have a problem with waste because it consist of mainly organic waste and the decomposers converted it in to use full materials. There were also fewer people and they generated little waste. The problems become large with more people generating more and Varity

of waste (chemical, liquid, solid nuclear and hazardous), little of this waste is food for the decomposers. Thus a Varity of methods must be used to manage the waste. Comprehensive solid waste management program encompasses seeping, storage, collection, and disposes of solid waste. Proper management in those for areas helps greatly in controlling insect, radian's, and fish ponds.

2.1.1 Types of Hazardous Solid Waste

Request includes all solid waste in practice is categories includes garbage, rubbish ashes and other waste.

Garbage: - designated participial waste resulting from the growing, handling, preparation of cooking and serving of food. It attracts insect's rates and rapidly decomposed is production of unpleasant odor.

Rubbish: - this term includes non-predicable refuse except ashes. There are two categories of rubbish combustible and no combustible.

A) **Combustible:** this materials is primary organic in nature and includes items such as paper, card board, wood and bedding.

B) **Non-combustible**: this materials is primary inorganic and include tin cans, metals, glass ceramics and other materials refuse.

3) **Ashes**:-in compostable materials that remains after fuel or soil waste has been burnt or waste products from the coal, charcoal and wood when burned.

4**) Infection waste: -** are wastes that contain or carry pathogenic organism in part or in whole such as waste from hospital and biological laboratories solid with blood or bodily fluids.

5**) Special waste: -** are waste from residential and commercial source that includes;-.Bulky items (large worn out or broken household, commercial and industrial items like furniture, lamp bookcases, filing cabinets etc.). Consumer electronic includes worn out broken and other no-longer wanted items such as radio, stereo's TV sets. White good (large worn out a broken household, commercial and industrial appliance such as stove, refrigerators rather dish washer, cloth washer and dryer)

6**) Organic waste**: food waste, paper, card board, plastics, textiles, rubber leather, wood, yard wastes.

7**) In organic waste**: glass, crockery (CUPS, plates etc) tin cans, aluminum, and other metals.

8**) Dead bodies**: dead animals like dogs, cows, donkey etc.

9**) Other waste**: demolished of materials a abundant cars and construction waste are also considers as municipal waste.

2.1.2 Source of Solid Waste

The materials that are collected under the term solid waste include many different substances from a multitude of source, the source of solid waste are dependent on the socio economic and technological level of society. As small rural community in Ethiopia many have known types of solid waste from knows source: while a big cities such as Addis Ababa may have many source.

Most people can identify solid waste management when their empty trash can there are much more household waste that are considers to waste than realized.

In all cases the following are universal: - Besides generated from living household (Domestic) generally contain non-hazardous waste, kitchen waste, “ketema” and ash are common in Ethiopia.

Agricultural solid waste due to agricultural activities: - food residuals, animal dung crop resident etc. such wastes are usually non- hazardous negligible in rural Ethiopia.

Commercial: - waste generates from business establishment, shops etc that generates generally hazardous waste such as paper car board: wood metal and plastic.

Industrial waste: - from various type of industrial process, the nature of the waste depends on the type of industry and kinds of raw materials involved. There may be toxic and hazard duos waste that have adverse effect to the environment.

Institution solid waste: generating from public and government institution office, religious institution, school, university etc, generally not hazardous.

Hospital solid waste: discarded, unwanted solid waste from hospital of both non-hazardous and hazardous waste, the above classification to identify whether the waste is hazardous or not.

Wish respect to Ethiopia, context, many urban centers are largely characterized by public provision of urban infrastructure service among the infrastructure service provided by the public agencies as water supply and soil waste collection are usually poor in quality and quantity. The reason for the in convenience, particularly in the case of social waste, is mostly related with poor administration stricture, weak man power/poor intension of local government to participate private enterprise and inadequate financial arrangement, from 1998 onwards, many municipalities have started to introduce private enterprise as partner for primary soils waste collection, such partner are establishing micro enterprises, which organize themselves from street dwelling, unemployed women and youth, recently, in Addis Ababa, capital of the nation, the number of micro enter praises who are involved in primary solid waste collection have been dramatically increasing from 14 in 1998 to 500 micro enterprise by 2006 of these a few enterprises have engaged on secondary collection which is transportation of solid waste disposal site (AAMES: 2006)

2.1.3 Components / hierarchy of solid waste management

The following information taken from different source provided basic insight in to the solid waste management components and the preferred solid waste hierarchy to address the increasing volume of municipal solid waste that is generated by household or instruction in the country. The environment protection agency of the united nation recommendation using hierarchical approach to waste management with *four* component: *source reduction, recycling, composition* and *land filing*, environmen*t* protection agency has ranked the most environment sound full approach for municipal solid waste management (loan,etal 1999.cointreauliven, 2000).

1. **Source Reduction**

Source reduction is the most preferable method to provide basic improvement on solid waste management. According to Cointreau liven, 2000 and haa.et al et al, 1998 source reduction is defined as to any reduction of waste generated daily in the Town design, manufactures, purchase, or reuse of materials or products their amount or toxicTown before they become municipals waste further they elaborate that source reduction helps to reduce costs for waste collection transportation and land filling. It avoids the cost of recycling, compositing and also conserves resource and reduces pollution.

2. **Recycling**

According to our environment protection agency municipals solid waste recycling refers to the separation of collected solid waste and transformed manufacturing of solid waste in to usable or marketable product. This implies that the recycling program ensures to enable countries to prevent so much waste from ending up in landfills and incinerators, furthermore, it support low income household to buy purchase the recycle solid waste at lower cost.

The US environmental protection agency also presented that in developing country besides to large scale private sector enterprise, many small scale enterprise are engaged on recycling of solid waste. These small and micro enterprises sometimes belonging to the informal sector, if they operate in unregistered and unregulated way. In the previous, informal waste collection was seen as social out cost; their businesses are illegal and considered as a problem for urban life.

Compositing:- compositing is another way of recycling, according to the environment protection agency, composting is a biological decomposition of organic waste such as animal waste and yard waste in to humans a soil like materials composition is natural methods of recycling of organic waste materials, which is used as fertilizer. A World Bank paper (2000) argued that although compositing is an essential element for sustainable development of solid waste management it is neglected with integrated waste management programs.

Thus, the World Bank recommendation that compositing should a wide speared practice in developing countries.

3. **Landfilling**

The fact that source reduction (reuse), recycling and composting taken the large protection solid waste management system; some solid remain to be placed in landfills, land of waste is the most impotent and widely. Land filling Used on solid waste management methods. However, landfills practice most low and middle income countries are open dumping and burning with very little control (Hein, et al 1998). The subsequent of waste dispose in open land fill is that problem on public health.

4. **Combustion**

For many, in developing countries burring of waste material in the open land fill disposal site has been a common method of reducing the volume of waste combustion refers to the confined and

controlled burring which helps to decreased the volume of wasted disposed on open land fails, further, in industrialized countries the waste burring processes recover energy which is used to produced stream and electric Town (Horn wera, et al, 1998).

2.1.4 Causes of Poor Solid Waste Management in Developing Countries

There are four major problems faced in developing countries on municipal solid waste management such as: in adequate service coverage, operating in efficiency in adequate service management of special waste and in adequate land fill disposal (Zurabug and scheretenlie, 1998)

A) In adequate service coverage

Zurbug and schetenilb 1998, stated that solid, waste collection service cities in developing countries generally serve only limited part of the urban population which is founded at the heart of the Town and high income people. Those who are remaining without waste collection service are usually low-income living at periphery.

B) Operational in efficiency of service and limited use of the informal sector.

According to and schereferileb, (1998) municipal authorities in development countries usually spend around 20 to 50% of the total municipal expenditure of the whole African cities. Whole African cities, however, event's such expenditure the level service is low. Only 40 to 50 percent of solid waste is collected and saving less than 50% of the population once collected it is disposed off in un controlled open dump.

C) In adequate management of special waste (hazardous waste)

Zurbrug and scheretenlib put this as third challenges argument. They argued that waste produced from hospital and clinic can be regard as special waste non industrial hazardous waste, Approximately 70% of the total waste generated by hospital and clinic assumed to be non-hazardous waste, where as 20% of the total regard as hazardous and infection waste.

While the remaining, 10% is considers as non-infections: but hazardous wastes therefore, it is essential that the generated. Waste be separated the non-hazardous and infection waste are: sharp needles, scarps, pharmaceutical and chemical residues and other hazardous waste (Zurbruy and schereterlib, 1998).

D) Inadequate land and disposal

In most developing courtiers solid wastes are deposed off on uncontrolled open dumping sites.

These unsafe open dumps lay on large plate, which is un controlled further it is exposed to scavenger, informal waste pickers, and animals eatery and ingesting of waste birding insects and usually produces unpleasant odor many authors suggested that the main reason t the inadequate land fail disposal is due to poor financial and institutional arrangement especially where local government are under financed and low level of institutional cape Town and rapid population growth further (Zurbruy and schereterlib, 1998), indicated that inadequate land fail deposal have acquired in area where appropriate guide lines for sitting lacks design and operation of new land fails as well as missing recommendation for possible up grading option of gaiting open land fail disposal sites.

2.1.5 Households Demand for Improved Environmental Quality

Economic studies on solid waste management in Ethiopia, especially those involving contingent valuation are externally scanty or non-existent. Therefore, in this section we review the broader literature particularly studied in other developing countries that look at the demand for improving environmental quality or service living contingent valuation technique.

The following conclusion can drown from the four going preview forestry municipal solid waste management is serious concern can collecting can transporting and disposing of MSW. Persons from editable challenges to many third world ethics including Ethiopia secondly, waste management represent in large expenditure of those cities and usually account for 30-50% of the refuse generated, despite those high expanses but more importantly, cost recovery is a serious eminent to efficient and effective solid waste management in those cities.

Thirdly, despite their low average rate of per capital solid waste generation per day, developing countries have peculiar solid waste management problem different than those faced by industrial countries. In particular the very composition of their waste is different from that of developed nations. Those peculiarities form industrialized nations percent additional challenges to developing countries cities in term of collection frequencies and equipment demand.

Over the relative scientific of house hold socio economic waste and environmental attributes of solid separation, collection and disposal of household's major developing countries cities have rarely been explored. There for, such WTP study would help finding out sustainable mines of funding for improve the solid waste management service in the cities.

2.2 Empirical Evidence on Solid Waste Management

Alter and deshazo (1996), in a study of household in Gujranwala Town, in the Punjab, Pakistan, surveyed the existing solid waste disposal system, WTP for improvements, and the print that household attach to improvements in solid waste management relative to improvement in water supply and sanitation. They use a stratified random sample of about 1000 households. They study explores the demand side information and verity whether using such demand-side information helps improve solid managements development countries. Put differently, they want to tests the briefs that integrating demand side information can improve the planning for provision of municipal service.

Chuen knew and Othman (2010), estimated the economic value of household performances for chemical solid waste disposal service in Malaysia, employing contingent valuation. They estimate and compare the mean ETP for two alternative disposal methods, representing improve options with better level of service characteristics, versus the current disposal methods both in the genetic and labeled format. The genetic option are "exiting facility" vis-à-vis "proposal alternatives" and the label option are "control toping" vis-à-vis "sanitary land fill: and icon ration "incineration" in their case, their case the WTP is interpreted as the additional or incremental monthly SWM payment that public pays for improved quality of service.

Wang et al. (2011) conducted economic analysis of municipal solid waste management in Eryan, a poor located in Yunnan province, china. They estimate the WTP of residents for an improved solid waste collection and treatment service and compare it with the prefect cost. Their study finds that the mean WTP is about 1 percent of household income, and the total WTP can basically cover the total cost of the project.

Their analysis also show, that the poorest household in Eruan, in general, are not only walling to pay more than the rich households, in percentage of income terms, but also are willing to pay not less than the rich, in absolute terms, particularly where no solid waste service are available.

The few studies focus on the capital city, Addis Ababa (Terfasa; fantu: 2007), or other aspects of improvement in environmental quality (Weldesilassie et al 2001), we do study of SWM for Ambo Town, also our review contingent valuation in developing countries shows and in expensive household survey can provide valued in puts in to cities planning processed and, in our cases inform policy makers on how to improve SWM delivery.

The respondent households are willing to pay for improved solid waste management service while majority of them choose the low price level for improved solid waste management. The study suggests that participation of household must be increased by informing them about the nature of improvement so that the importance of household in improved solid waste management being reached. (Ologedeta, 2014)

The study reveals that among the factors income and awareness of environmental quality significantly influence the household's willingness to pay for improved solid waste management service. The study suggests that the fees charged to most waste generator used for solid waste management must be increased so that the company dealing with solid waste management can reach their goals.(Dagnew, 2014)

The study shows that respondents willing to pay more for improved waste management services. Improved waste management service is determined by level of education, length of stay in area, housing arrangement and awareness of respondents. The study suggests that all the people must come forward for managing solid waste problems. (Dodson, 2013)

Majority (85%) of the respondents are willing to pay for improved solid waste

service. Willingness to pay for improved waste disposal in Tema Metropolis is greatly influenced by educational level, number of dependents, income, size of household age of respondents and distance to solid waste dumping sites. (Nkansah,2013)

The households are willing to pay for improved waste management but it is not directly influenced by education level, marital status, quantity of waste generated, household size and household expenditure. Age of the respondents alone has significantly related to the willingness to pay. The study suggests creating awareness on negative side of mismanagement of solid waste. (Agrey, 2013)

The study shows that service price, education level, age, household size and the household monthly expenditure are the main variables that determine or influence willingness to pay for waste management. (Yousef, 2014)

Generally, the above empirical work showed that the existing research on willingness to pay for solid waste management service is conducted on whole source of solid waste but this paper was used only household's sources of solid waste exist in the town.

CHAPTER THREE

METHDOLOG OF STUDY

3.1 Description of the Study Area

Ambo town is located in the western state of Oromia region and it is the zonal town of the West Showa zone. It is located at a distance of 112km from Addis Ababa on the main road that leads to western region of Ethiopia. Ambo town was established in 1889 and covers of 8587 hectares of land. It is one of the oldest towns in Ethiopia. The name Ambo town is related with offspring called “Ambo Tseble” (*Ambo town city administration,*).

Geographical location of Ambo town is 08 59’ E longitudes. The average elevation of the town is 2090 meters above sea level and it varies from 2060 meters to 2140 meters above sea level. The town and its surrounding have meant annual precipitation of 912millimetres and the mean annual temperature of the town is about 17.6 centigrade. The town is an administrative capital for west shewa zone. The master plan covers different aspects such as development plans road network plans, drainage and land use plan etc.(*Ambo town city administration,2014*).

As per survey conducted by (Solomon; 2010) due to inadequate waste collection service waste are dumped nearby river, open space, drain and burned openly. Even the household stated that municipal by it collected solid waste and burn in surrounding of community living area. Such action or failure of municipal really indicates contribution of solid waste a lot to environmental pollution and human health problem. In Ambo town solid waste are generated in form of plastic, paper, cattle feed, and its waste are some form of solid waste generated by house hold in Ambo town. He found that generation rate and types of solid waste is determined by the consumption habit and living condition of households.

3.2 Methodology

This section percent an over view of the methods that were used in the study areas covered include the research design, sample, and sampling techniques, and data collection.

3.2.1 Target Group

The target groups of this study are households that lived in the study area, which are the major suppliers of waste to the surface of the town (Ambo)

3.2.2 Data Collection and Sampling Techniques

The study was used primary and secondary data. The primary data collected with the use of structured questionnaires; random sampling technique was used to avoid sample selection bias. A total of 100 households were sampled from the selected study area. The total population of Ambo is 49815. By the formula of Bayesian Approach simple random sampling techniques: -

Bayesian sample determination

$$n = \frac{N}{1 + N(e^2)} = \frac{49815}{43815 + 1 * 0.1} = 99.77 \approx 100$$

Where, n=sample size

N= Total population

e=estimated error of the sample [10%]

3.3 Data Source and Type

In order to attain the objectives of the investigations the researcher utilized both primary and secondary source of data. The primary data was used for the analysis of the data and the secondary data was used for literature review and to support implication of the analysis and the data types, utilized for this study are nominal and ordinal type of data which is collected from the targeted respondents through questionnaires.

Primary data: to full fill the objectives of the study both cloth and open ended questionnaires were designed for sample household of Ambo

Secondary data: secondary data permitting to the study is gathered from municipalities of Ambo, Ambo administration office, magazines and annual reports and Ambo town libraries and various leading journals and articles form Internet were searched.

3.4 Tools /Instrument of Data Collection

To have variable research output the way of collecting data is virtual, because in appropriate utilization of instruments use of data collection resulted in unreliable conclusion.

Questionnaires: the study conduct highly depends on primary data. The data required for the study was collecting through questionnaire; the questionnaires were designed to address the

objective of the study and the research questions raise in the study. The questionnaires were distributed to sample respondents of the Ambo town.

Interview: to achieve the objectives of the study semi structured interview hold with the administrator of the local government area to acquire key information.

Contingent valuation method: contingent valuation method used in order to ask respondents households about a maximum amount of willingness to pay in order to improve the problem solid waste management service in case of Ambo town.

3.5 Data Analysis Techniques

The data gathered through both primary and secondary methods were processed and analyzed by descriptive statistics and econometrics model by using statistical software Stata 12 version and descriptive statistics(quantitative and qualitative method) which includes tabulation, frequency distribution table, and percentage method used in presenting households profile. Accordingly the summarized data were analyzed to brief the theoretical frame work of the study to arrive at a meaning full conclusion and recommendation.

3.6 Model Specification

Given the nature of data, econometric analysis may provide better information and clearer focus on factors determine willingness to pay for improved waste management service. Policy recommendation made based on result conclusion. Probit model used to identifies, which factors are responsible for being willingness to pay for solid waste management service.

The probit model

This model was used to identify factors that influence household's willingness to pay for improved solid waste management service the dependent variable in the model take value 1 and 0. 1 if household willing to pay for solid waste management service and 0 otherwise

$WTPí=xiβ+εí$…….1

Where

β = vector of coefficient

xí = vector of independent variable

ε = error terms

The probit model formulation

Prob(wtp =1)=βo+β1AGE+β2SEX+β3EDU+β4MAN+β5FASI+β6HHINC+β7HO+β8ASWE+9DDA+εi 2

Where: WTP_i= vector of dependent variable

Xi= vector of independent variable

β= vector of unknown parameter

U_i= error term that respondent all factors that affect WTP that does not exist one simple regression function

Where, xi=AGE, SEX, EDU, MAN, FASI, HHINC, HO, ASWE, DDA

AGE= age of household head (year)

SEX= gender of households (Dummy: male =1; female= 0)

EDU= Education level of households head (in terms of year).

MAN= marital status of household head 1=if married 0= otherwise.

FASI = number of member households.

HHINC = monthly income of the head of the household in birr.

HO= house owner ship of the respondents, 1 if owns the house and 0 other wise.

ASWE= weekly generation of solid waste measured in sacks.

DDA= distance from dump area measured in terms of length (km).

3.7 Definitions of the Variables and Their Expected Signs

1. Age (AGE): - this refers to the age of the respondent in terms of year and it is expected to affect willingness to pay by both negatively and positively. This is because old people may consider waste collection, as government's responsibility and could be less willing to pay for it. While the younger generation might be more familiar with cost sharing like for education, health,

etc and they could be more willing to pay and also older people may be more willingness to pay due to high income they earn.

2. **Sex (SEX):** the gender of the households, it is assumed that is the family headed by women are expected to have highest willingness to pay for improved solid waste disposal than family headed by men this is because every activities of the household are responsibility by the female so they wish to it is difficult to set whether it has negative or positive sign (Aklilu, 2002). Since most of development countries women are economically dependents and influence by cultural to make decision this variable has dummy value 1 if the head is female otherwise will be 0.

3. Education (EDU):-The education variable is the total years of formal education attained by the household head. Educated people are expected to understand the adverse effects of waste on human health and the environment. This study expects that education will have a positive influence on households' WTP for improved waste management service.

4. House Ownership (HO):-This study expects that those who are living in their own house are more willing to pay for the improved waste management service than those who are living in a rented property. This is due to house owners are more concerned about maintaining the cleanliness of their property and surroundings.

5. Marital (MAN): is the marital status of households in this study as dummy variable take value 1if respondent is married and 0 other wise. The variable expected to have positive and negative sign in regression.

6. Family size (FASI): - this variable is continuous explanatory variable and refers to the number family of the household. It is assumed that household with large family size can have more households expenditure, therefore the variable expected to effect the WTP negative.

7. Household (HHIC):- is monthly income of the head of the household in birr. Income is the main determinant of demand for normal good and service. It is a general agreement from economic theories as income increase demand increase and also purchasing power of consumer increase. Therefore the expected sign of the coefficient is positive for willingness to pay (WTP).

8. Households weakly generation of solid waste (ASWE):- The amount of solid waste, which households dispose, measured in term of sack. The households, who generate more waste is

expected to pay more for solid waste management service. There for the expected sign is positive on willingness to pay.

9. Distance of households from dump area (DDA):-The distance of household house from dump area measured in term of kilometer. Household may be not thinks for problems of waste management service as their house distance is far from dump area. There for expected sign is negative on WTP.

CHAPTER FOUR

RESSULTS AND DISCUSSION

In order to give clear in sight to the both descriptive analysis and econometrics analysis are used. The data for descriptive analysis part mainly a rise from both the designed questionnaire filled by the individual households, secondary data from ambo town administration and from direct observation in the area.

4.1 Descriptive Analysis

The method of discussion in this study was conducted on different explanations or descriptive method of data analysis such as statement of explanation form, percentage and tabular presentation was used. In order to answer the research questions of study, the investigator were used both quantitative and qualitative research methods. A quantitative method was used to quantify numerical data relating to the study, which was obtained from open and closed ended questions. A qualitative method was used to explore the attributes and experiences of household heads. Data generated by closed ended questions was analyzed and interpreted quantitatively using simple descriptive statistics, such as tabulation, percentage and frequency supported by concise discussions.

4.1.1 Age

Table4.1: Age of Respondents

Age(year)	NO respondent	percentage	WTP(YES/NO) for improved SWM		
			YES	NO	Percentage of yes
20_40	55	55%	30	14	49.18
41_60	45	45%	31	25	50.08
Total	100	100%	61	39	

Source: Own Survey (2019)

As it is shown on the above table, age distribution can be summarized as follows; most of the household head respondents are between 20-40 years, which constitute 55 respondents out of 100 the total respondents. It can be concluded that most of respondent are young age group. The remaining are covered by respondents age between 41-60 years which constitutes 45

Respondents or 45%% from this table we conclude that 41- 60 age groups of respondents are more willing to pay for improved solid waste than 20-40 age groups of respondents.

4.1.2 Sex

Table 4.2: Sex of Respondents

Sex	NO of respondent	Percentage	WTP(YES/NO) for improve SWM		
			Yes	No	Percent of yes response
Male	60	60%	39	21	65.5%
Female	40	40%	22	18	55.5%
Total	100	100%	61	39	

Source: Own Survey (2019)

The demographic distribution concern of the sample respondents indicates 40 respondents are female out the total 100 respondents or 40% of the sample size. The remaining 60 or 60% of the total sample size is male respondents. In this regard the higher portion of male respondents (60%

Percent) had a positive WTP for improve solid waste management, compare to female respondents (40 percent), this may be the fact that women are financially dependent on male in developing countries.

4.1.3 Education Level

Table 4.3: Education Level of Respondents

Education level (year)	NO respondents	percentage	WTP(YES/NO) for improve SWM		
			Yes	No	Percent of yes response
1_10	35	35%	13	17	37.1%
11_12	45	45%	30	15	66.667%
>12	20	20%	18	2	90%

Source: Own Survey (2019)

The educational status of respondents has an impact on improved solid waste management services. Education increases the awareness of the respondents on environmental quality and their contribution to improve the service effectively. The education status of the respondents is

summarized in the above table is showed that as the education year is increased the willingness to pay poor improve solid waste management is also increased. For illustration the respondents with greater than 12 years of education had 90 percent positive response for improved solid management services.

4.1.4 Martial Status

Table: 4.4: Martial status of respondents

Marital status	NO of respondents	percentage	WTP(YES/NO) for improve SWM		
			YES	NO	Percentage yes response
Married	59	59%	35	24	59.3%
Unmarried	41	41%	26	15	65%
Total	100	100%	61	39	

Source: Own survey (2019)

As it is shown on the above table marital status of respondents are summarized as follows; most of the household head respondents are married that constitutes 59 out of total respondents or 59 percent of total of the sample and 41 respondents or 41 percent out of the total respondents are covered households. In this regard married household are more respondents and have lower WTP for improved solid waste management with 59.3% of positive respondents of SWM, compared to otherwise respondents (65%). These tables indicate unmarried respondent households are more willingness to pay for improved solid waste management service than married respondents due to most unmarried respondents are educated person and many of married respondents are uneducated, only primary education and etc.

4.1.5 Family Size

Table 4.5: Family size of respondents

Family size	No of respondents	Percentage	WTP(YES/NO) for improve SWM		
			Yes	No	Percent yes response
<2	55	55%	40	15	72.12%
3_6	25	25%	12	13	48%

>6	20	20%	9	11	0.55%
Total	100	100%	61	39	

Source: Own survey (2019)

As it shown on the above table, family size description on can be summarized as follows, 55 respondents or 55% percent from total sample these household with less family size is more willingness to pay for improved solid waste management service that constitute 72.12% of positive response to WTP. The reaming portion is covered by respondents with 25 number of respondents or25% and 20% respondents or 20%, was filled by respondents with family size 3-6 and greater than 6 peoples in household respectively.

4.1.6 Monthly Income

Table 4.6: Monthly income of respondents

Monthly income	No of respondents	Percentage	WTP(YES/N0) for improve SWM		
			Yes	No	Percent yes response
1500-3500ET birr	55	55%	20	35	36.667%
3501-6500	20	20%	18	2	90%
>6500	25	25%	23	2	92%
Total	100	100%	61	39	

Source: Own survey (2019)

As it is shown on the above table, the monthly income earned by the respondents can be summarized as follows; most of the household's head respondents between monthly incomes between 1500-3500 are not Willingness to pay for SWM. From these 55 respondents with 55% of the total respondents only 25 number of household give positive respondents the remaining 30 respondents failed to pay for improved SWM. In other words the respondents with monthly income 3500-6500 ETB and >3500 constitute 20 respondent households or 20% out of the total respondents and 25 respondents out of total sample have more wtp for improved solid waste respectively; those all respondents are given positive response with 90% and 92% percentage of yes response respectively. This implies that income is the most determinant factor for improved solid waste management service.

4.1.7 House Ownership

Table 4.7: House ownerships of respondents

House ownership	No of respondents	Percentage	WTP(YES/NO) for improve SWM		
			Yes	No	Percent yes response
Owner	61	61%	55	6	90.01%
No owner	39	39%	12	27	30.7%
Total	100	100%	61	39	

Source: Own survey (2019)

The house ownership concerns of the sample respondents 61 respondent are owner of house out of the 100 respondents 61% percent of sample size the remaining 39 or 39percent of a total sample size are households without house ownership. In this regard the higher proportion of house owner respondents, (61 percent) had a positive WTP for improved SWM, compared respondents without any owner ship of house (39 percent). This may be because of those people living in a rented household considers their residential area was temporary or may be due to the current condition in the Town that only house owner are paying for sanitation.

4.1.8 Households Weekly Generated Of Solid Waste Measured In Sacks.

Table 4.8: amount of solid waste weekly generated in terms of sack

Monthly generated in sack	No of respondents	Percentage	WTP(YES/NO) for improve SWM		
			Yes	No	Percent yes response
<0.5	45	45%	30	15	66.667%
0.5-0.75	20	20%	10	10	50%
0.75- 0.85	20	20%	10	10	50%
>0.85	15	15%	11	4	73.3%
Total	100	100%	61	39	

Source: Ambo municipality (2019)

sacks :- As is common in such studies in developing countries, we could sacks as a measurement unit, which, is the most common unit in this case it should be noted, however, that it is not an accurate measures since sack sizes different. However, in this particular study, we weighted sacks trade only and in most case they ranged between 15-20 kilo grams

As it is shown on the above table, the amount of solid waste generated weekly can be summarized as follows; most of the household's respondent's heads respondents are between >0.5 sacks, which constitution 45 respondents or 45%% of the total respondents. In addition 20 respondents or 20% had generated 0.5-0.75. 15 respondents generate more waste range from 0.75-1.00 sacks weekly than other respondents. From this we conclude that the highest generated solid waste in sack weekly is higher willingness to pay for SWM. For all illustration purpose of respondents generate greater than 0.85 sacks which constructer 15%, all respondents those respondents are 73.33% positive respond to solid waste management.

4.1.9 Occupation of Households.

Table 4.9: occupational characteristics of respondents

Employment	No of respondents	Percentage	WTP(yes/no),for improve solid waste management		
			Yes	No	Percentage yes response
Civil servant and company employed	14	14%	14	0	1%
Trader	45	45%	30	15	50%
Self-employed labored	15	15%	10	5	66.7%
Unemployed	26	26%	7	19	17%
Total	100	100	69	31	100%

Source: Own survey (2019)

*other includes retired individuals

The occupation distribution concern of the sample respondents indicates 18 respondents are civil servant and company employed out of total 100 respondents or 14% of the sample size. In addition traders consists 29 respondents or 44.61% of the total selected samples, the remaining part was covered by self-employed (15%), unemployed (28%) of the total sample size.

In this regard the civil servant and company employed with better education status and the trader with better monthly income the response for solid waste management was relatively high with 100 percent and 50 percent respectively.

4.2 Existing Situation Regarding Solid Waste and Environmental Attributes

In the study time the existing situation of solid waste and environmental attributes is 70% sample households considered the current SWM to be inadequate and 30% perceived the current SWM system. As fire furthermore 58.4% demanded only collection and disposal service of solid waste, while 41.6% demanded recycling in addition to collection to disposal, an average sample household generated 0.7325 sacks of solid waste per week with the minimum and maximum being 0.5 and 1.00 sacks per week respectively.

About 40 percent of respondents reported that the disposed of their solid waste in nearby community container 20% dumped in the open space near their home, only 45.6% of respondent has their waste collected from home by waste collection cooperative contracted by municipality are almost all respondents reported that they did not separate their solid waste (organic plastic food or glass), before disposing of it in addition 92.16% a great that women were responsible for dialing with household waste 5.6% said children were responsible in the remaining 4% responded that both were responsible.

4.2.1 Methods of Solid Waste Disposal Reliability of Methods and Frequency of Disposal

The general method of disposing waste its reliability as well as the frequency of waste disposal is presented; the result reviled that 25% of the respondents claimed to dispose their waste through burning which helps to keep the environment client. On the friability of use this method 40% attested that it is reliable means of disposing their waste, on other hand 45% of the respondents dispose their waste by dumping it on road side at a dump side or nearby bush. However, 60% of this categories indicated that it is not a reliable means of disposing their waste 15% the respondent used waste vendor (waste collector), by playing a take to disposing their refuse but

60% of this category also claimed that was not a reliably means of disposing waste because number of waste vender. Lastly, only 10% the respondents bury their waste in the soil and they all claimed that the method is reliable to dispose their house hold waste.

The frequency of disposing waste showed that while 10% dispose waste daily about 50% of respondents dispose their waste 2 time weekly basis and 15% of the responded dispose their waste 5 times a week and only 10% disposed occasionally with the knowledge that keeping household waste. In the house for a week long has it health implication because it can have our gremmies bread rafts mosquitoes, case our position amongst others given this result household may be encouraged to pay for improved, promote and regular waste disposal through the private sector.

Table: 4.10: Methods of solid waste disposal, reliability of methods and frequency of disposal.

Method		Frequency	Percent
	Burning	25	25%
	Use of waste vendor	15	15%
	Dump near by	45	45%
	Bury in the soil	15	15%
	Total	100	100
Reliability methods	Burning	20	40%
	Use of waste vendor	10	60%
	Dump near by	40	40%
	Bury in the soil	10	10%
	Total	100	
Frequency disposal	2times a week	50	50%
	5times a week	25	25%
	Occasionally	15	15%
	Daily	10	10%
	Total	100	

Source: Own survey.

As is common in such studies in developing countries, we could sacks as a measurement unit, which, is the most common unit in this case it should be noted, however, that it is not an accurate measures since sack sizes different. However, in this particular study, we weighted sacks trade only and in most case they ranged between 15-20 kilo grams.

4.2.2 Source of Solid Waste

The source of solid concern of the sample respondent's indicates 45 respondents or 69.23 percent of the total sample size, the household said we are the major source of solid waste and throw to the surface of the Town. The remaining part are covered by service (18.85%), industries (10.77%) and 6.15 percent by other service.

Table 4.11: sources of solid waste

Source of solid waste	NO of respondents	Percentage
Households	65	65%
Industrials	5	5%
Service	15	15%
Others	15	15%
Total	100	100%

Source: Own survey (2019)

4.2.3 Types of solid Waste Generated

Table 4.12: types of solid waste generated

Types of solid waste generated	No of respondents	Percentage
Food	45	45%
Paper and plastic	30	30%
Glass	5	5%
Metals	10	10%
Others	10	10%
Total	100	100%

Source: own survey (2019)

The types of waste generated to the surface was different plastic and paper was constitutes 45 percent respond by 30 households from the total sample size. Both food and metals are percentage of dispose 45 percent and 10 respectively this is due to the fact that food dispose was less due to religions and cultural perspectives and metal also low percentage of disposal in to the surface area because of recycling and reuse.

4.3 Econometrics Analysis

The choice of econometric model based on the nature of dependent variable. Since the dependent variable of this study takes value 1 for wtp and 0 otherwise. This analysis was conducted using probit models as analysis tool for WTP on solid waste a dichotomous dependent variable.

4.3.1 Probit Regression Result

The result of the binary probit regression model from stata 12 versions reveals that out of the nine independent variables included in the model six of the variable were found to be significant up to 1%, 5% and 10% level of significance. Thus variables or factors that significantly affect the households WTP for improved solid waste management service are educational level of house hold heads, income of households, solid waste generated amount by respondent households, distance from damp area, family size and house ownership. Educational level of households head, house ownership, solid waste generation and Income of households have a statically significant positive effect the dependent variable of willingness to pay for improved solid waste service. Ages of respondent households and distance from damp area of their house have a statistically significant and they have negatively effect the dependent variable.

Table: 4.13: Summary result of probit regression model on households WTP for improved solid waste management service.

Probit regression Number of obs = 100

LR chi2 (9) = 102.46

Prob> chi2 = 0.0000

Pseudo R2 = 0.7660

Log likelihood = -15.6460

NO	Variables	Coefficients	Standard error	Z	p>/z/	Marginal effect
1	EDU	.2637972	.1089701	2.42	0.015	.022937
2	ASWE	7.759433	3.6379	2.13	0.033	.674679
3	HHINC	.000356	.0001472	2.42	0.016	.000031
4	DDA	.4823773	.1835594	2.63	0.009	.0419425
5	HO	3.32824	1.113355	2.99	0.003	.2893889
6	FASI	-.521858	.2398893	2.18	0.030	-.0453753
7	MAN	.9732957	.7487658	1.30	0.194	.0846276
8	SEX	.1247201	.5681726	0.22	0.826	.0108444
9	AGE	.0797739	.0671702	1.19	0.235	.0069363
10	CON	4.962607	2.761081	1.80	0.072	

Number of observation = 100 *significance level: at 1%, 5% and 10%

Goodness fit of the model: The goodness of fit of the model has been tested in this analysis with some diagnostic tests which fulfill the following measure of respectable results.

The pseudo R-squared: It explains the proportion of variation in the observed values of the response (dependent) variable explained by the independent variable regression. It summarizes the proportion of variance in the dependent variable associated with the independent variables, with larger pseudo R-squared values indicating that more of the variation is explained by the model. A pseudo R-squared of 76.6% was obtained suggesting that 76.6% variation in WTP explained by the independent variables or model.

The log-likelihood ratio statistics also computes the difference between the log-likelihood function of the full model and restricted model. The value of the log-likelihood function is -15.6460 for the WTP for improved solid waste management service of households.

LRch2 (9): It shows that the estimated regression is meaning full in the sense that the dependent variable is related to every explanatory variables. The linear relation of the model is highly significant at 1% level of significance (= 0.0000).

Education of Respondent: As expected education had positive significant effect on willingness to pay at 1% level of significance. Holding all other variables constant, educated people are more willing to pay for improved solid waste management service than less educated people. This result seems direct and reasonable since level of education could be related to a better understanding of the problem of solid waste. The marginal effect indicate that as the education level of respondent households increase by one level, the probability of WTP increase by 0.84 percentage on average keeping other factor remain constant. The possible explanation might be that educated (literate) households' heads are more aware about the environment compared to those who less educated or uneducated household heads. This also in line with the expectation that hold heads with high educational level have more willingness to pay for improved solid waste management service.This is the same with what Yousef found shows that education level, are the main variables that determine or influence willingness to pay for waste management. (Yousef, 2014)

Solid waste generation weekly: Solid waste generation per week had positive significant effect on willingness to pay at 1% level of significance. It is also due to the more waste generated by larger respondent households and the fact that they cannot pay for all the waste they generate. Large respondent household are also associated with high income households. Marginal effect show 0.674, other thing being constant an increase in solid waste generation by one sack increase the probability of willingness to pay by 6.74percentage on average.

House ownership: As expected house ownership had a positive coefficient and is significant on willingness to pay at the 1% level of significance. This indicates that house owners respondents are more willing to pay for improved solid waste management than those not own house. Marginal effect show when house ownerships change from non-house owners to the house owner respondents(0 to 1), the probability of willingness to pay taking value 1 rises by 28.9 percentage on average other factor being constant. The same with what (Yousef, 2014) found

Distance from dump area: As expected distance from damp area had a negative coefficient and is significant on willingness to pay. The marginal effect show an increase in the distance of household house by one kilometer decrease the probability of willingness to pay by 4.2percentage, on average other factor remain constant. These indicate as respondent households house distance increase from solid waste, the respondent not think much about solid waste problems. This is due to inadequate awareness about value of environment for every nature. This is the same with what's Othman, 2010 found in studies of chemical waste management in Malaysia.

Family size: The negative coefficient for household size and significance at 1% level of significance. This indicates that holding all other variables constant, the number of persons in the household even though significant did not have the expected sign on WTP. The negative relationship between household size and WTP could be due to their income level, as low income household generate low volumes of waste. Large household sizes are also associated with low income households. The size of the effects can be judge by analyzing the marginal effects, which are indicators of percentage change in people's willingness to pay, when all other factors are kept at their average value. As family size increase by one person the probability of willingness to pay increase by 4.5percentage, on average other factors remains constant.

Household income: Total average income of households had positive significant effect on willingness to pay at 1% level of significance. It shows that other thing being constant, on average an increase income of respondents by one unit, increase the probability of WTP for waste management service by 0.031percentage on average other factors remain constant. This also in line with the expectation that respondents with higher income are expected to be more willing to pay; in fact its responsiveness is very much less. Because: income is a positively related with demand in general and the same with environmental demand. This also indicates that environmental good is a normal good since its demand increases with income. The same with what (dagnew, 2014) founds.

Mean of willingness to pay

According to Hanemann, et al one of the objective of estimating willingness to pay is to get mean of willingness to pay as follow,

Mean of willingness to pay of total sample= - (βO)/bids

Where; bids are the reported maximum willingness to pay amount by surveyed households and in sample size. From survey conducted in Ambo town household's respondent response show 61 respondents willing to pay birr monthly for willingness to pay

Mean of willingness to pay of total sample = -(-1.1411)/0.11

Mean of willingness to pay of total population = 10.3

Out of 100 household's respondent in this study, 61 households, i.e., around 61%, are willing to pay for the improved waste collection service in Ambo town. This study used the open-ended CV method to elicit the maximum amount those households are willing to pay for the improved waste collection service. The minimum and the maximum amount that the households willing to pay are 5 ET birr and 15 Ethiopia birr per month, respectively. The mean WTP amount is calculated using above Equation. This study found that the mean WTP amount for the improved waste management service in Ambo town 10.3 ET birr. This is too small and not sustain problem of waste management service.

Test for multicolliniarity

To check the existence of multicolliniarity simple correlation matrix was conveyed. Multicolliniarity is series problem when correlation coefficient is more than 0.8 and above (vif more than 10) which based on rule of thumb (Gujarat 2005). There is no problem of multicolliniarity (look appendix).

Tests of hetroskedasticity

LRch2(9) look straight to the P-value is (preferable) 0.05 or smaller, then the null hypothesis is rejected and here is significant evidence there is heteroskedasticity, but if prob-chi2 is 0.05 or greater than, or then null hypothesis is rejected, here significant, evidence there is no hetroskedasticiy problem (Gujarati, 2004). Look the following estimation result. Then by default there is problem of heteroskedasticity. Then to solve this problem robust was employed. (Look appendix)

CHAPTERFIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

In several rapidly growing developing countries solid waste is the major sources of concern due to take of appropriate planning. In adequate governance, resource constraint and effective solid waste management, According to UNEP (2004), the generation of the solid waste has become an environmental and public health problems everywhere in the world, particularly in developing countries.

In Ambo town, solid waste management is mainly provided by the municipality and it has been measured and evaluated always based on the role and performance of the service provider (supplier of service) and demand side i.e. WTP of the respondents ignored. The participation of the service receivers or clients especially households who are the primary producers and generator of significant propitiation of uncollected solid waste and perhaps the main victim of the effect of solid waste, should allow to determine their provider and participate in making of sound policy decision including designing of effective joint solutions of solid waste management. This would help the service providers to understand households' willingness to participate and pay.

The solid waste collection in Ambo is poor, its SWM system is not modern, and other is no organized recycling, solid waste is primary dumped by the citizen in open space and the too-few community refuse containers are dumped in an improperly sited land fill.

This study aims to analyze householders' WTP for improved solid waste management service in Ambo town by using the data obtained from the sample of 100 households. The study used primary data from the sample and secondary data from institutes, authorities (like municipality of Ambo town) and administrations of Ambo town.

Results from the descriptive statistics revealed that about 70% of the respondents think there are inconsistencies in the number of times waste collection is done per week. However, majority (30%) were satisfied with the current waste collection services.

Results from the probit regression model revealed that solid waste generation, income of households, distance from dump area, house ownership, family size and education significantly influence household willingness to pay for improved solid waste management service

5.2 Recommendations

Thus based on our we can draw the following recommendation

- ✓ Resources spent on education are well spent resources as far as improving solid waste management service is concerned. The town municipality needs to under-take educational campaign in the town on how to deal with solid waste including the avocation of the three R'S (Reduce, Reuse, and Recycle).
- ✓ If people know or are informed about the nature of improvement in environment quality, that is, improved solid waste management, the investigate welfare improvement clients peoples WTP (Hart, wick et al: 1998). Therefore, WTP can be used to predict the level of welfare gained from improved solid waste management system.
- ✓ The programmers to be offer investors in waste disposing belittled while payment for these services should be made affordable to encourage those households that are willing to pay. In addition public enlightenment campaign through mass media could also be adopted in order to properly inform the citizens on the need to support solid waste disposal investors.
- ✓ Municipality as one could not be able to bring sustainable improvement to solid waste management system. To promote, high service coverage, efficiency and resource recovery, the municipality has to seek collaborative efforts with other actor such as NGO's, CBOs, cooperatives and private enterprises especially in the field of solid waste collection, reduction and recycling.
- ✓ In addition the municipality must charge fee to most solid waste generator and take into consideration about house ownership, and income which significantly influence willingness to pay for SWM.

- ✓ The municipality shall allocate realistic and rationalized budget for create an enabling environment for NGO's and private enterprises participation on solid waste management service delivery as well as for effective and efficiently utilization of limited resources. In connection with this feasible funding mechanisms' for sustainable solid waste service delivery should be developed.
- ✓ Finally it must be taken in to consideration that this study there to identify the most important determinants that affect the willingness to pay of households on solid waste management but due to data limitation, we cannot go through while we argue that this area need further investigation.

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APPENDIX

WOLKITE UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTEMENT OF ECONOMICS

QUESTIONARIES

This questionnaire is designed for household willingness to pay for improved solid waste management service. So I politely request to respond genuinely and honesty, because your response is the base for my study. Choose your answer from the alternatives choices.

Section I QUESTION ABOUT WILLINGNESS TO PAY FOR IMPROVED SOLID WASTE MANAGEMENT SERVICE.

In this section I would like to ask you how much you are willing to pay for the given the provision of improved solid waste service via the proposed programs. To solve the problems in sustainable use improved solid waste at any time for year to year that will insure the community welfare. Thus please listen carefully the scenario that will be presented.

Proper managing of waste is becoming a series problem of city all over the world especially in developing countries where financial and technical scarcity is very grave. Looking at Ambo town, although with the increasing volume of solid waste, the town administration could not be able to adequately collect and dispose the waste.

Therefore, it is important to note that if the program is implemented, all permanent residents in ambo town would pay for SWM service. The payment vehicle is such that service receivers pay

monthly service charge to the service providers. Therefore these studies designed to generate demand side information which is vital for planning process and mainly attempts to estimate households WTP for varies improved solid waste management service. The improvement in environmental quality treatments may increase social well- being for which in principle there should be a positive WTP. Hence, joint mobilization to ward improved solid waste management is crucial to ensure sustainable SWM. The information provided is confidential and it may be used to design future waste management policy. You are invited to participate in this survey by providing answer to the best of your knowledge

Are you willing to contribute to this improved solid waste management program in order to ensure "government-local community mutual management program"?

Yes B. NO

If your answer is yes go to the next question and if your answer is no go to part II

If "yes" would you be willing to pay 5, 10, 15, 20 birr?

Yes B. no

What is the maximum you could pay for improved solid waste management……birr monthly?

If not willing to pay at all, why reason for not willing to pay?

I'm previously pay sufficient in taxes.

Those who are responsible for its degradation should pay.

I trust the government should cover all the cost.

I don't have enough money to afford.

I don't believe new policy of the government.

I don't think the management program is effective.

I believe improved solid waste can take place without my contribution.

Section II: Demographic characters of respondent households

1. Gender: - Male ( ) Female ( )

2. Age of households head……. (in year)

3) What is your level of Education (number of year of school)? ----------years

4) What is the occupation of the principle income earner in the households?

A. Self employs B. Civil servant and company employed

C. Trader D. Unemployed E. other

5) What is your marital status?

A. Martial B. Single C. Widow D. divorced

6) House hold size number…….?

7) What is your monthly income in terms of birr…….?

8) Do you have your own house? A. Yes B. No

9) How many amount of solid waste generated weekly by sacks……..?

SECTION III, Existing situation regarding solid waste

10) Does your house hold have durable metal or plastic containers for Storing Waste?

A. yes, we have metal or plastic C. no we don't have container

B. we have basket or carbon container D. don't know

11) Who collect the waste from the curbside communal container, or pile?

A. Local government B. Local public authority

C. Neighborhood group C. private company D. don't know

12) What is your opinion of the service that you are receiving for collection of

Solid waste from your house holds?

A. very satisfied B. Reasonable satisfied

C. not satisfied at all D. don't know

13) If you are not satisfied with service would you state your primary reason?

A. The service is no reliable

B. frequency of service the interval between collections is to long

C. The collection workers are rude or impolite

D. lack of clean appearance of the neighbor hood

E. other problem please explain ----------

14) If you are satisfied do you know where the collected waste is taken for final disposal when if leaves tour neighborhood?

A. Yes B. don't know

15) Are you concerned about whether the final disposal is environmentally safe and acceptable?

A. Yes B. NO C. Don't Know

SECTION IV, How to improve the solid waste management

16) What is the largest source of pollution in living environment in Ambo Town?

A. Industries B. Households C. Service D. Other

17) How often do you throw garbage in the trash containers?

A. Daily B. 5 times a week C. 2 times a week D. Occasionally

18) What kinds of solid waste do you dispose?

A. Food B. Papers & plastic C. Glass D. Metals

19) What type of solid waste disposal methods would be you are using?

A. Burning B. Use of waste vendor

C. Dump nearby D. Bury in the soil

20) From the above methods of disposal which methods is reliable? _____

_____.

21) How often does the waste management collect trash from the containers you use?

A. Daily B. Five times a week

C. 4 times a week D. 2 times a week E. One's a week

22) Do you think waste collection is enough?

A. Yes B. No

23) If it is not enough, how often does the trash from the garbage container you

Need to be collected? _____

_____.

24) If every house as its own trash container do you think this will help us solve the waste management problems in Ambo?

A. Yes B. No

25) What is your household distance from the main road of Ambo town? ---------- In terms of meter.

probit estimation results

probitwtpeduaswehhincdda ho fasi man sex age

Iteration 0: log likelihood = -66.874809

Iteration 1: log likelihood = -20.438749

Iteration 2: log likelihood = -16.754511

Iteration 3: log likelihood = -15.683698

Iteration 4: log likelihood = -15.646014

Iteration 5: log likelihood = -15.646007

Iteration 6: log likelihood = -15.646007

Probit regression Number of obs = 100

LR chi2(9) = 102.46

Prob> chi2 = 0.0000

Log likelihood = -15.646007: Pseudo R2 = 0.7660

--

wtp | Coef. Std. Err. z P>|z| [95% Conf. Interval]

-------------+--

edu | .2637972 .1089701 2.42 0.015 .0502199 .4773746

aswe | 7.759433 3.6379 2.13 0.033 .6292807 14.88959

hhinc | .000356 .0001472 2.42 0.016 .0000674 .0006445

dda | -.4823773 .1835594 -2.63 0.009 -.8421472 -.1226075

ho | 3.32824 1.113355 2.99 0.003 1.146105 5.510375

fasi | -.5218583 .2398893 -2.18 0.030 -.9920328 -.0516839

man | -.9732957 .7487658 -1.30 0.194 -2.44085 .4942583

sex | .1247201 .5681726 0.22 0.826 -.9888776 1.238318

age | .0797739 .0671702 1.19 0.235 -.0518773 .211425

_cons | -4.962607 2.761081 -1.80 0.072 -10.37423 .4490112

--

Note: 14 failures and 5 successes completely determined.

. corr edu aswe hhinc dda ho fasi man sex age

(Observation=100)

	edu	aswe	hhinc	dda	ho	fasi	man	sex	age
edu	**1.0000**								
aswe	**0.4498**	**1.0000**							
hhinc	**-0.0203**	**0.1346**	**1.0000**						
dda	**-0.2861**	**-0.2644**	**-0.4794**	**1.0000**					
ho	**0.2298**	**0.4316**	**0.3483**	**-0.3551**	**1.0000**				
fasi	**0.0115**	**-0.0277**	**0.1489**	**-0.0911**	**0.0206**	**1.0000**			
man	**0.1130**	**0.1217**	**0.2544**	**-0.1838**	**0.1987**	**0.2863**	**1.0000**		
sex	**0.1785**	**0.3642**	**0.2275**	**-0.2971**	**0.4405**	**0.0825**	**0.1870**	**1.0000**	
age	**0.1517**	**0.2507**	**0.2903**	**-0.2926**	**0.2381**	**0.2306**	**0.4310**	**0.4230**	**1.0000**

Probit regression Number of obs = 100

LR chi2(2) = 39.51

Prob > chi2 = 0.0000

Log likelihood = -47.118112 Pseudo R2 = 0.2954

wtp	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
bids	.1055849	.0335672	3.15	0.002	.0397943	.1713755

_cons | -1.141193 .3101617 -3.68 0.000 -1.749099 -.5332875

. vif, uncentered

Variable	VIF	1/VIF
age	2.73	0.037409
aswe	1.25	0.088915
hhinc	8.83	0.113213
fasi	7.05	0.141870
ho	4.94	0.202536
sex	4.08	0.244966
dda	3.36	0.297853
man	3.32	0.300972
edu	2.76	0.362116
Mean VIF	4.04	

. probitwtpeduaswehhincdda ho fasi man sex age, robust

Iteration 0: log pseudolikelihood = -66.874809

Iteration 1: log pseudolikelihood = -20.438749

Iteration 2: log pseudolikelihood = -16.754511

Iteration 3: log pseudolikelihood = -15.683698

Iteration 4: log pseudolikelihood = -15.646014

Iteration 5: log pseudolikelihood = -15.646007

Iteration 6: log pseudolikelihood = -15.646007

Probit regression **Number of obs = 100**

Wald chi2(9) = 35.59

Prob> chi2 = 0.0000

Log pseudolikelihood = -15.646007: **Pseudo R2 = 0.7660**

--

| Robust

wtp | Coef. Std. Err. z P> |z| [95% Conf. Interval]

-------------+--

edu | .2637972 .0551896 4.78 0.000 .1556276 .3719669

aswe | 7.759433 3.819046 2.03 0.042 .2742403 15.24463

hhinc | .000356 .0001625 2.19 0.028 .0000376 .0006744

dda | -.4823773 .145676 -3.31 0.001 -.7678971 -.1968575

ho | 3.32824 .8532098 3.90 0.000 1.65598 5.000501

fasi | -.5218583 .1912398 -2.73 0.006 -.8966815 -.1470352

man | -.9732957 .5454008 -1.78 0.074 -2.042262 .0956702

sex | .1247201 .4972057 0.25 0.802 -.8497852 1.099225

age | .0797739 .0500428 1.59 0.111 -.0183082 .177856

cons | -4.962607 1.901673 -2.61 0.009 -8.689817 -1.235397

--

Note: 14 failures and 5 successes completely determined.

. margins, dydx(eduaswehhincdda ho fasi man sex age)

Average marginal effects Number of obs = 100

Model VCE : Robust

Expression : Pr(wtp), predict()

dy/dx w.r.t. : eduaswehhincdda ho fasi man sex age

--

| Delta-method

dy/dx Std. Err. z P>|z| [95% Conf. Interval]

-------------+--

edu | .022937 .0050776 4.52 0.000 .0129852 .0328889

aswe | .674679 .2608496 2.59 0.010 .1634233 1.185935

hhinc | .000031 .0000122 2.54 0.011 7.08e-06 .0000548

dda | -.0419425 .0097315 -4.31 0.000 -.0610159 -.022869

ho | .2893889 .063377 4.57 0.000 .1651722 .4136056

fasi | -.0453753 .0147617 -3.07 0.002 -.0743077 -.016443

man | -.0846276 .050192 -1.69 0.092 -.1830021 .0137469

sex | .0108444 .0437935 0.25 0.804 -.0749893 .096678

age | .0069363 .0045207 1.53 0.125 -.0019242 .0157968