ADDIS ABABA UNIVERSITY

COLLEGE OF DEVELOPMENT STUDIES

CENTER FOR ENVIRONMENT AND DEVELOPMENT

DETERMINANTS OF HOUSEHOLD 'ELECTRIC' *INJERA MITAD* AND COOK STOVE ADOPTION IN ADDIS ABABA, ETHIOPIA

BY

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October, 2020

Addis Ababa, Ethiopia

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A THESIS SUBMITTED TO CENTER FOR ENVIRONMENT AND DEVELOPMENT OF COLLEGE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF ARTS DEGREE IN DEVELOPMENT STUDIES (SPECIALIZATION IN ENVIRONMENT AND SUSTAINABLE DEVELOPMENT STUDIES)

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DECLARATION

I undersigned, declare that this thesis work is my original work carried out by me. All the resources and materials used for this thesis have been fully acknowledged.

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Name of student	signature	Date	Place

This thesis has been submitted for examination with my approval as university advisor.

Dr. Dawit Diriba	10/November 2020	
Adviser	Date	Signature

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This is to certify that this thesis, entitled: "**Determinants of Household 'Electric'** ***Injera Mitad*** **and Cook Stove Adoption in Addis Ababa, Ethiopia**)" and submitted in partial fulfillment of the requirements for the award of the degree of Master of arts (Development Studies to the College of Environment and Development, Addis Ababa University, through the Department of Environment and Sustainable Development, done by Mr. Wubalem Gelaw, ID No. GSE/**5371/10** is an authentic work carried out by him under our guidance. The matter embodied in this thesis has not been submitted earlier for award of any degree or diploma to the best of our knowledge and belief.

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List of Abbreviations and Acronyms

CEINFMP	Cooking Efficiency Improvement and New Fuels Marketing Project
CRGE	Climate Resilient Green Economy
CSA	Central Statistical Agency of Ethiopia
ECO	Energy Coordination Office
EnDev	Energizing Development
EREDP	Ethiopian Energy Studies and Research
ESMPA	Energy Sector Management Assistance Programmee
FAO	Food and Agricultural Organization
GACC	Global Alliance for Clean Stove
HH	Household
ICS	Improved Cook Stove
NCCSPE	Ethiopia National Clean Cook Stove Programme
UN	United Nations
WHO	World Health Organization

Abstract

In the urban city adoptions of Electrical Cook stoves and disseminates technologies in different areas of Addis Ababa, which have wellbeing, monetary and ecological advantages. Understanding determinants of 'Electric' Injera Mitad and Cook stove adoption assumes a key role. The aim of this study was to examine factors that affect households 'Electric' Injera Mitad and Cook stoves adoption decision in Addis Ababa, by using mixed research methods. A data study was collected using a structured questionnaire. Only the data collection a total 396 households that were interviewed respondents households were select using systematic random sampling procedures. The Sub-cities were selected based on expenditure, level of income and head of household based on the criteria of higher, medium and lower level purposively structure interviews were also held with a total of 9 key informants. Descriptive statistics and bivariate relapse model were used to analyses data gathered using standard questionnaires and figurers from study were examined through concentrated textual analysis. Results reveal that heads of education level, monthly income, and marital status, ownership of house and having separate kitchen were found to be significant and positively correlated with the probability of Electric Injera Mitad and cook stove adoption decision. On contrary, marital status, age and sex head, room number, family size of Electric Injera Mitad and Cook stove were found not to be significant and negatively relation with the probability of Electric Injera Mitad/Cook stove adoption decision. The majority 87 percent of the sampled households adopted electric injera mitad; and 83 percent of the households adopted cook stove. From this situation the adoption of Electric injera Mitads and Cook stoves seems to have similar adoption patterns. Furthermore, providing Access of electric supply in urban settlement and providing within policy and strategy to the potential users and producers, and availability of Electric Injera Mitad and Cook stove production sites in close proximity were found to be institutional factors to influence Electric Injera Mitad and Cook stove adoption. The study recommended that Ethiopian Electric Services Utility and related government sectors look monthly Electric Payment should cost set providing service with in policy and strategy proportional, which helps contribute to adoption Electric Injera Mitad and Cook stove adoption.

***Key words**: Adoption, Addis Ababa, Cook stove, electric power, Injera mitad,*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Over 1.1 billion people worldwide live without access to electricity and nearly 3 billion people lack clean facilities to cook low supply of affordable and reliable energy continues to affect the world's poor (FAO, 2017). New, clean energy is therefore essential to human well-being.

The United Nations prioritizes the Sustainable Development Goal (SDG) number 7, which seeks to ensure access for all too accessible, secure, sustainable and modern energy (UN 2015). In addition, renewable, affordable and reliable energy is essential to achieving many other sustainable development goals, including eradication of poverty (SDG 2), health advancement (SDG 3), Quality education (SDG 4), water supply (SDG 6), and mitigation of climate change (SDG 13) The UN SDGs claims that energy technology needs to be improved by 2030, in order to supply new and sustainable clean energy in developing countries that are inaccessible to land (FAO 2017). Ethiopia is one of the countries pursuing this goal, being a developing land in an open world.

Global organizations, international development organizations, local governments and the private sector have been working in recent decades to facilitate the distribution and implementation of healthier solutions for cooking (Hewitt, *et al* 2008). Because in many countries there is still limited access to energy infrastructure and modern cooking alternatives, biomass remains the most feasible fuel for the near future. Better cookstoves (ICS) may represent an intermediate step on the energy ladder towards safer, more sustainable solutions within this scenario (Van der *et al* 2014).

Many regional and global projects, including the Western African Economic Community (ECOWAS 2006), the Eastern African Community (EAC 2007), the United Nations Commission on Sustainable Development (Rehfuess 2007), the United Nations Foundation for the Global Clean Cookstoves Alliance (UNGACC 2010), the World Energy Outlook 2010 (IEA 2010) and

the United Nations Secretary-General Advisory Group on Given this growing recognition and substantial unused financial resources in development aid, investment by the private sector and official / voluntary carbon offset schemes, the wide-ranging promotion of new household energy technologies today seems more feasible than ever before.

One example of such a transition is replacing; (IEA, 2010) switching away from fuelwood to Electricity. Electric is one wellspring of cooking energy, and is more secure and doesn't cause deforestation. Changing from fuelwood to power in this way prompts decreased timberland asset weight and lower indoor air contamination. Be that as it may, such a change is adapted by the rate at which the applicable cooking machine or cooker innovation is received. At the end of the day, the innovation permits most families to follow. Consequently, understanding the components which decide the pace of reception turns out to be pivotal.

Like many other sub-Saharan African countries, Ethiopia is heavily dependent on renewable energy sources such as fuelwood, coal, and animal dung and crop residues. According to the Ethiopian Environmental Protection Agency (EEPA, 2004), the biomass energy sources account for more than 90 per cent of total domestic energy demands. The EEPA further estimate that around 95 per cent of Ethiopia total population uses biomass fuels as their primary source of energy. Despite the fact that urban families have preferable admittance to current energy over the countryside population, the biomass use difference about 99% of country in rural families contrasted and 94% of urban family units. The solid dependence and wasteful utilization of biomass assets have assisted with exhausting woodland assets in Ethiopia. As a rule, Ethiopians are poor, and as Geist and Lambin (2003) and Vance and Iovanna (2006) have noted, destitution and other financial components are driving individuals in creating nations, including Ethiopia, to misuse woods assets for both homegrown energy utilization and business gains. Biomasses were kept on overwhelming energy request in metropolitan Ethiopia over the not so distant future given the high paces of reliance.

Intrinsic creativity is the first and most important determinant of adopting a new technology, related to the perceived value of the new product or service. Electrical Cookstove systems are most effective when prospective customers see the cookstove to provide tangible and measurable benefits. In urban areas, where fuelwood is often purchased, consumers are inspired by stoves

which save money from Doug Barnes *et al*. (2005). Therefore, present day oven reception faces different difficulties, as not every individual in building nations is were to fee for or requests to apply such new developments (Lewis and Pattanayak, 2012; Bensch et al., 2015; Hanna et al., 2016). Past endeavors to urge individuals in Ethiopia to grasp and utilize current ovens have met with controlled success. The administration has tried to inspire unpolluted stove tools, and although acceptance rates have improved gradually over time, there has been no large-scale implementation of the stoves needed to achieve climate benefits.

In contrast, households are less likely to want a new stove if conventional stove technology is available. The central question this study is interested in addressing is why urban households do not adopt new cooking stoves when they have access to electricity, such as electric injera mitad and cook stoves.

Improving access to affordable and efficient cooking energy services is important in reducing the adverse impacts of the use of solid fuels on developing countries. Urban households need to move from solid fuel to biomass fuels then move to modern energy sources. Nonetheless, the household transition to the use of electricity to cook strongly depends on the adoption of suitable cooking appliances or cooking technologies. A wealth of programs and projects has been working in creating nations, including Ethiopia, to disperse improved and current cooking ovens that have wellbeing, monetary and natural advantages. Despite this, family request and information on the advantages of new and upgraded cooking ovens, (for example, lessening indoor air contamination) stay low in Ethiopia. Thus, present day oven appropriation faces different difficulties, as not every person in creating nations is were to pay for or wishes to utilize such new advancements (Lewis and Pattanayak, 2012; Bensch *et al*., 2015; Hanna *et al*., 2016).Previous labors to encourage people in Ethiopia to grasp and utilize present day ovens have met with restricted achievement. The legislature has attempted to support clean oven innovation, and keeping in mind that appropriation rates have expanded consistently after some time, there has been no enormous scope usage of ovens expected to accomplish atmosphere benefits. Conversely, households are less likely to want a new stove if conventional stove technology is available.

A common misperception is that electricity adoption was significantly change household cooking practices in developing countries. The reality is that people have been using firewood for cooking for thousands of years. In most countries, the advent of electricity does not significantly change customary cooking practices. In the case of urban communities in many other developing countries, Ethiopia's urban centers were found to use electric stove to meet much of their daily cooking needs after adopting electricity (Barnes, 2016).

Ethiopia's energy sector is divided into two major blocks: traditional and modern energy. The vast part of the population depends heavily on traditional energy sources and very few people have access to alternative resources such as electricity. Wood and biomass thus account for approximately 93% of the country's total energy consumption (Girma, 2000).

The central question that this study is interested in addressing is what factors urban households adopts new cooking stove when they have access to electricity, such as electric injera mitad, electric bread baking and others cook stoves. In urban and peri-urban areas, electricity is a viable option, provided the expected increase in generation capacity, when combined with price structuring to meet poorer households (Getachew et.al, 2018). Rich household-levels panel data spanning a decade to examine the determinants and dynamics of electric cook stoves adoption by households in urban Ethiopia (Yonas *et.al*, 2013). Notwithstanding, the determinants of electrical cookstoves selection and supported use have not been at this point completely analyzed, consequently, more thorough examination helps for fortifying the comprehension of which elements are generally significant for making sure about reception and continued use (Klasen et al, 2013; Puzzolo, 2013; Damte and Koch, 2011). Lewis and Pattanayak (2012) additionally, in their precise audit, presumed that appropriation investigation of cook ovens innovation is scant, dissipated, and of differential quality. In addition, Puzzolo et al (2013) and Schlag and Zuzarte (2008), in their methodical survey of elements influencing the appropriation of improved cookstoves innovation, reasoned that significant factors, for example, the function of financial, adoption or none adoption; factors and policy and strategy promoting are understudied and they recommend future researches to include these variables. Therefore, this study contributes to fill this gap by identifying factors affecting the adoption of electric injera mitad and cook stoves since these understudying variables (socio-economic, adoption or none adoption; factors and policy and strategy promoting factors) were included in the analysis.

Nonetheless, the determinants of electrical cookstoves adoption and supported use have not been at this point completely inspected, hence, more thorough examination helps for fortifying the comprehension of which variables are generally significant for making sure about appropriation and continued use (Klasen et al, 2013; Puzzolo, 2013; Damte and Koch, 2011). Lewis and Pattanayak (2012) likewise, in their systematic review, presumed that appropriation investigation of improved stoves innovation is scant, dispersed, and of differential quality. Furthermore, Puzzolo et al (2013) and Schlag and Zuzarte (2008), in their orderly survey of components influencing the selection of improved cookstoves innovation, inferred that significant factors, for example, the part of financial, appropriation or none reception; elements and strategy and system advancing are understudied and they prescribe future investigates to incorporate these factors. Accordingly, this investigation may add to fill this hole by identify factors influencing the adoption of electric injera mitad and cook stove since these understudying variables (socio-economic, adoption or none adoption; factors and policy and strategy promoting factors) were included in the analysis.

1.2 Statements of the Problems

Many theoretical literatures on household energy usage reiterate the notion that urbanization stems from the transformation of household oil: from the use of conventional fuels to modern ones through the emergence of global fuel markets and shifts in lifestyles (Barnes, *et al*., 2004). However, the pace at which households move towards modern uses of cooking energy has been stalled in many developing countries, especially in sub-Saharan Africa cities (Barnes *et al*., 2004; Mekonnen & Kohlin, 2008).

For example, while African cities have experienced remarkable urbanization processes with some degree of socio-economic growth in the last decade or so, yet more than half of urban residents across the continent rely solely on traditional fuels for cooking services (IEA, 2010). It is also expected that the proportion of households reliant on traditional cooking fuels continue to grow by at least 14 percent until 2015 unless successful measures are taken (Takama *et al*., 2011).

As previous studies household energy transition challenges are nowhere more pressing than in Ethiopia, as more than 92 per cent of its citizens still rely mainly on traditional energy sources

for cooking activities (MoFED, 2013). Conscious of the severe nature of the problem and the relative importance of modern energy supply for the overall development of the country, the Government of Ethiopia (GoE) has been working to increase electricity access to most of the country's major cities and rural towns. However, although there have been significant improvements in the use of this increased access to electricity for lighting end-uses, this has not been the case with cooking activities (Gamtessa, 2003; Abebaw, 2007; Gebre'egziabher, *et al*., 2012).Given the availability of electricity and other alternative cooking fuels, such as kerosene , it is still popular in most urban Ethiopia even these days to see households cooking with firewood and charcoal. Consequently, this high demand for and use of traditional cooking fuels has intensified the rate of deforestation which ultimately made these traditional fuels (mainly firewood and charcoal) scarcer and more expensive in most cases.

Optimizing existing technologies as well as designing new technology behaviors had aspects of importing ants for senior citizens towards smart home technologies used (Binisha Hamal, 2015). Household transformation prospects for renewable household energy: implementation of a rapid tool (heart) for household energy assessment in Ethiopia (Getachew et.al, 2018)

Adoption of electric stove has been put into action to solve the problem caused by inefficient stove technologies in developing countries. Technology support for electric stoves claims that improved stoves bring social, environmental and economic benefits (Barnes *et al*., 1994). In addition, electric stoves reduce indoor air pollution, deforestation and thus reduce the risk of eyes and breathing problems for women and children who spend most of their time in the kitchen (WHO, 2005). Had more determinants of appliances ownership and electricity consumption in urban Ghanaian households, the high weighted share of residential electricity consumption is due to high ownership and use of appliances and other household / building factors (Marriette *et al*, 2018). To minimize the affecting electricity consumption government to develop its energy conservation policy, integrating with regulations of energy efficiency standards energy labeling schemes and the consumption characteristics in the Residential Sector china (Yi-Tui Chen, 2017). The socio-economic, dwelling and appliance related factors affecting electricity consumption in domestic buildings have significant or non-significant effects on domestic electricity consumption (Rory *et al*, 2014). (Abdalla et.al, 2017) Adoption of the new highly

efficient cooking stoves by urban households reduced cost, environment degradation and health impacts studied in two country Zanzibar and Tanzania.

Previous studies on the dynamics of electrical cooking stoves: panel data from Ethiopian firewood and access to credit as major determinants of adoption and transition (Yonas *et.al*, 2013), and (Mebratu Negera, 2019) the price of electricity and firewood, and access to credit as major determinants of adoption and transition; according to (Yonas, et.al,201) support to this study for policies aiming at promotion of energy source Electric stove uses and reduction of the pressure on forest resources in developing countries.

Therefore, with an overall aim to create deep understanding on the importance of devising sound policy mechanisms that address the household electric injera mitad and cook stove adoption transition factors prevailing in most parts of urban Ethiopia in general and in Addis Ababa city in particular, investigating what factors contributes of urban households in Addis Ababa city still heavily challenged on modern technology adoption for cooking services and what are the different factors underpinning such phenomenon is the concern of this paper.

Therefore, this research contrasts from past investigations in Ethiopia and found the gab in that it includes government policy promotion factors, the socio economic, educational back ground and living area in the analysis of factors affecting the adoption of electric *Injera Mitad* and Cook stove. Accordingly, this investigation may add a unique commitment to the current reserve of knowledge as to factors affecting household adoption decision in electric injera mitad and cook stove technology.

1.3 General Objectives

The principle goal of this study to explore factors affecting household adoption of electric *injera mitad* and cook stove in Addis Ababa city.

1.3.1 Specific Objectives

This study was direct to accomplish the accompanying explicit goals:

1. To assess the socio-economic characteristics of adopters and non-adopter of electric *injera mitad* and Cook stove

2. To examine the factors affecting household adoption of electric *injera mitad* and cook stove
3. To assess electric injera mitad and cook stoves types mainly adopted for household decision
4. To examine the role of benefits adopting electrical *injera mitad* and cook stoves

1.3.2 Research Questions

The research was direct to respond to following questions:

1. What are the socio-economics important of adopter and non- adopter in Addis Ababa city?
2. What are the factors of affecting on a household's Electric injera mitad and cook stove adoption decision?
3. Which electrical injera mitad and cook stoves type more adopt for household decisions?
4. What are the benefits adopting electrical injera mitad and cook stoves?

1.4 Scope of the study area

Topographically, this study is cutoff to Addis Ababa city area at three Sub cities (woredas) in capital city of Ethiopia. Reasonably, this exploration is breaking point to recognizing factors affecting adoption of 'electric injera mitad and cook 'stove at the family unit level. Hypothetically, the examination depends on the thoughts of Adopt Innovation, and Diffusion of development hypotheses in recognizing factors influencing families' decision to adopt or not. Furthermore, methodologically, this study utilize mixed exploration strategies and regarding time, this research utilizes cross-sectional information that is accumulate in recognizing factors affecting the adoption of electric injera mitad and cook stove. Thematic areas of the study focus on the Adoption of Electric Injera Mitad and Cook stove in city; addition, its major targets were be urban household respondents of sample *Addis Ababa city*.

1.5 Limitation of the Study

The research did exclude other eco-friendly cookstoves. The research was restricted to distinguish determinants of family unit the adoption of Electric Injera Mitad and cook stove at the household level. This research confronted restrictions because of the very idea of methodologies, strategies and tools that were utilized. Longitudinal data were not utilized for this research. In addition to this the outbreak of Covid-19 pandemic, the researcher faced challenges

to collect data from focus group discussion. From the above point the data were collected by interview and questionnaires.

1.6 Significance of the study

The findings of this study were having number of significances. It was being helped to the reader to understand the adoption of electric injera mitad and cook stove in urban area implies for health and environmental development. It was make possible decrease deforestation and time consuming for households. The study found that higher in household income higher the probability that the household adopts electric stoves. Adoption of present day cooking stoves assumes a critical function in improving way of life of urban family units and in diminishing unfriendly impacts of human activity on the climate. The investigation found that expansion in family salary expands the likelihood that the family unit embraces electric ovens.

The finding of the research may help policy implementers, neighborhood electric stove makers, Energy office, various operators and National Clean Cookstoves Program of Ethiopia to know about the determinant factors which influence family units' electric injera mitad and cook stove adoption decision.

The determinant factors that influence household 'Electrical' stove adoption decision were examine; the previously mentioned bodies can without much of a stretch recognize the possibly powerful mediation territories which can assume essential function for their success. On the off chance that the previously mentioned bodies take in to thought factors affecting family unit's adoption of 'electric injera mitad and cook' stove and work to overcome barrier of adoption, at that point families would liable to adopt the stove. Thus, all the families and the activities would be adoption, and everywhere this contributes its part for the acknowledgment of Ethiopia's Green Economy Strategy.

Other researchers may also use the findings of this study in relation to factors affecting the adoption of ‘electrical’ stoves in urban areas. The study may contribute to the contemporary empirical literature on factors that determine household choice of adoption of electric injera mitad and cook stoves in developing countries. Additionally to increasing energy efficiency in production and use improving energy efficiency is the cheapest, fastest and most environmentally friendly way to meet a significant portion of the Addis Ababa city energy needs.

Improved energy efficiency reduces the need for investing in energy supply. Lastly when measures in cost-effective, and they were pay for themselves over their lifetime through reduce energy costs.

1.7 Organization of the thesis

This thesis has five parts. The primary section deals the background of the study and problems the issue of the research, fundamental questions and goals of the study, the scope and constraint of study and the centrality of the investigation. The secondary part incorporates adoption innovation, innovation dispersion, and family unit energy utilization worldwide review, Energy flexibly utilization in Africa, Ethiopian National Energy Policy and Electric cooking Stoves in urban families. Empirical studies on Determinant of Electrical Injera Mitad and Cookstoves Adoption. Moreover, this section examines the hypothetical and calculated structure of the investigation. The third section manages the techniques for the study. Under this section, the selection and study area description, data type and source, research design and research strategy, sampling design and procedures, data collection and instruments, data collection procedure, and data processing, definition and description of variables as well as model specification are dealt. The fourth chapter presents analysis and discussion and the fifth chapter of this paper deals with conclusion and recommendation. Finally, the reference materials and appendices are also included.

1.8 Definition of concepts

Adoption: In this study adoption refers to the choice of families to acquire/adopt an Electric cookstove and the concern to use (Smith and Brodzinsky, 1998).

Household: Here household refers to a collection of people who eat together regularly and/or who sleep under the same roof together (Beaman and Dillon, 2011).

Electrical Cookstove: An Electrical cookstove is a stove that is more efficient and releases very lower emissions as compared to improved stoves (Lina Anderson, M.L, 2006).

Injera: Injera is the traditional food in major Ethiopian households, and mostly prepared from "teff" (Stewart RB, Getachew A., Econ Bot 1962).

Mitad- is the local name for a stove that is exclusively used for baking injera, the staple bread in Ethiopia (DANAS 2015).

Sub City: Sub city refers to government's administrative unit in Ethiopia which is middle level to higher Addis Ababa administration.

Woreda: Woreda refers to government's administrative unit in Ethiopia which is equivalent to district.

CHAPTER TWO

LITERATURES REVIEW

2.1. Injera and Electric Injera Mitad

Injera is a thin pancake like leavened bread that can either be made of Teff, Maize, Sorghum and Millet or a combination of two or three of them, and is used by most Ethiopians as the staple food. (IBID, 2015) Baked in urban areas, Injera weighs about 300 to 450 grams. Injera is consumed more than once a day by most Ethiopians. Injera is baked using 40-60 cm diameter clay plate, called Mitad, which uses eithers biomass, firewood, cow dung, leaves, saw dust and electrical power as energy source.

The Electric Injera Mitad is made of steel or aluminum sheet metal frame with a conical lift cover, small cylindrical enclosure (body), clay plate, electrical heater, heat insulator, and an endorsement stand. ((IBID, 2015)) The electric Injera Mitad clay plate is made either as a single or double circular plate with a diameter of between 40 and 60 cm and a thickness of between 2.3 and 2.5c.m. And part of this the most popular plate of tiles with a diameter of 58c.ms. The distinction between the form of single and double clay plate is the method of positioning of the support mechanism for the heating element and clay plate. And they can be found in Ethiopia, wherever electricity is available, priced about 4,000 Birr. Most of which are rated at 3.7 to 4.0 KW capacity, the electric Injera Mitads is estimated to constitute about 60 percent of a typical residential household's power demand. It is common practice to see the dimming light bulbs, lowering the power level and generating high volume of steam and heat while Injera is baked. When Mitads is in service other electrical appliances such as stoves and water heaters were not be switched on. Electric Injera Mitads contributes to the bulk of a typical residential household and the nation's electric power production and use.

Electrical stoves form an integrated cooking and baking heating system. Electric stoves became common as substitutes for solid-fuel (wood or charcoal) stoves, which required more labor to operate and maintain. Electric stoves can have single or multiple cook tops and are controlled by a finite or infinite rotary switch number of positions, each requiring a different combination of electrical resistance and hence different heating power.

Some may have a power to turn electricity on and off and track the average heating effect of the elements (DANAS 2017). For Ethiopian homes and viable kitchens electric stoves are widely used.

2.2. Theoretical Framework

2.2.1. Adoption of Technology

According to (Rogers, (1995) and (Van'den Ban and Hawkins, (1960), whenever an invention is introduced to households there is often a trend in how the innovation is embraced by new users over time. Some in the households were enthusiastic and sensitive citizens of early adopters who were easily accept the innovation. Second groups were imitating the first group very soon and implement the concept. Third groups were being more skeptical about the concept and were implement it only under social or economic pressure. Usually, a fourth group would follow an innovation that has only been overtaken by another innovation. There seems to be an extra final group of people never to follow the concept. Building on the Concepts the study identified variable which could have bearing on the pace of adoption, e.g. the presence of champions which they are early adopters and inspire others, who may be more cautious to also adopt the new Electrical stove.

When the consumer has decided to adopt it, the technology adoption process does not stop; a follow-up is needed to ensure that the intended benefits of the technology actually occur (Rogers, 1986). Only when the technology is embraced was a person able to manage and operate it independently (Rogers, 1986). It is the engagement and organization of human motivation value that helps households to fully accept a technology (Troncoso, 2010). This study examines several variables regarding the user's follow-up and ownership of the electric stove, and confirms the relevance of those accepted by sustainable stove adoption households (Troncoso, 2010).

Appropriate technology in Addis Ababa’s latest stove technology according to Electrical stove studies must be more useful than the one it replaces for adoption. It must be consistent with the behaviors, principles, beliefs and desires of potential users, because it were be difficult to adopt any concept that goes against well-established practice in a household (Troncoso, 2010). Appropriate technology according to Electrical stove studies must be more useful in Addis Ababa's new stove technology than the one it replaces for adoption.

It must be compatible with the habits, practices, preferences and expectations of potential users, because it were be difficult to adopt any definition that goes against well-established household trends (Troncoso, 2010). The product must also be easy to understand and execute and noticeable for its results and benefits (Van'den Ban and Hawkins, 1996). Finally, an acceptable technology can be described as one that is simple to respond to the basic needs of the consumer respects the local culture employs local materials and labor users of the resource in a fair and sustainable manner and understands urban people's technological and cultural traditions (Aguilar, 1990).

Social learning has two possible functions, in terms of acceptance and diffusion. Second, individuals who witness others embracing a specific concept may be more inclined to consider adoption themselves by modeling. Somebody's vicarious experience using a system effectively or unsuccessfully can be affecting others. Second, modeling was conceived mainly as a concrete phenomenon in previous years, but the technological developments of recent years and the accessibility of mass media, modeling, and vicarious learning indicate that vicarious learning often exists in the abstract domain (Bandura, 2001). Social learning doesn't only influence the decision to follow a technique influence the decision whether to adopt a technology but the explosion of the Internet, widespread use of television and radio, and even the influx of cellular phones has expanded the space to a worldwide area of possibilities

Practices influencing energy use people in their everyday domestic lives are engaged in practices such as cooking, eating, sleeping, shopping and dancing. Also work includes a wide variety of practices. When people are asked about their everyday life, they usually describe the practices they are engaged in (Røpke, 2009). While the roots of practice theory can be traced back to the Enlightenment, the term itself has more recent origins. One branch of practice theory that has been developed within sociology (our main frame of reference) emanates from Bourdieu (1977) and Giddens (1984), and has been developed further by Schatzki (1996) and Reckwitz (2002). In relation to energy consumption, Shove (2003) and Gram-Hanssen (2010) have made important contributions.

Early work on this perspective traced ideas built into technology by designers and producers (Glad, 2012) and, more recently, social learning related to the use of different energy

technologies has been acknowledged (e.g. Darby, 2006; Rohracher, 2006; Stagl, 2006; Vergragt & Szejnwald Brown, 2006).

Designers and users of modern technology need to think about the contexts in which technology were be used, even if everyday life use offers endless variations. Sørensen (1996) has emphasised that technologies of everyday life form heterogeneous networks of technology hardware, software and the social systems of routines and culture.

Accordingly, the decision to purchase the stove and choice regarding its efficient use depends on household attitudes regarding risk and their expectation of the uncertain gains from adoption. They test some of the results from their theoretical models using a sample of 99 rural households from Nepal and show that households living in high price regions, those expecting greater fuel savings, those with more risky capital, and educated households are more likely to adopt the new technology before the less endowed households. Using a randomly selected sample of 300 households from Khartoum state, Sudan, El Tayeb Muneer & Mohamed (2003) used a multiple linear regression method to analyze the adoption rate and the factors affecting adoption of improved cookstoves in what they call a "patriarchal society".

2.2.2. Technology Diffusion

The 1962 work of Everett Rogers, The Propagation of Inventions (and subsequently the many later editions), has undoubtedly become the most influential book in the field of understanding how an invention infiltrates (or not) a population. Based on a wide range of sociology, education, psychology, Straub 630 geography, and other science crossing fields (Rogers, 1995), Rogers offered a systematic basis for understanding individual acceptance and, collectively, diffusion. The theory of Rogers is especially important because it inspired many other theories of adoption and distribution (Boyne, Gould-Wereiams, Law, & Walker, 2005; Deffuant *et al*., 2005; Pennington, 2004; Venkatesh *et al*, 2003). The strength of Rogers ' theory lies in the broad foundation it provides for under-standing the factors which affect an individual's choices about an innovation. It's the basis for recognizing adoption. Because of the scope of this theory, this section can only begin to touch on the different components, but it does ease a basic understanding of the principle of innovation diffusion (IDT).

Selected hypotheses of acceptance and propagation centered on the frequency of the presence in the literature. First, Rogers ' theory of diffusion of invention offers a fundamental understanding of the theories of adoption. Rogers ' theory has been commonly used for recognizing and anticipating progress through disciplines.

Although while several research studies attempt to understand the process of adoption, only a few hypotheses are commonly used in the current literature. Analysis of the education research identified two key adoption hypotheses introduced in the current literature in education. The Concerns-Based Adoption Model (CBAM) was first used to explain technological change. The CBAM was used to explain curriculum reform for teachers (Christou, Eliophotou-Menon, & Phillippou, 2004) and the implementation of a professional teacher model (Pedron & Evans, 1990), as well as technology change and adoption directly (N. E. Davis & Roblyer, 2005; Dobbs, 2004).

Rogers Everret (2003) uses the diffusion of innovation theory to describe how the implementation cycle of a new innovation forms the characteristic of various innovations. These include relative edge, reliability, difficulty, trialability and observability. Those various phases are explained below.

Relative advantage refers to the degree to which it perceives an invention as greater than the one it supersedes. This can be measured in terms of finances, ease, social prestige and contentment. What is critical is how beneficial a person perceives the invention as opposed to the advantages it brings. The increase perceived relative value of an invention, the higher the rate of adoptions. Compatibility is the degree to which an invention is seen to be consistent with current beliefs, past experiences, and future adopters ' needs. If a concept is to be accepted it must be consistent with a social system's existing values and norms. Hence, an invention must be consistent with the current social values and norms for easy adoption. Complexity is the degree to which an invention is seen as hard to understand and use. Innovations that members of a social system can quickly and readily comprehend are implemented faster than complicated Novelties. The typically once speeding up the adoption of new simpler solutions those are easier to understand than the technologies that need the adopter to acquire new skills and understandings.

The degree to which an invention can be experimented with on a minimal bias is trialability. New ideas which can be carried out on the installment plan were be implemented at a faster rate than non-divisible inventions. A trialable invention is less confusion for a future adopter, since testing is feasible. Observability is the degree to which someone else can see the effects of an invention. The more individuals see the consequences of an invention, the more likely they are to implement it. This exposure stimulates debate among people asking for performance / innovation outcomes from the adopter of new ideas.

To put it briefly, technologies viewed by users as having greater relative advantage, reliability, trialability, observability, and less difficulty were be implemented at a faster rate than other inventions (Rogers 1995).

2.2.3. Household energy consumption: Global overview

Over three billion (near half of the world's human) globally deprived of access to modern alternatives to energy. All of these people live in poor countries and are relying on conventional biomass resources to meet their basic energy needs. This has contributed to worse results for health and the environment. As a consequence, the central premise of the global energy policy aimed to move from high-cost use and Environmentally harmful fossil fuels to cost-effective, renewable energy sources (biomass, wind, hydro and solar) (Dawit, 2012).

Empirically the African continent, though sheltering 15 percent of the world's population, accounts for just 3 percent of global energy consumption, and an African's average energy consumption is six times less than the world's total. In comparison, the US makes up 5% of the world's population but consumes 24% of the world's energy. On average, 2Japanese, 6 Mexicans, 13 Chinese, 31 Indians, 128Bangladeshis, 307 Tanzanians and 370 Ethiopians consume as much energy as one American. Nine percent of the world's population accounts for sub-Saharan Africa, producing 2.5 percent of world economic activity. The country absorbs 2.7 per cent of primary industrial energy in the world. The country has 2 percent of proven world oil reserves, 3 percent of proven world gas reserves and 6 percent of proven world coal reserves. There is a great potential for hydropower, also capable of exporting to other regions more than local needs (UNEP, 2006).

Energy demand in industrialized countries accounts for more than 98% of the global energy sector's supply; the remaining less than 2% from biomass. The same trend in developing countries was 48 and 52 per cent, respectively. Nevertheless, there are exceptions even in developing countries where biomass serves as the primary source of energy (Miller, 1986). On the other hand, the per capita consumption of modern energy in developing countries is extremely low compared to that in industrial countries. For example, in the early 1990s, per capita consumption of modern energy in the US was 8 tons of oil equivalent energy per year, 80 times that of Africa, 40 times that of South Asia, 15 times that of East Asia and 8 times that of Latin America (World Bank, 1996).

Since higher income households still tend to use traditional fuels such as biomass in conjunction with modern ones, this transition can rarely be complete. This is partly because some traditional fuels are required for different cooking styles (Bereket, 2000). According to the World Bank Study (1996), there are nearly two billion people worldwide without access to modern forms of energy, most of who come from developing countries. About one-third of all energy consumption is obtained from wood burning, crop residues and animal dung, particularly in this part of the world (World Bank, 1996). It's further evidence that conventional fuel consumption is enormous even in developing world towns and cities. This is particularly true in many non-oil producing sub-Saharan African countries, where current availability and distribution costs of obtaining related appliances often hinder the use of modern energy sources (World Bank, 1996).

2.2.4. Energy Supply and Consumption in Africa

Africa has a rich potential for non-renewable and renewable energies. However, in Africa, given its energy resource capacity, lack of investment capital and advanced modern technologies, up to 5.5 per cent of the world's energy is consumed. Most of the African countries have very low energy consumption per capita. The energy consumption per capita of 0.5 Toe is much smaller than the world average of 0.2 per capita, which makes the continent lag behind all the other energy uses (IEA, 1999). Existing energy consumption figures in Africa indicate significant and continuing reliance on traditional biomass energy and minimal use of modern energy sources (Karwekezi, 1997). Modern energy consumption in Africa is less than 300 kg of petroleum equivalent on average per person, compared with 7905 kg in North America and 1434 kg on a world average (World Bank, 1996).

Nevertheless, the growing demand for electricity has been rising over time in most African countries due to the large number of consumers, large industries, government offices and so on (Norton 1995). In 2000 the continent consumed just 524 kWh of electricity per capita, the lowest of all other world regions (World Bank, 1996). Looking at monthly domestic electricity consumption, 28% of domestic customers use less than 100 kWh a month and less than 1% household of average of 25 kWh while 500 kWh is used by 69 per cent (Hunegne 1994). Oil remains Africa's largest source of modern energy, with production hitting 441 MTOE in 2000, representing 11.4 per cent of the total world energy (World Bank, 1996).

The household's energy consumption in Africa has preponderance over the total demand of all other sectors put together and is largely based on conventional fuels (Bereket, 2000). In countries including Mali, Burkina Faso and Ethiopia, fuel wood charcoal is projected to surpass 90 per cent of national energy consumption. Nine out of 10 people on the continent as a whole rely on fuel wood for their household energy (FAO, 1997). FAO, 2000 also reported that Africa alone produces and consumes about half of the world's supply of charcoal, which is used as domestic fuel in many urban areas and as a fuel for cooking. It also reported that energy accounts for 90 to 98 per cent of total household energy consumption in rural areas of Africa through product charcoal. In this relationship, the FAO, 1997 also estimated that about 100 million tons of wood are cut annually for the production of charcoal. Charcoal is made in simple earth kilns or pit kilns by small producers where the conventional production techniques lead to low conversion efficiency with high wastage.

Dependence on the biomass fuel to meet the basic domestic energy source needs; in most Africa country current conditions last ten years. In most African countries, it contributes over two-thirds of the total annual energy usage (Hailelul, 2000). (Sokona, 1997) further states that aggregating the base of biomass resources in sub-Saharan Africa is more than sufficient to cover the annual demand for fuel per capita. Natural forest resource capacity covers 22.2 percent of the total land area and is estimated at about 82 billion tons of biomass resource which has the potential of 168.2 tons per human. Modern biomass, primarily wood and charcoal, is by far the most important fuel, except for South Africa, which accounts for more than 70 per cent of total primary consumption across the continent (Farienlli, 1997).

The most striking feature of the African energy situation is the excessive consumption of conventional low-grade energy sources and the use of modern high-quality fuels. Demand for fuel wood leads to loss of forest in per-urban areas that focus on fuel wood and charcoal production. Increasing fuel wood and charcoal demand is creating a halo of deforestation around many cities and roads (World Bank, 1996).

2.2.5. Ethiopian National Energy Policy

In 1994 the first National Energy Policy of Ethiopia that has been followed up to now was formulated. Being mindful of the legislative constraint to address the current energy situation, in February 2013, the Government of Ethiopia drafted a revised Energy Policy.

The reason for updating the energy policy was to align energy sector growth strategies with current national development strategies, as well as to emphasize the production and use of renewable energy sources that support the country's climate-resilient green economy strategy. The revised energy policy has clearly set guidelines for the policies and plans for the growth of the energy sector Development strategies and plans to meet the rising and increasing citizens ' energy demand by taking into account advances in technology that integrate new fuels and energy conversion technologies.

The main objective of energy policy is to ensure the availability, efficiency, affordability, protection and reliability of energy services in support of the countries accelerated and sustainable social and economic growth and transformation. Increased use of modern energy sources to the degree that the country becomes a regional hub for the production and use of renewable energy resources is articulated as one of the main strategies that would guarantee energy security and environmental sustainability. (Gaia 2015) The Energy Policy clearly stated the need for the production of renewable energy resources and fossil fuel replacement and conventional use of energy in households and other economic sectors. Strengthening the governance of the energy sector and setting up strong energy institutions are also given due attention within the country's new energy policy.

The policy acknowledges that providing alternative energy supplies were help increase the national energy supply mix and reduce the burden on biomass resources as well. With regard to the production of biomass resources, the new policy clearly sets targets and policy mechanisms

to assist in the creation and productive use of solid biomass and modern biomass fuels including bioethanol. Important policy instruments set out in the energy policy included active engagement of energy cooperatives and the private sector in the provision of sustainable energy services, development of renewable energy production and conversion. (Gaia, 2015) Small-, medium-and large-scale biofuel production one of the highlights of the policy instruments is technology by enhancing the transition and adoption of effective and cleaner energy technologies. The policy has imposed favorable import duties on renewable energy conversion technologies and end-use products as one of the policy instruments to promote the wide-scale deployment of renewable energy technologies and make them accessible for the majority of citizens. The policy highlighted the need to develop and enforce standards and quality control in order to ensure continuity of supply, efficient and safe use of energy technologies and resources.

2.2.6. Electric Cooking stoves in Urban Households

Household stoves are usually known as stoves for cooking and baking. Many stoves are also used to roast, bake, boil, and reheat. In the surveyed areas, electrical stoves are also commonly used in urban households (25 per cent). Ownership and use of electric cookstoves varies greatly among regions. In Addis Ababa, (CSA, 2011) where it is widely used, it is used for cooking by 48 per cent of households. Just 8 per cent of households own electrical stoves at Tigray and Afar. The most common baking stove used by 41 per cent of urban households is open fire. Ownership and use of Open Fire for baking in most regions is between 40% and 70%. Just about 15 per cent of the households surveyed in Houses in Addis Ababa, and none in Tigray, use Open Fire to bake. Approximately 50 per cent of households in Addis Ababa use electric baking stoves. The national fuel survey found stove stacking is a commonly displayed activity in urban households with over 90% charcoal, 70% firewood, and about 33% cooking / baking electricity users. With about 68 per cent consumers, the number of urban households using electricity is the highest in the capital city, Addis Ababa.

In recent years, most urban households are increasingly using electricity to cook, as the prices of other fuels such as kerosene, LPG and coal are rising steadily, while the price of electricity remains constant for the last eight years. While the use of electricity for cooking increased from 2.4 percent in 2004 to 6.2 percent in 2011, there has been exponential growth in recent electricity use. (CSA, 2011) Electricity, which is used by about one third of urban households, is the third

most important fuel for cooking / baking. Addis Ababa's highest percentages of urban households use electricity (68 percent) use it for cooking. Approximately 50% of households in Addis Ababa use electric stoves for baking.

2.3. Empirical Literature Review

2.3.1. Determinant of Electrical Injera Mitad and Cookstoves Adoption

As it was surveyed in the past section, there are factors that discovered to be determinant in deciding family units' electrical cookstoves adoption decision. These components are talked about.

2.3.1.1. Age of head

The past investigations discovered conflicting outcomes concerning the connection among age and electrical cookstoves adoption. An audit by Lewis and Pattanayak (2012), family unit head's age was demonstrated to be huge negative factor that decides the appropriation of cookstoves across examines surveyed. In opposite, Gebreegziabher et al (2010) discovered family unit head's age to be positive and factually critical determinant factor of Electrical stove appropriation choice. The finding of Dawit (2008) uncovers that family unit head's age is adversely and measurably critical determinant factor of cook oven appropriation. As to the impact of a family head' age on family's Electrical cookstoves adoption decision, ongoing work of Puzzolo et al (2013) discovered irregularity among research discoveries. Therefore, based on the previous empirical works and with the assumption that older people may tend to be conservative in accepting new cooking technologies, in this study it is expected age to affect the household’s electric injera mitad and cook stove adoption decision positively.

2.3.1.2. Marital status

Single women (female headed families) were discovered bound to receive electrical stove when contrasted with married women male headed partners (Damte and Koch, 2011; Inayat, 2011; Adrianzen, 2009). The creators contend that in male centric culture since husband more capacity to settle on monetary choices in the family unit, hitched ladies' electrical ovens buying choice relies up upon the were of their companion. Having this seeing, subsequently, it is normal that

conjugal status (for single) to influence Electrical stove adoption emphatically in urban family units.

2.3.1.3. Education of head

A survey by Lewis and Pattanayak (2012) found that family unit head's training is decidedly and measurably noteworthy elements that decide the adoption of Electrical stove across examines assessed. It is contended that informed potential clients are bound to know about the advantages of electrical stove when contrasted with uninformed or less taught clients (Inayat, 2011; Menon and, Thandapani, 2011; Adrianzen, 2009). Menon and Thandapani (2011) again guarantee that the customers training about the diverse budgetary instruments they can profit to buy the cook stove so the apparent cost can be limited. Damte and Koch, Gebreegziabher et al (2010), Dawit (2008) and Makame (2007) discovered family unit head's instruction as a positive factor in impacting current stove appropriation choice in Ethiopia. It was discovered positive relationship between the family unit head's degree of education and Electrical stove adoption.

This past writing about the impact of level of education on electrical stove adoption choice empowers one to expect a constructive outcome of education on urban family units' Electrical stove adoption decision in the investigation region. Subsequently, positive and noteworthy relationship is normal between ladies' education level and Electrical stove adoption decision.

2.3.1.4. Income

The deliberate survey of Puzzolo et al (2013) discovered electorate among research results that higher financial status is positive and critical factor in deciding a family unit's electrical ovens selection choice. An audit by Lewis and Pattanayak (2012) found that salary is emphatically and noteworthy factor that decide the adoption of electrical ovens across considers surveyed. Pine et al (2011) and Inayat (2011) found that family pay is determinant factor of families' electrical stove adoption decision. The examination explored measurably noteworthy positive connection between electrical stove adoption and family salary. Crafted by Damte and Koch (2011), Gebreegziabher et al (2010) and Dawit (2008) uncover that family pay is factually huge positive determinant factor in deciding families' Electrical stove adoption decision.

2.3.1.5. Family size

With respect to family size, Puzzolo et al (2013) discovered irregularity among discoveries. A survey by Lewis and Pattanayak (2012) found that family size is measurably noteworthy and decidedly connected with the likelihood of adoption of electrical stoves across examines investigated.

Pine *et al* (2011) found that household size is statistically significant factor that determines electrical stoves adoption decision. The study revealed statistically positive correlation between electrical stoves adoption and large family size. These authors claim that households with larger family size consume larger fuel wood as compared to households' smaller family size that results in influencing larger family size households to economize electrical stoves usages. Gebreegziabher *et al* (2010) found that family size is positive and statistically factor in influencing adoption decision of electric stove. Households with large family size were found more likely to adopt electrical stoves. Given this previous literature, it is expected that large family size positively affects households electric stove decision.

Pine et al (2011) found that family unit size is factually noteworthy factor that decides electrical ovens selection choice. The investigation uncovered measurably sure relationship between electrical ovens selection and enormous family size. These creators guarantee that families with bigger family size devour bigger fuel wood when contrasted with family units' littler family size that outcomes in impacting bigger family size family units to streamline electrical ovens uses. Gebreegziabher et al (2010) found that family size is positive and statistically factor in impacting adoption decision of electric stove. Families with enormous family size were discovered bound to receive electrical stove. Given this past research, it is normal that huge family size emphatically influences families' electric stove adoption.

2.3.1.6. Separate kitchen

Puzzolo et al (2013) discovered supporters among research results that having separate kitchen is positive and measurably critical factor in deciding a family's electrical ovens selection choice. Past examinations discovered separate kitchen house as one huge factor that has constructive outcome on a family unit's electrical ovens reception choice (Axen, 2012; Damte and Koch, 2011; Adrianzen, 2009). These works explored the positive connection between different kitchen and electrical adoption decision. In view of the current writing, having separate kitchen is

required to positively affect families' electrical adopt choice in the examination territory. Family units with kitchen are required to be discovered almost certain electrical stove adopters with the supposition that since electrical stove is bigger in size and actually fixed in nature, extra space is required.

2.3.1.7. Price

Value factors incorporate the cost of electrical stove, others. Yet, for this examination reason, the impact of electrical ovens' cost on families' selection choice is investigated. An ongoing report by Levine et al (2013) found that powerlessness of the poor to pay the expense of electrical ovens is one of significant hindrances of appropriation choice. Axen (2012) contends that the cost of electrical ovens and family units' discernment on the cost have impact on the likelihood of the families appropriation choice. Slaski and Thurber (2009) recognized that electrical ovens cost reasonableness by the poor is a positive determinant factor of appropriation. The creators contend that low moderateness of the cost electrical ovens adversely influences electrical ovens appropriation probability by poor people. Makame (2007) found that the buying cost of cookstoves is significant factor in impacting a family's appropriation choice. The investigation's outcome shows that since the cost of the electric one (territories US$11-US$15) not exactly the costs of current electrical oven (ranges US$150-US$325) family units were discovered tending to buy present day electric stove.

These past examinations provide some insight into expect what the impact of Electrical stove cost to be on urban families' buying choice. Thusly, it is normal the cost of electric injera mitad and cook stove to negatively affect the families' buying decision in the investigation area.

2.3.1.8. Social and institutional factors

From the exact research different components that are found to impact the adoption decision of electrical stove incorporate institutional and social variables. Makonese et al (2006) keep up that the current institutional set up is a key factor that impacts the usage, advancement and dispersal of electrical stove in a specific nation. These creators found that preparation, innovation and data trade, innovation standard and decentralizing energy frameworks are institutional components that impact the creation, dispersal and appropriation of electrical stove. Crafted by Puzzolo et al (2013) and Agarwal (1983) likewise found that augmentation administrations, for example,

mindfulness creation and budgetary admittance to the clients and the maker are positive institutional variables that impact the selection choice of electrical stove. Social components are additionally discovered to be the other significant factors to impact electrical stove adoption decision Puzzolo et al, 2013).

2.4. Conceptual Frameworks

Mixed strategies analysts can utilize hypothesis either deductively in testing and confirmation, or inductively as in a rising hypothesis or example (Creswell, 2003). Subsequently, this investigation depends on three speculations; Energy Ladder Theory, Energy Stacking Theory and Diffusion of Innovation Theory.

With respect to family unit, there are two sorts of family energy decision hypothesis, energy stepping stool and energy stacking (Iyant et al, 2011). Energy stepping stool model, considered as exemplary and conventional, puts weighty accentuation on pay (reasonableness) in both clarifying and deciding a family's energy/fuel/oven decision (Masera et al, 2000). This suggests the family unit's salary is taken as the main determinant factor that impacts family's stove adoption decision. However, this point of view is exceptionally condemned by various investigations with two pragmatic reasons (Masera et al, 2000; Schlag and Zuzarte, 2008; Kowsari, 2013; Puzzolo, 2013). One of the reactions is that there are different determinant factors, other than pay, that impact family's stove adoption decision.

Then again, energy stacking family energy decision point of view beats the downsides of the energy stepping stool speculation. Energy stacking, additionally called fuel/oven stacking is considered as the most recent and it depends on exact proof and is more practical than the exemplary energy stepping stool speculation (Kowsari, 2013). Fuel type decision and additionally oven appropriation choice relies up upon an intricate communication between financial, social, social and ecological variables (Masera et al. 2000; Schlag and Zuzarte, 2008). Specialists (Mekonnen et al, 2009; Takama et al, 2011) additionally contend that pay alone doesn't decide appropriation/oven decision; family size, age and training are critical and matter more in deciding if a family receives. Therefore, the ongoing examinations applied energy marking theory and suggest that future investigates ought not depend unnecessarily on the

energy stepping stool model; for family units in helpless creating nations, for example, those in Ethiopia, more regard for be paid to other nonmonetary angles other than pay in the investigation (Mekonnen et al, 2009).

The other hypothesis with respect to innovation selection is 'Dissemination of Innovation hypothesis'. As indicated by Rogers (2003), the Diffusion of Innovation Theory states that people and early adopters in a specific social framework can impact disposition and conduct of others casually either to advance or block the acknowledgment of another innovation. As per this hypothesis, Electric Injera Mitad and cook stove technology are bound to spread out in a specific populace if the stove first addition acknowledgment among 'early adopters. In view of these expressed speculations, the writing that the scientist has checked on and dependent on the discoveries of the past experimental examinations on determinants of family unit the adoption of Electric Injera Mitad and cookstoves, the accompanying theoretical system is creating.

The conceptual frame work state shortly in these study determinants of household decision for adoption Electric Injera Mitad and Cooks stoves influenced by characteristics, family size, income, age, separate kitchen, occupation, marital status and educational level shown. In another way to examine household adopter or non- adopter Injera Mitad and cook stove decision. Lastly policy strategy and social factors promote for decision Electric Injera Mitad and cook stove adoption influence.

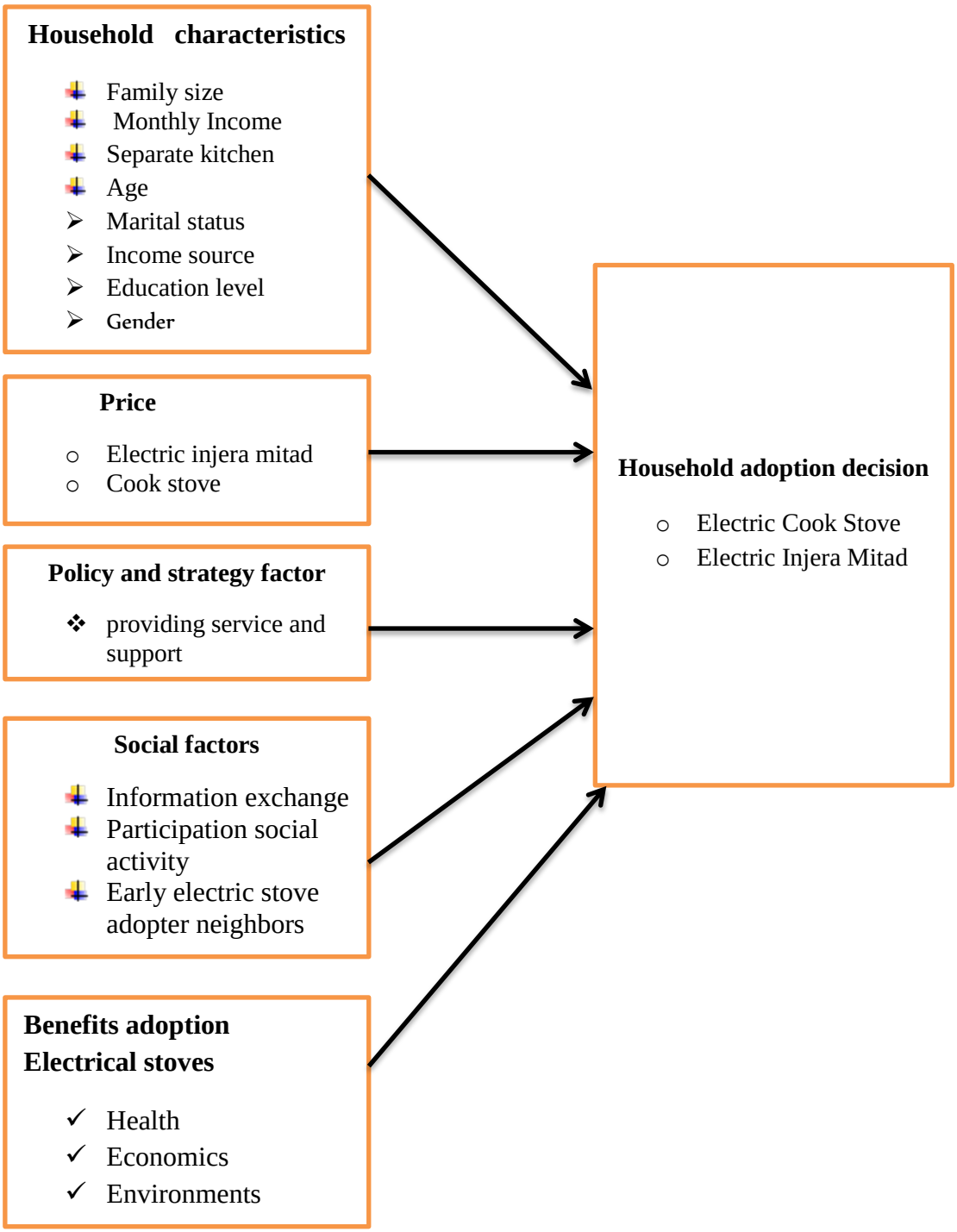

Figure 2.1: Conceptual Framework

Source: Own researcher (2020)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Methods

This part deals with focuses on the research design, sampling procedure and unit, source of data, sampling technique, method of data collection, and method of analysis.

3.1.1 Selection and Description of the Study Area

The study is conduct in Addis Ababa, is the capital city of Ethiopia. It is also the largest city in the country by population, with a total population of 3,384,569 according to the (CSA, 2007) census. However, it is believed that this number was inaccurate when recorded and underestimated the city's population. Close to half of the population is of the ethnic group Amhara, while the majority of the remaining population is split among the groups Oromo, Gurage, and Tigray. 71% of the population use Amharic, Oromo is in use with just over 10% of the people, with four additional languages ranking more than 1% use among the population. It is located on a well-watered plateau surrounded by hills and mountains, in the geographic center of the country. Only since the late 19th century has Addis Ababa been the capital of the Ethiopian state. The landlocked country in East Africa, the city is located almost in the center of the nation in the foothills of Mount Entoto about 2,500 m (8,200 ft) above sea level. The city was founded in 1886 by Emperor Menelik II of Ethiopia. Addis Ababa, Ethiopia's sprawling capital in the highlands bordering the Great Rift Valley is the country's commercial and cultural hub. Its National Museum exhibits Ethiopian art, traditional crafts and prehistoric fossils, including replicas of the famous early hominid, "Lucy''. The burial place of the 20th- century emperor Haile Selassie, copper-domed Holy Trinity Cathedral, is a neo- baroque architectural landmark.

Addis Ababa lies on 2350m above sea level in Addis Ababa; the climate is warm and temperate. The summers are much rainier than the winters in Addis Ababa. The average annual temperature in Addis Ababa is 16.3ºC/ 61.4ºF.

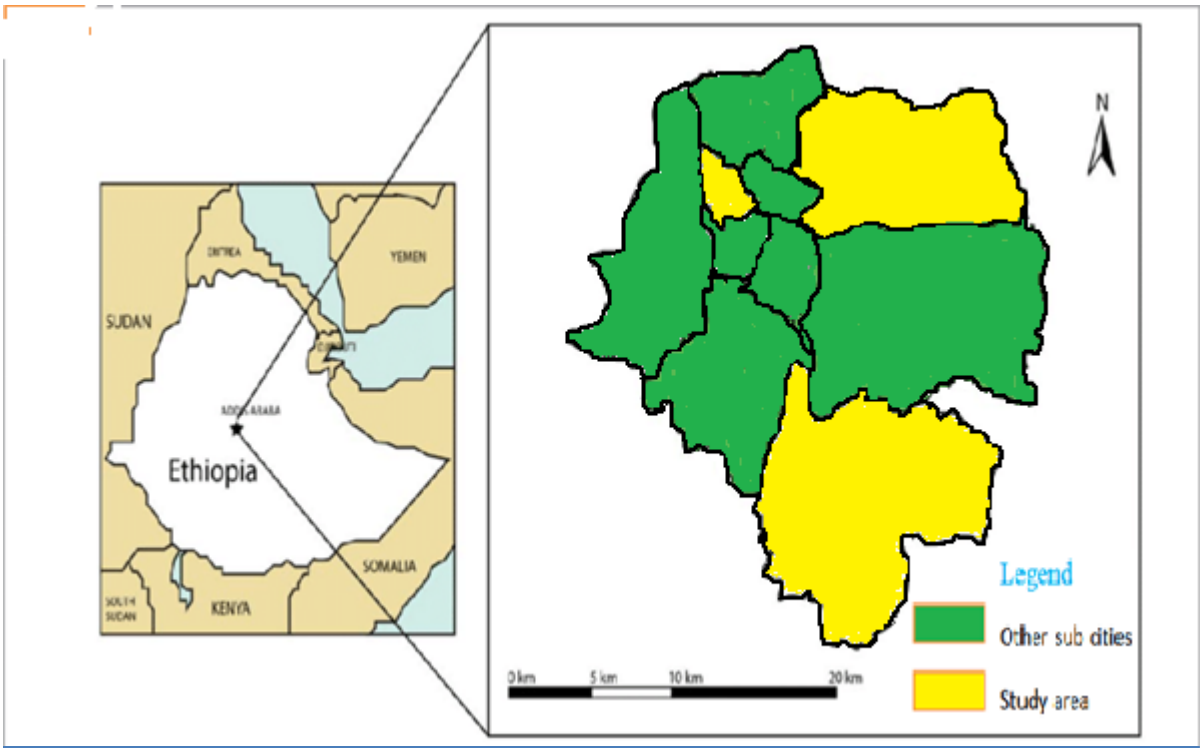

Figure 3.1: The Map of Addis Ababa City

Source: - Arc GIS (2020)

3.2. Research Design and Strategy

In this part, the plan of the investigation, for example, the philosophical view to thoroughly consider and the techniques which were utilizes are introduced. The other worry of this part is the exploration approach which is employs.

3.2.1 Research Design

Research design includes different issues, for example, the world view that the examiner thoroughly considers the systems of the investigation and the strategies to be utilized (Creswell, 2009). Subsequently, this investigation was following the way of thinking of realism with reasons. As per the creator, sober mindedness is described as true practice situated, pluralistic, and issue focused and it applies in blended strategies research because of its preferences over other philosophical perspectives, for example, positivism and constructivism it could be said that this philosophical world view gives the best comprehension of an examination issue, permits numerous techniques to be utilized, diverse perspectives to thoroughly consider, various types of

information assortment and investigation. The scientist utilizes unmistakable study research plan. Illustrative strategy is use on the grounds that the reason for the analyst is to gather, examine and close about the current conditions all at once.

What's more, the analyst makes an overall decision about the entire populace dependent on the information which was gather from just example respondents. And furthermore, the analyst discovered this strategy significant as the necessary information was gathering from tests of respondents and key sources. Furthermore, overview technique empowers the scientist to viably deal with all the essential exercises that were occur in the examination. The scientist additionally utilizes cross-sectional strategy, in light of the fact that the investigation is direct in a way that a little bit of a populace is test just at a time.

3.2.2 Research Approach

Mixed approach was utilized. By mixed strategies the shortcomings of the subjective technique would be tackling by the quantitative strategy and the shortcomings of the quantitative strategy would be overwhelmed by the subjective technique; and consequently, utilizing blended techniques qualities the investigation (Onwuegbuzie and Leech, 2004). Puzzolo et al (2013) prescribe that reviews configuration explicitly to fortify the comprehension of elements influencing electrical ovens appropriation to draw on a mix of quantitative and subjective examination methodologies.

3.3. Data Type and Source

For this investigation, the specialist utilizes both quantitative and subjective data with reasons. The quantitative information was utilizing so as to address research questions and destinations that could be better location quantitatively. The information about respondent's age, family size, month to month salary, room number and cost of Electrical Injera Mitad and cookstove were assembling mathematically (see meaning of factors). The subjective information is use to address research destinations which could be better location subjectively. The information about the factors of the respondent's conjugal status and instruction in years, salary source, house proprietorships and separate kitchen house, institutional and social elements were accumulate subjectively (see meaning of factors). Concerning the information sources, the scientist utilizes both essential and auxiliary sources. The essential wellsprings of investigation were heads of

households of families and the key informant of neighborhood 'Electric stove makers and clients. GIZ, Energy Office, The auxiliary sources were the distinctive report, books, diaries, authoritative archives (decrees, guideline and mandates), measurable edited compositions, study proposition and theses among others. These wellsprings of optional data were being access from the web, college libraries, and foundations.

3.4. Sampling Design and Procedures

Systematic sampling techniques were be used to select representative sample from the population. In the first stage, simple random sampling techniques used to select three sub-cities from a total of ten sub-cities in Addis Ababa. From data were taken (CSA, 2016) Addis Ababa head of households by income, expenditure and numbers of household heads higher, meddle and the lower level of one year. From this point select respectively systematically select sub cities for the sample. In the second stage, randomly proportion to their total population size woredas are selected, the selected woredas from each sub-cities are woredas (2, 6 and 8) from Yeka , woredas (2, 4 and 5) from Addis Ketema and woreda(2, 5 and 8) from Akaki Kaliti. In the third stage, electrical Injera Mitad adopter households and electric cook stove or not adopter were be selected from each selected woredas in randomly proportion to their total population size. The reasons for selecting three sub cities higher, middle and lower with income; expenditure and head of household’s in the sub cities woredas for this study is there are large numbers of households and to satisfy the theory of large enough sample size. Yeka, Addis Ketema and Akaki Kaliti numbers of households in these sub cities were 20994, 7795 and 6018 respectively.

To make speculation about the entire population diverse sampling design and techniques were utilized to the get the really agent test (Israel, 1992). Subsequently, this segment presents the sampling design and procedures that are utilize for this investigation. At the point when the reaction for the properties being estimated is expected a dichotomous, the utilization of Yamane's (1967) tables and equations to decide test size is more suitable (Israel, 1992). Since the needy variable in this investigation was dichotomous, the scientist formula Yamane's recipe to decide the size for the questionnaire respondents,

$$n = \frac{N}{1 + (N)e^2}$$

n= Sample Size,

N= Total Population and

e= Precision level at 95% (α=0.05) confident interval for normal distribution data. Therefore the sample size: N=34807and e, at α=0.05

n=34807/1+ $(0.05)^2$, n= 396

Accordingly the sample size and distribution were being as follows;

Table 3.1: Determination of adopter and non- adopter across sub-cities

Sub city	woredas	No of head household	Adoption or non- adoption sample proportion (%)	Sample size	Adoption		Non – Adoption	
					Injera Mitad	Cook stove	Injera Mitad	Cook stove
Yeka	2	7525	22	86	74	71	12	15
	6	6849	20	78	65	61	13	17
	8	6620	18	75	71	73	4	2
Sub -city total		20994	60	239	210	205	29	34
Addis Ketema	2	2500	7	28	26	22	2	6
	6	2140	6	24	24	24	0	0
	8	3155	9	36	36	36	0	0
Sub -city total		7795	22	88	86	82	2	6
Akaki Kaliti	3	1911	5	22	17	14	5	8
	5	2100	6	24	19	15	5	9
	8	2007	6	23	18	16	5	7
Sub -city total		6018	17	69	54	43	15	24
Grand total		34807	100	396	350	332	46	64

Source: Own computation (2020)

Household for the organized questionnaire were select by utilizing efficient arbitrary examining strategy in each woreda from the family units' edge. The purpose for utilizing this examining method is its straightforwardness, quick and low expensive (Zou, 2006). To conquer a few defects of this procedure, the specialist did exam if the family units were deliberately masterminded, in each woreda outline. The family units were not organizing deliberately. On account of choosing the respondents in the survey, the household heads were select. This is in accordance with Damte and Koch (2011) who demonstrated that; household heads are the fundamentally taken a preferences in view of utilizing electric stoves , as much of the time they

are the ones in testing of kindling assortment, food preparing and normally invest a higher measure of energy inside the home, profiting altogether from decreasing in indoor pollution .

Concerning the structure interview, the key sources were draw from the organizations working in the GIZ, Energy Office and individual ones and the "Electric *Injera Mitad* and other Cook oven makers by utilizing purposive testing strategy. An aggregate of 9 people were talk with; 3individuals (EPA commission) from the three select office one individual from the GIZ, 2 people from electric administrations office (the energy specialists) and 3 makers of nearby Electrical oven from the select woredas (one from each woreda). While the two neighborhood makers were the nearby accomplices of the energy areas.

3.5. Data Collection

To reduce incompleteness and make it useful in the analysis, the raw data were filter. To solve the problems related with inappropriate responses, incomplete answers and other fictitious responses, the raw data were edit code, group, tabulate and summarize with the help of SPSS software version 20 and STATA version 14.

3.5.1 Data Collection Methods

Household survey: A structured questionnaire was regulated. The researcher builds up the questionnaire in English and converted into Amharic. The questionnaire, which takes 24-30 minutes to fill, included data about urban family units' sex alignment based obligation and stove type and consumption, the respondent's attributes, the presence of isolated kitchen, source salary, the cost of Electrical stove, institutional and social factors just as Electrical adoption influence factors.

Interview: Interviews were utilized to investigate factors under scrutiny in more noteworthy detail. Twelve key informant interview were held with Electrical stove makers in each woreda, GIZ workplaces, (EPA commission specialists), and Ethiopian Electric Utility. The length of meeting with key witnesses ranges between the base of 12 minutes and the limit of 28 minutes. The focal points of the meetings with the key sources were institutional variables like how, when and where the stove is spread and families to be educated, neighborhood, about the administrations and supports, service gave by the organizations to both the makers and expected clients and the most probable boundaries of Electrical stove production and adoption.

3.5.2 Reliability Test measures using Cronbach's alpha

Cronbach's alpha, the overall reliability of the questionnaire is indicated to be 0.73 which is above the minimum acceptable value (0.7).

Table 3.2: Reliability Test measures using Cronbach's alpha

Attributes	Cronbach's Alpha	Number of item
Reasons for purchase electric stove	0.72	4
Factors influence electrical stove purchase decision	0.82	5
Opinions influence electrical stove adoption	0.65	4
Over all reliability result	0.73	

Source: Own survey data (2020)

3.6. Methods of Data Analyzing

Descriptive Statistics: The descriptive statistics of frequency, percentage, means and standard deviation were used by using the SPSS software version 20 while econometric analysis done by STATA version 14 in analyzing the data collects through questionnaire. The data collect through structure interviews were analyze by the use of intensive textual analysis.

Econometrics: The discrete choice models were employing in answering for research questions. In the study area, the electric Injera mitad and cook stoves enclose urban type stoves are the two major cooking appliances for different baking preparation. The electric Injera mitad type stove is for mainly Injera purpose stove and the cook stove uses for wott and others. Identifying the most important factors that determine the adoption of the electric Injera mitad and cook stove choice between the two stoves might not be independent, hence, the need to develop an empirical procedure that allows us to capture this interdependence. The bivariate probit model is a joint model for two binary outcomes that generalizes the index function model from one latent

variable to two latent variables. Let *v* be an indicator variable, with *iv*, and *cv*, indexing whether or not the household adopt an electric Injera mitad or a Cook stove, respectively.

3.7 Models Specification

In specifying the model, it denoted that the latent Y* from the decision to adopt household electric injera mitad depends on a vector of explanatory variables 'x' so that the binary outcome Y= 1 arises when the latent variable Y*> 0. Another observation about the interdependency of the decision to adopt injera mitad and cook stove is Y2, which is that using the injera mitad model access and adopt the cook stove is only observed if Y1 (adopt injera mitad model) =1. The outcome of the decision represented by the first probit equation is fully observed. However, there is a complete sample in the second equation representing use of the model to adopt cook stove because it is an off-shoot of the original response of the head of households. According to Green, (2003), this complete of adoptions implies the importance of taking into account self-selection at the injera mitad and cook stove decision stage to ensure proper estimation of model parameters. Hence, there are two latent variables (Y1*and Y2*) and in modeling two independent decisions, the assumption is that each observed variable takes on the value of 1 if and only if its underlying continuous latent variable takes on a positive value. The bivariate model can therefore be stated as follows:

$$Y_1 = \begin{cases} 1 if iv1 * > 0 , \\ 0 \; if iv1 * \leq 0 , \end{cases} \quad (2)$$

$$Y_2 = \begin{cases} 1 if cv2 * > 0 , \\ 0 \; if cv2 * \leq 0 , \end{cases} \quad (3)$$

With

$$\begin{cases} \gamma 1 *, x1 + \beta 1 \\ \gamma 2 *, x2 + \beta 2 \end{cases} \quad (4)$$

And $\begin{pmatrix} \varepsilon 1 \\ \varepsilon 2 \end{pmatrix} \setminus x \sim \mu \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & P \\ P & 1 \end{pmatrix}$ (5)

Note: Y_1*and Y_2* are underlying latent variables Y_1 = 1, if sample household adopt injera mitad, 0 otherwise. (Not adopt in household electric injera mitad). Y_2= 1, if sample household adopt injera mitad and cook stove at a time, 0 otherwise.β_1, β_2 Vectors of estimation parameter are to be computed. X_{1and} X_2 are explanatory variables entered into the estimation model. $\boldsymbol{\varepsilon}_1$and $\boldsymbol{\varepsilon}_2$are normally distributed error terms.

ρ = the likelihood ratio (LR) test function. From the above, we estimated the values of β_1 and **ρ** to properly fit the model and maximize the likelihood of the bivariate model as follows: where $\boldsymbol{\varepsilon}_1$and $\boldsymbol{\varepsilon}_2$ **are** joint normal with:

$$E\,[\boldsymbol{\varepsilon}_{1|}x_{1,}X_{2|]} = E\,[\boldsymbol{\varepsilon}_{2}x_{|}x_{1,}X_{2|]} = 0$$

$$Var\,[\boldsymbol{\varepsilon}_{1}x_{1,}X_{2]} = Var\,[\boldsymbol{\varepsilon}_{2|}x_{1,}X_{2|]} = 1$$

$$Cov\ \boldsymbol{\varepsilon}_1,\ \boldsymbol{\varepsilon}_{2|}\ x_{1,}X_{2|} = \rho \qquad (6)$$

Note that each latent variable in Eq. (5) is a function of some explanatory variable xi, for i=1, 2. Hence, it could be that the equations have the same, i.e., x_1=x_2 or completely different explanatory variables, i.e., $x_1 \neq x_2$ or may contain some common variables plus some variables that appear only in one or other equation. Then, the bivariate probit model specifies the observed outcome as:

$$Y_1 = \begin{cases} 1 if\ iv1 * > 0, \\ 0\ if iv1 * \leq 0\ , \end{cases}$$

$$Y_2 = \begin{cases} 1 if cv2 * > 0\ , \\ 0\ if cv2 * \leq 0\ , \end{cases} \qquad (7)$$

Note that this model collapses to two separate probit models for Y_1 and Y_2 when the error correlation ρ=0. However, the advantage of estimating them together as a system in a bivariate probit framework is an efficiency gain when ρ≠0. When ρ≠0, we have the joint probability:

$$\rho = pr\,[Y_{1=}1, Y_{2=}1]$$

$$pr[Y * 1 > 0\ , Y2 * > 0]$$

$$pr[-\varepsilon 1 > x1'\beta 1\,, -\varepsilon 2 > x2'\beta 2],$$
$$pr[\varepsilon 1 > x1'\beta 1\,, \varepsilon 2 > x2'\beta 2],$$

$$\Phi\,(x1^{'}\beta 1\,, x2^{'}\beta 2, \rho) \qquad (8)$$

Where Φ is the standardized bivariate cumulative density function; X is, for i=1, 2, are vectors of regressors; and βi are vectors of parameters to be estimated. The above equation is simplified by rewriting so that the log-likelihood function appears; thus, we have: In equation 8, Φ is the cumulative distribution function of the bivariate normal distribution. Similarly, Y1and Y2 in the log-likelihood function above are observed variables, being equal to one or zero, depending on the household's decision regarding electric injera mitad and cook stove adopt.

From the above, there are three possible observations obtainable from each household, which are stated below:

$$Y2 = 0\text{: prob } (Y2 = 0) = 1 - \Phi(x2\beta 2) \qquad (9)$$

$$Y1 = 0,\ Y2 = 1\text{: prob } (Y_1 = 0,\ Y_2 = 1) = \Phi 2(-x_1\beta_1,\ x2\beta 2,\ -\rho) \qquad (10)$$

$$Y1 = 1,\ Y2 = 1\text{: prob } (Y_1 = 1,\ Y_2 = 1) = \Phi 2(-x1\beta 1,\ x2\beta 2, \rho) \qquad (11)$$

Given that our study focuses on Electrical *Injera Mitad* and Cook stove, the study then models the above equation as bivariate probit model.

3.8. Definition and Description variables

This study included variables of electric injera mitad and cook stove adoption, household decision characteristics, and income, strategy , social factors and others factors. Here under these variables are defined and described.

Dependent variable: the dependent variable refers to for adoption decision electric Injera mitad and/or others cook stove. The dependent variable injera mitad, represented by "*iv*", the variable takes the value 1 if the household heads has adopted the range of non-cook stoves covers in sub cities and 0 otherwise. Similarly for other cook stoves, represented by "*cv*", the variable takes the value 1 if the heads of households has adopted cook stoves, and 0 otherwise. In other words, in a bivariate probit model, four possibilities were incorporate. These are: (i) the nonadoption of both

injera mitad and cook stove (*iv*=0, *cv*=0); (ii) the adoption of cook stove only (*iv*=0, *cv*=1); (iii) the adoption of injera mitad only (*iv*=1, *cv*=0); and (iv) the adoption of both electric injera mitad and cook stove (*iv*=1, *cv*=1) (Green, 2003).

Independent variables: The independent variables were select based on the existing theories and empirical studies (Puzzolo *et al*, 2013; Damte & Koch, 2011; Rogers, 2003; Masera *et al*, 2000). The definitions of these select explanatory variables are given below.

Age (age): Here refers to the respondent's age in years.

Gender (gender): in this study household head is male a dummy value '1' or whether the head household female is value'0'.

Education in years (edu): By level of literacy in this study is a dummy which refers to whether the respondent is literate (sixteen years in education Values of '1' were assign for literate) or illiterate (not sixteen years in education is value '0').

House ownership (hseown): in this study house ownership is a dummy value '1'which refers to whether the head households own house and '0' not house own.

Room numbers (Ronu): in this study refers to numbers of room in households.

Monthly Income (inclevel): it is the total income level of household in monthly generated.

Marital status (marstat): In this study marital status is a dummy which refers to the respondent's state of being married or other. Values of '1' were given to married and '0' for others.

Family size (famsize): It is the total number of persons in a household.

Separate kitchen (sepakich): It is about whether the household has separate kitchen house or not. In this study separate kitchen is a dummy valued '1' for a household that has separate kitchen and '0' for has not.

Price (pri): Here price refers the end users cost to buy Electrical stove in Ethiopia Birr.

Policy and strategy factors: Institutional factors in this study include provision of services (e.g. awareness creation, quality control and price regulation) and supports (e.g. technical, material

and financial), decentralization of Electrical stove production sites to the potential users and the role of institutions in denying the access to open local forests.

Social factors: Social variables remember for this investigation incorporate memberships to social affiliations, interest in social activity, the impact of casual informal information, the influence of early Electrical stove adopters and the influence of neighbors.

Table 3.3: Summary definition of variables employed

Variable	Variable definition Dependent and explanatory variable	Variable type
Dependent		
iv adoption of household Electric injera mitad (yes =1, =0 otherwise)		dummy
ic adoption of household Electric cook stove (yes =1, =0 other wise)		dummy
Explanatory	household characteristics	
Age	Age of household head	continuous
Gender	Gender of household head (if male=1, female =0)	dummy
Edu	Level of Education household head(1=16 years)	dummy
Hseown	house ownership of household (1 if owner,0=not)	dummy
Ronu	numbers of room household	continuous
Famsize	household size of family	continuous
Marstat	head of household if married =1, not =0	dummy
Sepakitc	separate kitchen of household(if have =1, not=0)	dummy
Incosour	source of income of household	Categorical
Economic variable		
Income	Monthly income of household	continuous
Pri	price of Electrical stoves	continuous

Source: Own survey data (2020)

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 Descriptive Statistics Analysis

4.1.1. Demographic Characteristic of Households

This section discusses the demographic characteristics of households such as gender, marital status, education level, house ownership, and separate kitchen. The respondents were asked to indicate their gender in order to establish how the demographic characteristics of household head affect the adoption of Electric Injera Mitad and Cook stove adoption. The result indicates in Table 4.1 shows, 54% of household heads were female while the rest 46% of them were male-headed households. This implies that most houses are dominated by female household heads. This might be because most urban City households in Ethiopian are known to be a female dominated in their characteristics.

The age composition of household heads the survey result in Table 4.1, illustrates that 22% of the family heads were age between 29-38 years, while 63%, 15% of the respondent were age between 39-48 years, 49 or more years respectively. So, the mean years of tested family head was 42.77 years with a scope of 29 to 61 years old. This suggests the biggest population was the center and youth age therefore, they had the option to comprehend issues identified with related Electric Stove adoption decision. Also, the outcome shows the greater part percent of the population is middle age this clarifies there is youth in defined in the study area. The base and greatest long years of the respondents are 29 and 61 while the mean and standard deviation are 42.77 and 6.079, respectively. The minimum and maximum years of the adopters are 29 and 61 while 33 and 56 years are for the non-adopters, respectively. And furthermore, while the methods for adopters and non-adopters are 42.77 and 46.42, the standard deviations for adopters and non-adopters are 12.96 and 1.41, respectively. This finding reveals that there is mean variation between the Electrical stove adopters' and the non- adopters' age. The average age of adopters is less than the average age of non-adopters. This implies that the age pattern respondents, the more likely to be Electric stove adopter In addition, this mean variation was

found to be statistically significant with t-value of 2.94. This t-value suggests that there is significant difference between the mean of Electric stove adopters and the mean of non-adopters at ($P<0.01$) level of significance.

The response of marital of the households indicated that majority (89.4) of household head were married, while (10.6%) of them were unmarried about their marital status. 354 are married in which 314 of them are Electric stove adopters and 40 of them are non-adopters while 42 are unmarried in which 36 are Electric stove adopters and 6 of them are Electric stove non-adopters. This implies that most of the household head in Addis Ababa study sub-cities are married. The results are presented in Table 4.1.

The distribution of the total sample respondents in terms of education level in years as describes in Table 4.1 shows 188 (53.7 %) were found 16 years level educated, 51 (14.6%) were found 13 years educated, 46 (13.1%) were found 10 year educated, and 41 (11.7) were found 8 years educated years levels to be Electric Injera Mitad and Cook Stove adopters respectively. 15 (4.3%) were found illiterate, 3(6.5%) were found 3 years Educated and 5(10.9%) were found 8 years educated to be Electric cook stoves non- adopter respectively. And the other The proportion once of Electric stove adopters (72 %) largely exceeds the proportion of educated above eight and more in years; non-adopters (12.8 %) the proportion of no recorded years, 8 years and 3 years education back ground year's level. In the study, majority of the respondents were knowledgeable with directly increase the rate of adoption of Electric Injera Mitad and Cook Stove adoption. This implies the level of education is a major factor affecting the adoption Electric Injera Mitad and Cook Stove adoption. This percentage difference was defines to be significant with P-value of 0.000. Therefore, it can be generalized that there is significant relationship between head of households education years at and the probability of Electrical stove adoption decision at ($p<0.001$) significance level. From this finding one can deduce that literate households are found to be more Electrical stoves adopters as compared to the illiterate households. 2013; Damte & Koch, 2011; Inayat, 2011; Tsangari, 2010) that found the increase education in years of heads of in a household has a positive effect on the likelihood of the household to adopt Electrical cookstove technologies.

The results show that about 54 percent of the household heads were female while the average age for the household head was 45 years. The youngest household head had 29 years while the oldest had 61 years of age. Regarding education level, about 47.7, 14.4, 15.2, 11.9, 6.1 and 4.8 percent of the household heads had degree, diploma, secondary, primary, write& read and illiterate education respectively. The average family size was 5 people with the largest household having 7 members.

The Table 4.1 shows the total number of household members living under the same roof. It indicates 17.7%, 65.2% and 17.2% of households have 2-3, 4-5 and 6-7 family size respectively. The mean household size of the sample households was 4.6 with a maximum range of 7 and a minimum rate of 1. This study shows that most of Addis Ababa city the household size living same roof 4.6, 1.09 is mean and standard deviation respectively.

Table 4.1 Demographic Characteristic of households

Variable demographic	Observation	%	Mean	St.dev	Max	Min	Injera Mitad		Cook Stove	
							p-value sig	t-test	p-value sig	t-test
Gender of the household head	396	100	1.54	0.499	2	1	0.000***	1.818	0.5842	-.907
Female	214	54								
Male	182	46								
Age group	396	100	42.77	5.85	61	29	0.000***	4.300	0.002**	1.320
29-38	86	22								
39-48	252	63								
49 years and above	58	15								
Marital status of the	396	100	0.893	0.308	1	0	0.012*8	-1.325	0.000***	-2.77

household head										4
Married	354	89.4								
Un married	42	10.6								
Education years level of household head	396	100	12.61	4.38	16	0	0.600	0.674	0.000***	-1.743
No year attainment	17	4.3								
3 years attainment	12	3.0								
8 years attainment	46	11.6								
10 years attainment	53	13.4								
12 years attainment	57	14.4								
16 years attainment	211	53								
Family size	396	100	4.601	1.096	7	2	0.479	-11.600	0.004**	0.285
2-3	70	17.7								
4-5	258	65.1								
6-7	68	17.2								

Source: Own survey data (2020) Significance at 1% and 10%

4.1.2 Socio-Economic profile of households

As table 4.2 show 161 (40.5%) were found house ownership Electric Injera Mitad and cook stoves adopters, 153 (43.7) were found adopters houses owners, non- adopters, 8 (17.4%) were found house owners, to be Electric cook stove non-adopters respectively. 118 (29.8%) were found others house , 108 (31) were found adopter Electric Injera Mitad and Cook stove and 10 (21.7%) were not non-adopters. 117 (29.7) were found renter house ownership, to be Electric Injera Mitad and Cook stove adopters 89 (25.3) and 28 (60.9) were found non-adopters of to be Electric cook stoves respectively. The majority of house owners had to adopt as compared to others house owners and rent proportion 43.7% of heads house owner's adopters of Electrical

Injera Mitad/Cook stoves. Have owner of house in heads of family has a positive value on likelihood to adopt technology Electric Stoves.

In the study below table 4.2 shows of Electric Injera Mitad and cook stove adoption numbers of rooms, from the total survey data 46 (11.6) were found had one room, 24 (6.9) were found adopters of to be Electric Injera Mitad and Cook stoves, 22 (43.1) were found one class room non-adopters of to be Electric Injera Mitad and Cook stoves, respectively. 96 (24.2) were found had two numbers room, 79(22.8) were found adopters of to be Electric Injera Mitad and cook stoves, 17 (33.3) were found two numbers room non-adopters of to be Electric Injera Mitad and cook stoves, respectively. 57 (14.3) were found had three class room, 45 (13) were found adopters of to be Electric Injera Mitad and Cook stoves, 12 (23.6) were found three numbers room non-adopters of to be Electric Injera Mitad and cook stoves, respectively. 65 (16.5) were found had four rooms, 65 (18.8) were found adopters of to be Electric Injera Mitad and cook stoves. 132 (38.5) were found had five and more than rooms, 132 (38.5) were found adopters of to be Electric Injera Mitad and cook stoves, 22 (43.1) were found five and more than rooms the majority proportion of house rooms are more of to be Electric Injera Mitad and cook stoves, respectively.

The separate kitchen composition of household heads the in Table 4.2,shows out of surveyed 396 household respondents, 326 (82.3 %) have separate kitchen house in family which 310 of those are Electric stove adopters and 40 of those are non-adopters. On the other side, 11 (21.5 %) have not separate kitchen in which 36 of them are found to be Electric stove adopters and 40 of them are non-adopters.

These shows that household that have separate kitchen house are discovered to be more electric stove adopters when contrasted with household that have not separate kitchen. This might be a direct result of its bigger cooks stove in size which requires bigger space. This outcome is reliable with the past works of (Puzzolo et al, 2013; Axen, 2012; Damte and Koch, 2011) that discovered families that have separate kitchen house are bound to adopt Electric cookstove advances when contrasted with family units that have not separate kitchen.

Table 4.2: socio-economic characteristics of households

Variable socio-economics	Observation	%	Mean	St.dev	Max	Min	Injera Mitad		Cook Stove	
							p-value sig	t-test	p-value sig	t-test
House ownership	396	100	1.99	0.77	3	1	0.003**	2.997	0.000***	-3.009
Owners	161	40.7								
Rent	117	29.5								
Others	118	29.8								
Numbers of room	396	100	3.199	1.628	7	1	0.000***	-8.354	0.004**	-3.212
One	54	13.7								
Two	115	29								
Three	69	17.4								
Four	69	17.4								
Five ≥	89	22.5								
separate kitchen of head	396	100	1.17	0.38	1	0	0.000***	10.329	0.000***	4.333
Have separate kitchen	326	82.3								
Have not separate kitchen	70	17.7								

Source: Own survey data (2020) Significance at 1% and 10%

4.1.3 Social Characteristic of Households

Social components clarify social connections and organizations, participation to social association, the influence of others, the influence of neighbors', the influence of relatives and different factors. But, for this study purpose the factors of enrollment to social affiliations, dynamic support in social activity, the impact of casual informal information, the influence of prior adopters and neighbors are discussed in examining social influences on Electrical Injera Mitad and cookstoves adoption decision.

As Table 4.3 presents, from the total of surveyed 396 heads of household, 215 (54.3) were not found member of three and above social associations in which 185 of them are Electrical stove adopters and 30 of them are non-adopters. On other way, 181 (45.7%) of respondents were found member of three and above social associations in which 165 of them are Electrical Injera Mitad and cook stoves adopters and 16 of them are non-adopters. This finding reveals that those heads of households who were not member of three and above social organizations were more found to be Electric Injera Mitad and cook stove adopters as compared to members. This investigation found that the proportion of heads of households that were not member of three and above social associations Electric stove adopters (52.85 %) largely exceeds the proportion of heads of households that were members of three and above social associations Electric stove adopters (47.15 %). On the other hand, the proportion of that were member of three and above social associations Electric stove adopter less proportion of family unit that were not socially involve of three and above social associations Electrical cook stove adopters. This implies that the more a heads of households didn't member of social associations, the more likely to be Electric cook stove adopter. This factor not affected to urban households to getting information and to share some experience from being of social association membership.

As it can be seen from Table 4.3, from the surveyed 350 heads of households, 263 (66.4 %) were not dynamic member in association and activity to which they are part in which 126 of them are Electrical cook stove adopters and 39 of them are non-adopters. while 126 (36.0 %) were discovered to be dynamic member in association and were not active member 224 (64%) were discovered them are Electrical cook stove adopters. This result reveals that heads of households who were passive participant in associations were found more to be Electric Injera Mitad and

Cook stoves adopters. The other one result active participants were found less one to be Electric Injera Mitad and Cook stoves adopters as compared to passive ones.

These findings imply that the more a heads of households is not member of social associations, the more likely to be Electric Injera Mitad and cooks stove adopter. This might be for of presence live metropolitan city has planned the chance to exchange with individuals who have changed information and knowledge diverse from social groups. There remained presence other choices information exchanges to inducement Electrical cook stoves buying decision. If head households developed not member of different social associations, that not move were to be Electric Injera Mitad and cooks stoves adoption greater. The finding of this study is differs one to the finding of Axen (2012), and (Tigabu) 2014, that found membership to social associations and be interacted and Adrianzen (2009) that found differs one a head's of households members of in different associations has not much significant positive effect on a household's Electric Injera Mitad an cookstoves adoption decision.

Table 4.3: social memberships and participation of households

Variable demographic	Observation	%	Mean	St.dev	Max	Min	Injera Mitad		Cook Stove	
							p-value sig	t-test	p-value sig	t-test
Social membership	396	100	1.5429	0.4987	2	1	0.000***	-1.780	0.190	-0.89
Only Membership	181	45.7								
Not members	215	54.3								
Social membership participants	396	100	1.6641	0.4728	2	1	0.000***	-.2510	0.000***	-4.275
Active participation	133	33.6								
Not participant	126	66.4								

Source: Own survey data (2020) Significance at 1% and 10%

4.1.4 Source and Monthly income of Households

As Table 4:4, shows, from the total of 396 respondents, 248 (62.6 %) were found employments source of Income heads of households to be adopt Electric Injera Mitad and cook stoves, 226 (64.5) were found the majority of the proportion adopters employments source of income , non-adopters, 22(47.8%) were found employment source of income, to be Electric cook stove non-adopters respectively. 11 (3.1%) were found pension source of income , to be adopter Electric Injera Mitad and cook stove. 37 (10.57%) were found renter small trade source of income heads of households, 23(6.5) were found to be Electric Injera Mitad and cook stove adopters, 14(30.4%) were to be non-adopters respectively. 30(8.5%) were found business owners out-off trade source of income, 30(8.5%) were found to be adopter source of income of households. 40 (10.1%) were found saftynet source of income heads of households, 30 (8.5%) were found to be Electric Injera Mitad and Cook Stove adopters; 10(21.7%) were to be non-adopters respectively. 30 (8.5%) were found home rent source of income to be adopter Electric Injera Mitad and cook stove.

In the study table 4.4 indicated, from the total of 396 respondents, 125 (31.5%) were found of monthly Income heads of households to be adopt Electric Injera Mitad and cook stoves, 125 (35.7) were found adopters of monthly income 7000 ETB is the majority of the proportion of adopters, to be Electric cook stove adopters. 91 (23%) were found monthly income 6000 ETB 80 (22.8%) were found to be adopter Electric Injera Mitad and cook stove. 91 (23%) were found got monthly income 4000 ETB 83(23.1%) to be adopters Electric Injera Mitad and cook stove, 89 (22.5%) were found monthly income 2000 ETB 62(17.71) were found to be adopter Electric Injera Mitad and cook stove. 27(58.8) were found of monthly income 2000 ETB to be non-adopter Electric Injera Mitad and cook stove, 11(23.9) were found of monthly income 6000 ETB to be non- adopter heads Households respectively. Form this result the majority of non- adopters proportion of heads of households their income level very low it results show non-adopt Electrical cooks stove adoption.

Table 4.4: Source and monthly income of household

Variable	Category	Electric Injera Mitad/ Cook stove adoption				Total	
		Adopter		Non –adopter			
		No.	Percent	No.	Percent	No.	Percent
Major Source of income	Saftynet	30	8.5	10	21.7	40	10.1
	Employment	226	64.7	22	47.8	248	62.6
	Pension	11	3.2	0	0	11	2.7
	Small trade	23	6.6	14	30.5	37	9.4
	Business owners out of trade	30	8.5	0	0	30	7.6
	Home rent	30	8.5	0	0	30	7.6
	Total	350	100	46	100	396	100
Monthly income in ETB	1000-3000	62	17.71	27	58.8	89	22.5
	4000-5000	83	23.1	8	17.3	91	23
	5001-7000	80	22.8	11	23.9	91	23
	7001 above	125	35.7	0	0	125	31.5
	Total	350	100	46	100	396	100

Source: Own survey data (2020) ETB- Ethiopian Birr

4.1.5 Comparison of Adopters and Non-adopters of Electric *Injera Mitad*

Previous studies undertaken in the context of other countries pointed out those adopters of a technology have unique characteristics than non-adopters. These characteristics can be social, personal, economical or environmental attributes. In this study adopters and non-adopters are compared along a couple of selected socio-economic and spatial variables. Here is the summary of the results of the T-test of the two groups (Table 4.5.) The average age of the total sampled households is 42.69 years and the sampled households were disaggregated along their technology adoption status and their corresponding age was calculated. Accordingly, the two groups varied in their ages in which the average age of adopters is 42.77 years of old while for non-adopters, it is 46.42 years. The mean difference of the age of adapters and non-adapters of electric stove technology is calculated and found to be 3.726. The adopters are quite younger than non-adopters and the difference is statistically significant ($P<0.05$).

Table 4.5: Comparison of Adopters and Non-adopters of Electric Injera Mitad

Variables	Adopter	Non-Adopter	Mean Difference
Age (Years)	42.690	46.420	3.726***
Sex (1= male, 0=Female)	1.523	1.660	.136
Hseown (1=Owner), 0= other	.4393	.180	. -.259***
Ronu	3.439	1.540	. -1.899 **
FamSize	4.635	4.380	-.255
Kitchen Availability (1= separate , 0= other)	1.109	1.640	5301 ***
Income	5182.08	3400.000	-1782.080***
Edu (Years)	14.75	10.24	-4.5***

Source: Own survey data (2020) , *, ** and *** is the level of significance where P<0.05, P<0.01 and P<0.001 respectively

4.1.6 Comparison of Adopters and Non-adopters of Electric Cook Stove

Previous studies undertaken in the context of other countries pointed out those adopters of a technology have unique characteristics than non-adopters. These characteristics can be social, personal, economical or environmental attributes. In this study adopters and non-adopters are compared along a couple of selected socio-economic and spatial variables. Here is the summary of the results of the T-test of the two groups (Table 4.6).

The average age of the total sampled households is 41.9 years and the sampled households were disaggregated along their technology adoption status and their corresponding age was calculated. Accordingly, the two groups varied in their ages in which the average age of adopters is 43.02 years of old while for non-adopters, it is 44.21 years. The mean difference of the age of adapters and non-adapters of electrical stove technology is calculated and found to be 1.188. The adopters are quite younger than non-adopters and the difference is statistically significant (P<0.05).

Table 4.6: Mean Difference of Adopters and Non-Adopters of Stove

Variables	Adopters	Non- adopters	Mean Difference
Age (Years)	43.02	44.21	1.188
Sex (1=male, 0=Female)	1.548	1.479	-.069
Ronu	3.296	2.500	-.795**
Famsize	4.597	4.645	.048
Sepakitc (1= separate, 0= other)	1.146	1.395	.249***
Income	5097.701	3937.500	-1160.2***
Edu(Years)	14.333	13.0417	-1.2916
Hseown (1=Owner,0= others)	.4339	.2083	-.2255*

Source: Own survey data (2020) *, ** and *** is the level of significance where P<0.05, P<0.01 and P<0.001 respectively

It is a conventional wisdom that adopters of modern energy technology are expected to be well endowed households than those households who failed to uptake the technology. The above table demonstrates that the total income is significantly varied (P<0.01) between adopters and non-adopters. Adopters have a modest income than non-adopters. On average, adopters have monthly income of 5097.7 Birr while the corresponding figure for non-adopters is 3937.7 Birr. Thus, there is a difference of 1160 birr of monthly income between the two respondents. Whereas Education level status increasing adopted technology of Electric Injera Mitad and Cook Stove adoption, so when higher at education level better to adopted stoves than non-adopter. Female are also very smart to adopt in stove technology better than male.

4.1.7. Judgment of compared to income and payment in the household

As Table 4.7 indicated, from the total of 350 respondents, 140 (40%) found judgment of payment cost electric as compared to usage to be cost proportional, 23 (6.6%) found judgment of payment electric as compared to usage to be cost minimal, 164 (46.9%) were found judgment of payment

cost electric as compared to usage to be the proportion majority high, 23 (6.6%) were found judgment of payment electric as compared to usage to be cost very high, respectively.

In general (12%) non- adopter majority of cost of Electric payment high were not found to be non-adopter Electric Injera Mitad and Cook stove adoption. And also the proportion of judgments of Electric payments as compared to income to be cost proportional were found Electric stove adopters 124 (35.4 %), 23 (6.6%) of judgments of Electric payments as compared to income level cost minimal were to be Electrical cook stove adopters, 203(58%) were found to be Electric Stove adoption of judgments of Electric payments as compared to income level cost electric very high and to be Electric cook stove non-adopter (12%).

Table 4.7: judgment of comparison household Electric of payment and income

Judge of heads households	Category	Frequency	Percent
Electric Payment compared as to usage	Cost proportion	140	40.0
	cost minimal	23	6.6
	cost high	164	46.9
	Cost very high	23	6.6
	Total	350	100
Judgement of Electric payment compared as to income	Cost proportion	124	35.4
	cost minimal	23	6.6
	cost high	203	58.0
	Total	350	100

Source: Own survey data (2020)

4.1.8 Electric Injera Mitad/cook stoves Adoption Price

From below table 4.8; show the minimum and maximum price is Electric Injera Mitad 700 and 3000, respectively. And also the standard deviation and average is 726.75 and 1850; Cook stoves prices are the minimum and maximum 250 and 20000 respectively. In the result of cook stoves adoption shows standard deviation and average 5742.26 and 10100 respectively.

Table 4.8: Electric Stoves Price

Adoption	Variable	Min	Max	Average	St.dev
Injera mitad	Price	700	3000	1850	726.75122
Cook stove		250	20000	10100	5742.26195

Source: Own survey data (2020)

4.1.9 Types of main Electrical cook stoves for cooking Energy in urban Households

As Table 4.9 shows, for 224 respondents (56.6 %), iron hot plate and Clay with iron plate was found to be the household's main source of energy type for cooking. Glass ceramic cook tops, Spiral hollow steel tube were also found to be the main source of energy for cooking for 44 respondents (11.2 %). For 128 respondents (32.2), open resistor type was also other main type for cooking energy. With regard to cooking practices, Injera baking was found to be the longer time taking practice for (78%) of respondents while (17.7 %) of the respondents considered wott cooking, bread baking were found also respondents (4.3%) others as the longer time taking practices. With regard to other source for energy cooking food practices, 43.2 % of respondents indicated charcoal as the other sources of energy for cooking practice while fire-wood, liquid fuel and liquefied Petroleum gas/LPG were the source of energy for 25.3 %, 18.9 % and 12.6 % of respondents, respectively.

Table 4.9: Energy Sources types electrical cook stoves for household

Household Energy	Type	Frequency	Percent
Household's main source of appliances	Iron hot plates	112	28.3
	Glass ceramic cook tops	22	5.6
	Spiral hollow steel tube	22	5.6
	Open resistor type	128	32.2
	Induction Stove	0	0
	Clay with iron plate	112	28.3
	Total	396	100
Food cooking practice takes longer time	Injera baking	309	78
	Bread baking	17	4.3
	Water heating	0	0
	Wott cooking	70	17.7

	Others	0	0
	Total	396	100
Other sources of Energy for cooking Consumption	Charcoal	171	43.2
	Fire- wood	100	25.3
	Liquid fuel	75	18.9
	liquefied Petroleum gas/LPG	50	12.6
	Total	396	100

Source: Own survey data (2020)

From the above table it can be determine that for majority households, open resistor type is the main source of types for preparing food and of the cooking activities, baking Injera is the first priority activity in terms of its takes longer time requirement food cooking practice. This may be because since Injera is the main components staple food in Ethiopia, in each family unit Injera is eaten. So as to feed household members, Injera may be made frequently which leads to takes much time as compared to other cooks.

4.1.10 Status of Electric Injera Mitad and Cook Stoves Adoption

To assess the status of Electric Injera Mitad adoption by households in Addis Ababa Addis Ababa, household respondents(heads of households) were asked whether they purchased Electrical cook stoves or not..

Similar studies, for instance, (Inayat, 2011; Dawit, 2008) used such type main replies and direct measure of binary dependent adjustable in defining the purchasing practice of cook stoves. As a result, for the aim of study common explanatory variables affecting family unit' Electric stoves adoption decision, both households who did adopt and did not adopt were included in the analysis. As it is observed in Table 4.10, from the total 396 respondents adopters of Electrical Injera Mitad and cook stove adoption while 87.4 %, (83.8) are adopters respectively. This implies the majority of the households were found to be adopters. While (12.6 %), (16.2) were found non-adopters of Electrical Injera Mitad and cook stove adoption

Table 4.10: Status of Electric Injera Mitad and Cook Stoves Adoption

Adoption of Injera Mitad	Numbers of households	Percent
Non- adopters	46	12.6
Adopters	350	87.4
Total	396	100
Adoption of Cook Stove	Numbers of households	Percent
Non-adopters	64	16.2
Adopters	332	83.8
Total	396	100

Source: Own survey data (2020)

4.1.11 Purchase of Households Electrical cook stove in numbers

To consider buying of Electric Stoves numbers adopted in the households of Addis Ababa, household respondents (heads of households) were asked whether they purchased Electrical cook stoves or not in the form of 'only Injera mitad', 'cook stoves only' and 'both electric cook stoves' response question.

As table 4.11 shows, for 327 respondents 82.6%, both electric cook stoves highly purchased in heads of households; The others 11 respondents 2.8% Injera mitad only and cook stoves only 15 respondents 3.8% of purchased heads of households. From this non- purchased household Electric cook stoves 43 respondents 10.8% .With regards to numbers of electrical cook stoves adoption in household heads or not in the form of have one , have two, have three and have-non response question. 233 respondents 58.8% have one electric Injera mitad and cook stoves in households, 70 respondents 17.7% have two Electric Injera Mitads and cooks stoves, 47 respondents 11.9% have three Electric Injera Mitads and cooks stoves in household adoption; while have-non 46 respondents 11.6% Electric Injera Mitads in numbers didn't adopted in heads of households.

Table 4.11: Households Electrical cook stove adoption patterns

Adoption Patterns	Numbers	Percent
Injera Mitad only	11	2.8
Cook Stoves only	15	3.8
Both Cook Stoves	327	82.6
Non- patterns	43	10.8
Total	396	100

Source: Own survey data (2020)

4.1.12 Reasons to adopt Electric Injera Mitad and Cook stoves

To investigate the most important reasons for the adoption of both Electrical stoves, only Electric stoves adopters (350 respondents) were. As the table 4.12 shows, the supposed relative profits of Electric stoves were found to be the most significant reasons to adopt this as cooking technology. The reason for adopt Electric Injera Mitad/ Cook Stove from testing statistically significant association ($P<0.001$) is found between household head adopters Electric Injera Mitad/ Cook stoves increasing adopting technology possibility save money, cleaner, safe to use and very quicker to cook.

As Table 4.12 presents, out of 350 Electric stove adopters, 153 (43.7 %) agreed and 80 (22.9%) strongly agreed that Electric stove's perceived money saving advantage is important reason to adopt it. From the total of 350 adopters, 223 (63.7 %) agreed and 81 (23.1%) strongly agreed that cleaner cooking perception on Electric stove is the reason to adopt. Out of the respondents 350 adopters of Electric stove, 242 (69.1 %) agreed and 62 (17.7%) strongly agreed that observation of safer to use is one central rationalization to purchase Electrical stove. 223 (63.7 %) of respondents agreed and 104 (29.7 %) strongly agreed that fast food preparation is the other reason to adopt Electric stoves. Therefore, these findings show that the chance of a household's Electric stoves adoption favorite is based on its clean for food preparation, safer to use, and money saving and swift cooking. This finding is similar to the previous studies (Bubendorfer, 2011; Holmes, 2010; Shanko, 2001; Tigabu,2014) that found cleaner cooking, safer to use, money saving and quicker to cook to be the core motives to purchase Electrical cookstove technologies.

Table 4.12: Reasons to Adopt Electric Injera Mitad and cook Stoves

Reason	Electric stove save money		Electric stove is cleaner		Electric stove is safer to use		Electric stove is quicker	
	Number	%	Number	%	Number	%	Number	%
Strongly disagree	0	0	0	0	46	13.2	0	0
Disagree	70	22.6	46	13.2	0	0	0	0
Neutral	38	10.9	0	0	0	0	23	6.6
Agree	153	43.7	223	63.7	242	69.1	223	63.7
Strongly agree	80	22.9	81	23.1	62	17.7	104	29.7
Total	350	100	350	100	350	100	350	100
Mean difference	-0.37488		-0.52068		-0.16796		0.17894	
Mean	7.8832		7.8555		7.7514		7.8563	

Source: Own survey data (2020)

4.1.13 Channel and source of information

As Table 4.13 shows, social association and government agents were found to be accessible channel of information about for 38.6 % and 34.9 % of respondents, respectively. Electric stove makers, media and others also were found to be less available sources of information for 17.7 %, 6.3 % and 2.6 % of respondents, respectively. With regard to market places and meeting were found to be available to get source information for 27.1% and 26.9 of respondents, respectively. Others work places and religious place to be available to become information for 26.3%, 13.1% and 6.6% of respondents, respectively.

From the analysis we can infer that, social associations, government agents, stove producers, media and others are found to be accessible sources of information for head of household urban city at the study area. And also market places, other place, meeting places, work places and religious places are identified to be more accessible sources of information for urban households.

The accesses to sources information and place informed about technology for adopt Electric Injera Mitad/ Cook Stove were testing statistically significant association ($P<0.001$) is found between household adopters Electric Injera Mitad/ Cook stoves increasing adopting technology more possibility source of information in case of government agents, social association and also

the accessible informed places meeting place and market place more chance to adopt technology respectively.

In addition to this more strength in qualitative Government agent interviewers approved can more informed indifferent organization to customer to adopt Electric Injera Mitad and Cook Stove adoption by well information transforming specially work shop and training most source of accessible for households.

Table 4.13: channel and source of information for Electric Injera Mitad and cook stoves

Source		Total		T- test	Significance
Accessible source of information	Category	Number	Percent	51.118	0.000***
	Media	22	6.3		
	Social Association	135	38.6		
	Stoves Producers	62	17.1		
	Government Agents	122	34.9		
	others	9	2.6		
	Total	350	100		
Accessible place/s to be informed	Religious places	23	6.6	54.401	0.000***
	Work places	46	13.1		
	Market places	94	26.9		
	Meeting place	95	27.1		
	others	92	26.3		
	Total	350	100		

Source: Own survey data (2020) significance at 1%

4.1.14 Electric Injera Mitad, Cook Stove Adoption and Institutional Factors

In examining policy and strategy influence on urban heads of households' Electric Injera Mitad and cook stove adoption decision in the study area, institutional variables of nearby government policy and strategy, access of electric supply in urban settlement, provision of services and support and availability and affordability cost of stoves types were analyzed. These institutional variables' influence on Electric Injera Mitad and Cook stove adoption decision is discussed below. When series of likert-type questions/items are used to measure a single main variable or character, mean and standard deviation are more proper in analyzing the data than using of mode and median(Boone and Boone, 2012).

In this study, institutional variables of nearby government policy and strategy, access of electric supply in urban settlement, provision of services and supports and availability and affordability cost of stoves were five scale likert response questions (from 1=strongly disagree 2= 3=neutral to 4= agree to 5= strongly agree) to examine institutional influence on households' Electric Injera Mitad and Cook stove adoption decision. As a result, the data were analyzed by using mean for central tendency and standard deviation for variability. So that, when the mean reply is under 5 it shows that the variable is either disagreed or strongly disagreed and when it is above 5shows that either the variable is agreed or strongly agreed. In addition to mean, frequency and percentage were used.

As Table 4.14 presents, nearby government policy and strategy, access of electric supply in urban settlement, establishment of services and supports and availability and affordability cost of stoves were found vital factors that influence Electrical Injera Mitad and cook stove adoption decision with average mean of 3.455.

As it is the below table shows, availability and affordability with different type stoves cost, with mean of 3.78, was found to be the concerned vital institutional factor that moves households Electrical cook stove adoption decision at the study area. Consistent to this mean value, majority (73.4 %) of respondents agreed that access of electric supply in urban settlement to adopt Electrical cook stoves. This may be due to the policy and the strategy of urban one mechanism to have electric supply for urban expansion and settlements.

Providing different types of electrical stove with available and affordable cost adoption decision larger size to agreed (76.9) was found the other institutional aspect in influencing Electrical cook stove adoption decision with mean of 3.78. With the different available cost and affordable cook stoves for heads of households were agreed highly from affect to adopt households.

Nearby government policy and strategy can influence Electrical stoves purchase decision, provision of services, supports and providing different types of electrical stove with available and affordable cost adoption decision were also found to be the other main institutional factors that move Electric Cook stove adoption decision with mean of 2.73, 3.69, 3.48 and 3.78, respectively. This may be, partly, since the part of institutions in generating an assisting working environment by given that diverse services and supports to inspire heads of households to adopt

stoves. And in case of highly convenience of Electrical stove and in expanded community awareness about its benefits, the chance of adoption may be great.

This descriptive analysis result was reinforced by the data increased from the key informants. The key informants answered that the nearby government institutions, through energy professional, EEU agents and availability different stove technology help to improve urban household's Electric stove adoption decision by providing different services such as awareness creation, price regulation, create good service and material and technical supports.

The other institutional factor that affects the probability of Electrical stoves adoption is the access to supply Electric power for urban households beside home and monthly payment mechanism suitable for adopters.

From these findings on can understand that nearby government policy and strategy, access of electric supply in urban settlement, establishment of services and supports and availability and affordability price of stoves were found to be vital institutional factors that move Electrical stoves adoption decision. This scholar came up with similar outcomes of Puzzolo *et al* (2013) and Agarwal (1983) that create addition (e.g. awareness creation) and the stove maker positive institutional basis factors for the adoption of Electrical cook stoves. This study is also consistent with the empirical works of Makonese, Chikowore and Annegarn (2006) that found keep fit, technology and information exchange, technology regular and distributing energy systems as institutional factors to effect the available and affordable with stoves price production, adoption of Electrical cookstoves.

Government policy and achievable strategy in Ethiopian Electric service Utility for expanding Electric usage in Addis Ababa is very wide and fast. We toughly did to address 100% Electric service in Addis Ababa by 2015 E.C. So in this case we know more adopter Electric stoves. This is one thing increasing Adopter Electric users in Addis Ababa. Other opportunities having a good policy become more different stove producers' chance to produce affordable price and easy to convenient for households to uses Electric Stoves in different area of Addis Ababa.

Table 4.14: Electric Injera Mitad and Cook Stove Adoption and Institutional Factors

Items		SD	D	N	A	SA	Total	Mean	St.dev
Nearby government policy and strategy can influence Electrical stoves purchase decision	Freq.	62	92	104	62	30	350	2.73	1.193
	%	17.7	26.3	29.7	17.7	8.6	100		
Providing service with in policy and strategy affect urban household Electrical stoves adoption	Freq.	21	21	31	247	30	350	3.69	0.93
	%	6	6	8.9	70.6	8.6	100		
Providing support electric power related issue policy and strategy affect Electrical stove adoption	Freq.	23	52	29	223	23	350	3.48	1.03
	%	6.6	14.9	8.3	63.7	6.6	100		
Access of electric supply in urban settlement influence Electrical stoves decision	Freq.	47	0	23	257	23	350	3.597	1.086
	%	13.4	0	6.6	73.4	6.6	100		
Providing different types of electrical stove with available and affordable cost adoption decision	Freq.	0	52	0	269	29	350	3.78	0.79
	%	0	14.9	0	76.9	8.6	100		
Average								**3.455**	

Source: Own survey data (2020)

4.1.15 Electric Injera Mitad/ Cook adoption social factor

In this study, others look influence of membership to local associations, information exchange by social associations, the influence of early adopters and neighbors were five scale likert response questions (From 1=strongly disagree 2= disagree to 3=neutral to 4 =agree to 5= strongly agree). As a result, the data were analyzed by using mean, standard deviation and percentage. So that, when the mean reply is lower 5 it shows that the variable is either disagreed or strongly disagreed and when it is above 5shows that either the variable is agreed or strongly agreed.

As it can be seen from the below table 4.15, informal information exchange by social associations with the mean of 2.951 was create to be the greatest significant social factor that influences Electric Injera Mitad and Cook stove adoption decision in the study area. In line with this, majority (29.7 %) agreed and neutral equal chance of weather the head of households respondents (29.7 %) of respondents that informal information exchange can influence adoption

decision or not influenced in decision. One description might be that by social associations members could not affected to Electric Injera Mitad and Cook stove purchasing decision. The above result being members of social organization much influenced to adoption decision or not influenced Electric Injera Mitad and Cook stove adoption decision. The respondents adopts by own different out of social members information system.

As the below 4.15 table shows, the other social factor that affects Electric Injera Mitad and Cook stoves adoption was found to be early Electric Injera Mitad and Cook stoves adopters with the mean of 3.82 Consistent to this mean value, most (50.6 %) of households agreed and 22.6 % strongly agreed that earlier adopter of 'Electric' Injera Mitad and Cook stove can influence others adoption decision. This result provisions dissemination of technology theory that states individuals and early adopters in a certain social framework can impact demeanor and conduct of others casually either to advance or block the acknowledgment of another innovation. This outcome is like the past works of Puzzolo et al (2013) and Adrianzen (2009) that discovered families that embraced the mechanical oven have a positive or negative impact on the family's probability of adoption. Neighbors' influence was, additionally, discovered one social factor that has effect on Electric Injera Mitad and Cook stove adoption decision with mean of 3.88 Consistent to this mean worth, greater part (58.6 %) of respondents concurred and 23.7 % emphatically concurred that neighbors can impact others adoption decision . In line to this stove technology adoption, Thandapani and Menon (2011) that found the impact of neighbors as one social factor to influence eco-friendly new cooking advancements adoption decision.

To sum up, membership to nearby association and dynamic interest were not completely influence selection of Electrical Stove decision; then again influence of early adopters and neighbors were discovered social factors that can influence Electric Injera Mitad and Cook ovens adoption decision with the normal mean of 3.467.

Table 4.15: Electric Injera Mitad and Cook stove Adoption and Influence of Social Factors

Items		SD	D	N	A	SA	Total	Mean	St.dev
Membership to different social organizations in the community can influence Electric Stoves purchasing decision	Freq.	29	52	199	47	23	350	2.951	0.936
	%	8.3	14.9	56.9	13.4	6.6	100		
In the social organization information exchange that can affect Electric stove purchasing decision	Freq.	23	72	104	104	47	350	3.22	1.11
	%	6.6	20.6	29.7	29.7	13.4	100		
Early adopter of electrical stoves can influence to other Electric stove adoption decision by promote reality	Freq.	0	47	47	177	79	350	3.82	0.931
	%	0	13.4	13.4	50.6	22.6	100		
Neighbors can influence on others Electrical stoves adoption decision	freq	0	62	0	205	83	350	3.88	0.966
	%	0	17.7	0	58.6	23.7	100		
Average								3.467	

Source: Own survey data (2020) **NB**: SD=strongly disagree, D= Disagree, N=Neutral, A=Agree, SA=strongly agree

4.2 Econometric Analysis and Discussion

4.2.1 Bivariate Probit Regression Model

The literature section of the paper has also argued that the simple portray of the energy ladder theory on energy choice, including Electric Mitad/stove, has been challenged and criticized as simple approach that failed to account other numerous factors that come into play in energy decision of households. Thus, many other factors both on the 'demand and supply sides' are considered and used in statistical models that aims at identification of determinants of adoption of a specific energy technology. There are long lists of these factors and researchers employ them based on the type of energy that they are dealing with and the local context. In this paper, sex, age, household size, nature of the house, education, assets and income of the family, were considered table 4.16.

In this section, the study presents the results of econometric analysis. In the econometric analysis, socio-economic characteristics variables are included to explain the Electric Injera Mitad and Cook stove. As described in the methodology part, to examine factors that determine the adoption of Electric Stove technology; by households in Addis Ababa City Bivariate probit model were used in this study. The results of the probit regression are given in Table 16. As mentioned in the methodology section, 396 observations were used in the regression. The coefficients, standard Error and joint probability for each variable are presented in Table 16. As the result shows sex, age, marital status and education in years of the household head, monthly income, house ownership, room number, monthly income, and kitchen availability significantly influence the adoption of Electric Injera Mitad; and the other hand marital status, kitchen availability, monthly income and house ownership significantly influence adoption Electric Cook stove in Addis Ababa city. Among the independent variables used in the analysis for the adoption of Electric Injera Mitad family size has no significant impact on the adoption; similarly to the above idea education in years, sex, and age, family size has no significant impact on the adoption of Electric Cook stove in Addis Ababa city. The probit model was assessed utilizing STATA programming application version 12. From the probit relapse result depicted in the table 4.16, we can see that the illustrative factors recognized in the model adequately clarify variety in the dependent variable, which was demonstrated moreover, significant of chi^2 is measurably noteworthy at 5 percent, which shows that all logical factors taken together are huge in clarifying

the model. Diagnostic tests were conducted in which no multicollinearity problems; The Variance Inflation Factor (VIF) is also computed to test multicollinearity. The VIF result confirms less than 10 and tolerance greater than 0.1; from result show there is no multicollinearity across explanatory variables as indicated in Table Appendix2.

Table 4.16: Bivariate probit estimates of determinants of Electric Injera Mitad and Cook stove adoption

Variables	Injera Mitad			Cook Stove		
	Coef.	Std. Err.	P>|z|	Coef.	Std. Err.	P>|z|
Age (Years)	-.0491	.0271	0.070*	.0021	.0185	0.907
Sex (0=Female)	-.6851	.3011	0.023**	.1603	.1780	0.368
Room Number	.4675	.1255	0.000***	.0735	.0565	0.193
Marital Status (1=married)	-.8081	.2126	0.000***	-.2651	.1291	0.040**
Family Size	-.0981	.1185	0.408	-.0792	.0840	0.346
Kitchen Availability (1=have separate kitchen)	-1.516	.3196	0.000***	-.5435	.2229	0.015***
Monthly Income ETH	.0002	.0006	0.001***	.0012	.0001	0.005***
Education (Years)	.0645	.0237	0.007***	.0085	.0178	0.631
House Ownership (1=yes)	.6004	.3089	0.052*	.5082	.2008	0.011***
Source of income	0.281	.0346	0.000***	.0391	.0592	0.509
Monthly electric payment	-.2670	.2263	0.239	.1483	.0994	0.136
Price of Stoves	.0001	.0001	0.697	.0001	0.001	0.836
Constant	4.206	1.856	0.023	1.030	1.136	0.365
Number of observation	396					
Wald chi2 (20)	73.68					
Log likelihood	-166.42354					
Prob > chi2	0.0000 parentheses					

Source: Own survey data (2020) ***, ** and * denote Significance at 1%, 5% and 10%, respectively, ETH= Ethiopian Birr

As indications in Table 16, the sex of household head has a positive significant result on the decision of adoption Injera Mitad; while Cook stove has a negative significance result on the adoption Addis Ababa city. It shows both sexes adopt Injera Mitad technology compared to Cook Stove. And it is also statistically significant at 5%. This indicates both sexes headed households in Addis Ababa mainly adopt and chooses Electric Injera Mitad than Cook Stove. This line with both gender knowledgeable clean and convenient for adopt priorities for Injera Mitad in urban Ethiopian cities.

Marital Status of the household head is also one of the determinants of household adoption of Electric Injera Mitad and Cook Stove. According to the result, unmarried household heads have a negative significant result on the decision of adoption of Electric stoves and they are both statistically significant at 1% and 5% respectively. This suggests that unmarried household head has small chance of adopting Electric Stove technology parallel to when compared to married household heads in the city. In addition to this being married a positive effect informed about technology and adoption pattern Electrical stoves.

The heads of age household has a positively significant effect on the adoption of Electric *Injera Mitad* technology at 10% level of significance. The result supported by Warkaw and Dr. Chawla (2016), research finding in Ambo shows that the probability of household adoption of stove technology sources increases by greater than 29 years adults of household head. And it is statically significant at 10%. A similar study by Walekhwa *et al*, (2009) illustrates that the probability of a household adopting energy source increases with decreasing less than 25 age of head of household. It can be concluded that the younger the household age is the better than older age household in adopting Electric Injera Mitad. 9.1% age of household head has a positive sign adoption of Cook stove technology the result shows is not statistically significance. Hence, comparing the two results it shows that it is more common among older household head to adopt Electric Injera mitad compared to Cook stove technology in Addis Ababa city.

Family size more than less than or more family size in numbers has a positive effect on the adoption of *Injera Mitad*/Cook stove; when statistically shown not significant. The results indicate when family size number higher or lower not influence the probability of household

adoption of *Injera Mitad* and cook stove. This implies in adoption of stoves technology products requires not only in the household with large and lower families to adopt in households.

The education in years of the respondent from Addis Ababa city has a positive effect on the adoption of Injera Mitad technology product. The household head that can education more in years are more likely influence to adopt Injera Mitad as compare to household head that education lower in years and statically significant at 1%. The other respondents' education more in years have 6.3% more chance of adoption of Cook stove than with lower education in years. However, it is no statically significant. This suggests that the more household head get more education in years they are likely to be exposed to more information such as the adoption of Injera Mitad and cook stove. In addition, Irene 2013, study finding also showed there was a positive relationship between the level of education of the household head and the adoption of stoves. It implies that more of the educated people tended to adopt the use of Injera Mitad and the higher their education years the more the adopted the use of Stove technology.

As it is indicated in Table 4.16, it was found that household monthly income from 4000- 7000 ETB or (87%) earn incomes households has more positive and the variable statically significant at 1% effect on household adoption of both electric Injera Mitad and Cook stoves in Addis Ababa city. The adoption will increment by a factor of around one as the income of family increments. At the end of the day, the likelihood that a family adoption electric injera mitad and cook stove will increment as his/her degree of income size, which affirms the energy ladder theory. This finding is predictable with the majority of the past examination discoveries. As indicated by SHEN (2014) and Malla and Timilsina (2014), the family unit month to month salary influences the selection of cooking ovens essentially. With increment in family salary, most families receive cleaner business energizes to improve their day to day environments (Masera et al., 2000; Heltberg, 2005; Rajmohan and Weerahewa, 2007; Faye, 2002).

The separate kitchen availability from relatives has 82.3% of households respond available separate kitchen for prepared food in their house. And a positive effect and statically significant at 1% on influence of adoption of electric Injera Mitad and cook stove in Addis Ababa. As indicated in Table 4.16, the household head has separate kitchen increases adopter stove technology as compared to non- separate kitchen household head. The result implies have

separate kitchen has probability for better cooking; as putting the stove product keep well for household heads.

As indicated table 4.16 shows, house ownership of household head from different respondents 41%(86) of households owner become more to become more adopter stove technologies has a positive effect on the adoption influence electric Injera Mitad and Cook stove in Addis Ababa city statically significant at 10% and 1% respectively. The result implies have housed ownership can influence and increase adoption electric Injera Mitad adoption of households as compared to non- ownership of housed household. The reason for adopters chance to keep the product of stove and manage the area of house.

In addition, room number of the respondent from households has a positive sign for adoption electric Injera Mitad influence statically significant at 1%. When the respondents' house more in number from less likely room number one increase the probability of adoption of electric Injera Mitad. The other, the room number from household has a positive sign for adoption cook stove is not a statistically significant variable.

As indicated table 4.16 shows, source of income in household has a positive effect on the adoption influence electric Injera Mitad in Addis Ababa city statically significant at 1%. The result implies source of income in households has a positive sign cannot influence and not statically significant. In this result shows whether difference or similar source of income not directly influence on adoption of electric cook stove.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1. Concussion

The Addis Ababa has supported the scattering of Electric Injera Mitad and Cook stove technologies, which have health, economic and environmental advantages. This study investigated factors affecting adoption of Electric Injera Mitad and Cook stove by households living in city Addis Ababa. The household main source of electric cook stove types for energy consumption the city indicates that open resistor type the major in cooking practice. This finding implies that the probability of electric stove adoption for a household that gets open resistor type local products in many places. The majority 87 percent of the sampled households adopted electric injera mitad; and 83 percent of the households adopted cook stove. Perceived benefits of electric saving money, cleaner cooking, safer to use and prompt cooking were found to be the main reasons to adopt Electric Injera Mitad and Cook stove. Market place and government source were also indicated to be the others more accessible place and source of information for household in Addis Ababa city regarding new electrical cookstove technologies.

Provision access of electric supply in urban settlement and providing within policy and strategy to the potential users and producers, and availability of Electric Injera Mitad and Cook stove production sites in different types closely proximity were found to be institutional factors to influence Electric Injera Mitad and Cook stove adoption.

From social factors, early adopters' influence and neighbors' influence were also found to be important variables that affect Electric Injera Mitad and Cook stove adoption decision in the study. The early Electrical stove adopters and neighbors may share their experience about the effect of adoption purchase decision. These findings confirm energy stacking theory with regard to cooking technology choice.

The probit model result revealed that the adoption of electric injera mitad and cook stove in the Addis Ababa city is influenced by household characteristic and socioeconomic factors. More

specifically, the adoption decision is positively affected by household monthly income, separate kitchen availability, ownership of house and marital status; all these variables are found to be significant. Addition to this education, age, sex and room number variables indicated to the adoption decision only electric Injera Mitad is positively affected and significant. However, unlike most urban city areas the family size households found to be not significant. This is because in both stove technology uses only not whether affect have one child and more.

The other variables adoption decision of Cook stove age, sex, education in years, and room number have positive and not significant effects on adoption Cook stove. The increasing household head age and household size decrease the chances of adopting cook stove. In addition, room number positive and not significant effect on the adoption of cook stove in the Addis Ababa. The result shows, most product of cook stove in size very medium and can put in even in one house room only in the households.

5.2. Recommendations

For the success of government programs and strategy enhance ultimately for the apprehension of the potential health, economic and environmental benefits, understanding determinants of Electric Injera Mitad and Cookstoves adoption decision offer various possible insights and policy implications. So that, based on the findings of this study the possible recommendation are forwarded below.

Based on the conclusion of the study, nearby government policy and strategy; providing services support to adopt electric stove technologies, from above points Ethiopian Electric Utility could be improve of access of Electric supply efficient in the city households and decreasing in the households' usage other energy consumption source fire wood and charcoal in the households.

Monthly electric payment price much higher for households; Ethiopian Electric Services Utility and related government offices look monthly electric payment should cost set not more than 750 ETB providing service with in policy and strategy proportional, which helps contribute to adoption Electric Injera Mitad and Cook stove adoption.

Further study: a household with a low annual income had low chances of adoption of electric Injera Mitad and Cook stoves. Thus, to increase the adoption of electric Injera Mitad/Cook

stoves government and non-government should continue to work on poverty alleviation program in urban areas and facility credit institution near the community which provide loan to buy stove products for the household. In addition, the government should consider lower tax rate and subsidies electric Injera Mitad/Cook stoves products for the private sector so stove product can be affordable more easily to the households.

Reference

Adkins, E.Tyler, E., Wang, J., Siriri, D. & Modi, V. (2010*). Field testing and survey evaluation of household biomass cook stoves in rural sub-saharan Africa. Energy for Sustainable Development 14 (2010) 172–185*

Adrianzén, M. (2009). *The role of social capital in the adoption of firewood efficient stoves in the Northern Peruvian Andes.* Working Paper Version – June 2009

Agarwal, R., Prasad, J. (1998) *A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology*, Information Systems Research 9, pp. 204 – 215

Aguilar, M., (1990) *Technology's Apropiadas Para que Para quie',* Grupo de Estudios Ambientales, Mexico City in Troncoso, K., Castillo, A., Masera, O., Merino, L. (2007) *Social perceptions abo technological innovation for fuelwood cooking: Case study in rural Mexico,* Energy Policy 35, pp. 2799-2910 *burning stoves. World Development, vol.11, No.4, PP.359-376*

Alem, Y., Hassen, S. & Kohlin, G., (2013). *The Dynamics of electric cookstove adoption: panel data evidence from Ethiopia. , 2473(557), p.26.*

Axén, J. (2012). *Fuel efficient and efficient aid: an analysis of factors affecting the spread of fuel efficient cooking stoves in Northern Tanzania.* Unpublished Thesis, Södertörn University

Bandura, A. (1977) *Social Learning Theory, General Learning Press, New York in Walden, E.A., Browne, G.J. (2009) Sequential Adoption Theory: A Theory for Understanding Herding Behavior in Early Adoption of Novel Technologies, Journal of the Association for Information Systems 10 (1), p31-62*

Barnes, D., Openshaw, K., Smith, K. & van der Plas, R. (1994) .*What makes people cook with improved biomass stoves? A comparative international review of stove programs World Bank.*

Barnes, D.F. K. Krutilla, and W. Hyde. (2005). *The Urban Household Energy Transition: Energy, Poverty, and the Environment in the Developing World. Washington, D.C.: Resources for the Future (RFF) Technical Paper, Number 242*

Barnes, D. F., P. Kumar, and K. Openshaw. (2015). *Cleaner Hearths, Better Homes: New Stoves for India and the Developing World. Washington, D.C.: The World Bank.*

Bensch, G., M. Grimm and J. Peters (2015). *Why Do Households Forego High Returns from Technology Adoption? Evidence from Improved Cooking Stoves in Burkina Faso. Journal of economy Economic Behavior and Organization. 116: 187-205*

Bereket kebede,(2000). *Modern energy and the urban poor in Ethiopia Africa energy policy research New York. Nairobi, Kenya.*

Bioe xie, (2012) *factors affecting purchase intention of electric cooking appliance in un publish* MA thesis Thailand

Bourdieu, P. (1977) *Outline of a theory of practice (Cambridge: Cambridge University Press). Applied Sciences, Netherlands*

César, E. & Ekbom, A. (2013) .*Ethiopia environmental and climate change policy brief.* Sida's help desk for environment and climate changes

Climate Institute (2009). *How does black carbon change the climate debate? Climate institute,Autum 2009 Volume 19, No. 4*

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches(* (2nd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approach (15th ed)*. Los Angeles: Sage. Chicago

CRGE, (2011) *Ethiopia's Climate-Resilient Green Economy Green economy strategy*

CSA (Central Statistical Authority). (2007). *The 2007 Population and Housing Census of Ethiopia, Addis Ababa*

CSA, (2004, 2011) *Ethiopian Welfare Monitoring Surveys CSA, Addis Ababa*

Damte, A. & Koch, S. (2011). *Clean fuel-saving technology adoption in urban Ethiopia.*Working paper 229

DANAS, (2015, 2017) *Project Document on Electric Injera Mitad: Energy Efficiency Standards & Labeling. 2015, 2017*

Dawit Diriba Guta. (2012). *Assessment of Biomass Fuel Resource Potential And Utilization in Ethiopia: Sourcing Strategies for Renewable Energies. International Journal of Renewable Energy Research. Vol.2, No.1, 2012. pp. 1-9.*

Dawit, W. (2008). *Fuel efficient technology adoption in Ethiopia: Evidence from improved "Mirt" stove technology: A Case in selected kebeles from "Adea" woreda. Ethiopian Journal of Economics, Volume Xvii, No 2, October 2008*

Darby, S. (2006) '*Social learning and public policy: lessons from an energy-conscious village', Energy Policy, 34(17): 2929-2940.*

Energy Sector Management Assistance Programme (1996). *Ethiopia energy assessment report. ESMAP, No. 179/96. Washington, DC: World Bank. 77*

Ethiopia Climate-Resilient Green Economy (2011*).Green economy strategy. Federal Democratic.*

Faye, S.G. (2002*). Household's consumption pattern and demand for energy in urban Ethiopia. An unpublished PhD thesis of Department of Economics, University of Alberta, Canada.*

FAO, (2007): *Removal of Wood Products 1990 to 2008, http://www.fao.org.forestry/32046/en. Access date 13/06/2017* Republic of Ethiopia

Gebreegziabher, Z., Cornelis van Kooten, G. & van Soest,D (2006) . *Land degradation in Ethiopia: What do stoves have to do with it?* Presentation at the International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12 -18, 2006

Gebreegziabher, Z., Mekonnen, A., Kassie, M. & Köhlin G. (2010) .*Urban energy transition and technology adoption: The case of Tigrai, Northern Ethiopia*. *Discussion paper EfD 10(22). Environment for Development (EfD) Initiative, and Resources for the Future (RFF), Washington, DC*

Gifford, M. (2010*) .A global review of cookstove programs*

GIZ-HERA (2012). *Mirt stove:* Ethiopia. *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH Postfach 5180 65726 Eschborn*

GIZ (2013). *Clean and Efficient Cooking Energy for 100 Million Homes: Results from the Bonn International Cooking Energy Forum 26–28 June 2013*

Glad, W. (2012) '*Housing renovation and energy systems: the need for social learning', Building Research &Information 40(3):274-289.*

Global Alliance for Clean Cookstoves (2012) .*Results report: Sharing progress on the path to adoption of clean cooking solutions*

Global Alliance for Clean Stoves (2011). *Igniting change*: A strategy for universal adoption of clean cookstoves and fuels *for the logistic regression model. Stat. in Med, Vol. 16, 965-980 (1997)*

Gram-Hanssen, K. (2011) *'Understanding change and continuity in residential energy consumption', Journal of Consumer Culture, 11 (1): 61-78.*

Greene, W. H., 2003. *Econometric Analysis. 5th Edition. Macmillan Publishing, New York.*

Hanna, R E. Duflo, and M Greenstone. (2016). *"Up in Smoke: The Influence of Household Behavior on the Long-run Impacts of Improved Cooking Stoves," American Economic Journal, 8, 80-114.*

Heltberg, R. (2005). *Factors determining household fuel choice in Guatemala. Environmental and development economics, 10, 337-61.*

Inayatullah, J. (2011) *What makes people adopt improved cookstoves? Empirical evidence from rural Northwest Pakistan.* The Governance of Clean Development, Working Paper Series 012 – January 2011

Inayatullah, J., Khan, H. & Hayat, S. (2012). *Determinants of household energy choices: An example from Pakistan. Pol.J.Environ.Stud.Vol.21, No.3 (2013), 635-641*

International Energy Agency (2010) .*Energy poverty: How to make modern energy access universal Special early excerpt of the World Energy Outlook 2010 for the UN General Assembly of the MDGs*

IEA, (2014). *Africa Energy Outlook. A focus on the energy prospects in sub-Saharan Africa, World Energy Outlook Special Report, International Energy Agency Publication.*

Israel, G. (1992) .*Sampling the Evidence of extension program impact*. Program evaluation and organizational development, IFAS, University of Florida. PEOD-5. October

Jacob, N. (2013) .*Promotion and use of improved cookstoves in the conservation of biomass resources and biomass briquettes from solid wastes in the Gambia.* ISESCO Journal *of Science and Technology Vol. 9, No. 1 5, M a y 2 0 1 3 (1 7 - 2 6)*

Karkezi and Ranja. T, (1997*). Renewable Energy Technologies in Africa, London and new Jersy: Zed Books in Association with African energy Policy Research (AFREPREN) and the Stockholm Environment Institute*

Karekezi, S., Banda, K. & Kithyoma,W.(2002) .*Improving energy services for the poor in Africa gender perspective. ENERGIA News vol. 5 nr 4 • 2002*

Kowsari, R. (2013) .*Twisted energy ladder: Complexities and unintended consequences in the transition to modern energy services.* Unpublished PhD Dissertation, University of British Columbia

Lee, C., Chandler, C., Lazarus, M. & Johnson, F. (2013) .*Assessing the climate impacts of cookstove projects:* Issues in emissions accounting. Stockholm Environment Institute, Working Paper 2013-01

Levine, D., Beltramo, T., Blalock, G. & Cotterman, C. (2013*)* .*What impedes efficient adoption of products?* Evidence from randomized variation in sales offers for improved cookstoves in Uganda 79

Lewis, J. J., and S. K. Pattanayak. (2012). *Who adopts improved fuels and cook stoves? A systematic review. Environmental Health Perspectives 120(5): 637–645.*

Makame, O. (2007).*Adoption of improved stoves and deforestation in Zanzibar. Management of environmental quality: An International Journal Vol. 18 No. 3, 2007 pp. 353-365.*

Makonese, T., Chikowore, G. & Annegarn, H. (2006). *The potential and prospects of improved cookstoves (ics) in Zimbabwe*

Malla, S., & Timilsina, G. (2014, June). *Household Cooking Fuel Choice and Adoption of Improved Cookstoves in Developing Countries. Policy Research Working Paper, pp. 1-50.*

Masera, O., Saatkamp, D. & Kamme, M. (2000) .*From linear fuel switching to multiple cooking strategies: A critique and alternative to the energy ladder model. World Development Vol. 28, No. 12, Pp. 2083-2103, 2000*

Masera, O. (2008). *Reduction in personal exposures to particulate matter and carbon monoxide as a result of the installation of a Patsari improved cook stove in Michoacan Mexico. Indoor Air 2008; 18(2):93-105*

Mebratu Negera, (2019) *Determinants of Household Adoption of Electric Injera Mitad in Urban Ethiopia: A Case Study of Woliso Town, American Journal of Economics 2019, 9(4): 216-221*

Mekonnen, A. (2009). *Rural household biomass fuel production and consumption in Ethiopia: A case study. Journal of Forest Economics, vol. 5, no. 1 (2009), pp. 69-97*

Miller, G. & Mobarak, A.M., (2013). *Gender Differences in Preferences, Intra-household Externalities and Low Demand for Improved Cookstoves, NBER Working Paper Series*. Institute for Financial Management Research Ministry of Water and Energy (2012) .*Scaling - up renewable energy program Ethiopia investment plan final draft, January 2012.* Federal Democratic Republic of Ethiopia.

Ministry of Finance and Economic development (MoFED).(2013). *Dynamics of growth and poverty in Ethiopia (1995/96-2004/05). Development Planning and Research Department, Ministry of Finance and Economic Development. Addis Ababa, Ethiopia.*

National Clean Cookstoves Programme Ethiopia (NCCSPE, 2011). *Road map*

Onwuegbuzie, A. & Leech, L. (2004) .*Enhancing the interpretation of "significant" findings:* The *role of mixed methods research. The Qualitative Report Volume 9 Number 4 December 2004 770-792*

Pachauri, S. (2011) *The energy poverty dimension of energy security, The Routledge Handbook of Energy Security, B. K.Sovacool. London, Routledge.Oreg 2003*

Puzzolo, E,Stanistreet, D., Pope, D., Bruce, N. & Rehfuess, E. (2013). *Factors influencing the large-scale uptake by households of cleaner and more efficient household energy technologies: Systematic review*

Pine, K., Edwards, R., Masera, O., Schilmann, A., Marrón-Mares, A. & Riojas-Rodríguez, H. (2011) *Adoption and use of improved biomass stoves in Rural Mexico. Energy for Sustainable Development 15 (2011) 176–183* 80

Rajmohan, K. and Weerahewa, J. (2007). *Household energy consumption patterns in Sri Lanka. University of Peradeniya, Sri Lanka.*

Rehfuess, E. (2003). *Water & sanitation and household energy - Two critical determinants of children's health: WHO-AMG roundtable on "healthy environments for children" 21 October 2003. Protection of the Human Environment, World Health Organization*

Rehfuess, E. A, Puzzolo, E., Stanistreet, D., Pope, D and Bruce, N. G. (2014). *Enablers and barrier to large-scale uptake of improved solid fuel stoves: a systematic review. Environmental Health Perspectives, 122(2). DOI:10.1289/ehp.1306639.*

Rogers, E.M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press

Røpke, I. (2009) *'Theories of practice: new inspiration for ecological economic studies on consumption', Ecological Economics 68(10): 2490–2497.*

Rory, C., Clifford, M. & Jewitt, S., (2014). *The introduction and uptake of improved cookstoves: Making sense of engineers, social scientists, barriers, markets and participation. HEDON, (64: Barriers to Cookstoves). 656*

Schlag, N. and Zuzarte,F. (2008). *Market barriers to clean cooking fuels in sub-saharan Africa: A review of literature.* Working paper, Stockholm Environment Institute, April 2008

Shen, G., Lin, W., Yue, D., Liu, Z., Chen, Y., & Yang, C. (2014*). Factors influencing the adoption and sustainable use of clean fuels and cookstoves in China-a Chines literature review.*

Shove, E. (2003) *Comfort, cleanliness and convenience (Oxford: Berg).*

Simons, L. (2012). *Reducing Ethiopian household fuel use with 80%: Report second visit Sunny Simons Ethiopia*

Slaski, X. & Thurber, M.(2009). *Research note: Cookstoves and obstacles to technology adoption by the poor.* Program on energy and sustainable development working paper No. 89 Stanford, CA

Smith, K. & Deng, K. (2010) *A Chinese national improved stove program for the 21st century to promote rural social and economic development.* English translation of article in Chinese in *Energy Policy Research*, 2010.1, 24-25.

Sørensen, K. H. (1996) '*Learning technology, constructing culture: socio-technical change as social learning' STS Working Paper no. 18/96, Centre for Technology and Society, University of Trondheim.*

Stock, J. & Watson, M. (2007).*Introduction to econometrics* (2nd ed.). Botson: Pearson Addison Wesley

Takama, T., Lambe,F., Johnson, X., Arvidson, A., Atanassov,B., Milkyas, Nilsson,L., Tella,P. & Tsephel, S. (2011) .*Were African consumers buy cleaner fuels and stoves? A household energy economic analysis model for the market introduction of bio-ethanol cooking stoves in Ethiopia, Tanzania and Mozambique: Research report, Stockholm Environment Institute, 2011* 81

Tigabu. Alamir (2014) *Factors Affecting Adoption of Improved Cookstoves in Rural Areas: Evidence from 'Mirt' Injera Baking Stove un publish MA Thesis (The Survey of Dembecha Woreda, Amhara Regional State, Ethiopia.*

Troncoso, K., Castillo, A., Masera, O. & Merino, L. (2010). *Social perceptions about a technological innovation for fuelwood cooking: Case study in rural Mexico. Energy Policy 35, 2799–2810*

UNEP and Eco Securities (2006): *Guidebook to Financing CDM Projects, The Hague. Kenya: a case of Wundanyi, Mwatate and Voi Districts*

United Nation Global Alliance for Clean Cookstoves (2010), *Progress Report Clean Cooking: Key to Achieving Global Development and Climate Goals, Technical report, Global Alliance for Clean Cookstoves.*

United Nation General Assembly (2015) Sustainable *Development, New York Head quarter.*

Venkatesh, V., Morris, M.G., Davis, G.B., Davis, F. (2003) *User acceptance of information technology:Toward a unified view, MIS Quarterly 27 (3), pp. 425 – 478*

Walekhwa, P. N., Mugisha, J., & Drake, L. (2009). *Biogas energy from family-sized digesters in Uganda: critical factors and policy implications*. Energy Policy, 37(7), 2754-2762.

Warkaw, L., Dr.A.S Chawla.(2016). *Determinants of Adoption of Renewable Energy Sources towards Reducing Deforestation In Ambo District, West Shoa, Oromia*‖; ISSN 2224-3232 (Paper) ISSN 2225-0573 (Online) Vol.6, No.11, 2016 .

World Bank, (1996). *The State of the Global Clean and Improved Cooking Sector. , pp.1–179.*

World Health Organization (WHO) (2005). *The Energy Access Situation in Developing Countries- A Review Focusing on the Least Developed Countries and Sub-Saharan Africa. http://content.undp.org/go/cms service/stream/asset/?asset id=2205620 accessed on 09-04-2013*

Yonas.A.et.al. (2013).The Dynamics of Electric Cookstove Adoption*: Panel Data Evidence from Ethiopia, working paper University of Gothenburg,* Sweden

Zenebe, G. (2007). *'Household Fuel Consumption and Resource Use in Rural-Urban Ethiopia', PhD Thesis, Wageningen University. The Netherlands,*

Zou, J. (2006). *Elements of statistics: Lecture note. AMS 102.7 Spring 2006*

List of Appendix

Appendix1. Questionnaire,

ADDIS ABABA UNIVERSITY

COLLEGE OF DEVELOPMENT STUDIES

DEPARTMENT OF- *Environment and Development*

A. Questionnaire filled by women/ household head

Objective:

Dear respondents, the purpose of this questionnaire is to gather primary data about determinants adoption of Electrical stove. The study is for partial fulfillment of the requirements for Master's Degree in Development Studies at Addis Ababa University. I confirm you that all data were be used for academic purpose and your responses were be kept confidential.

Instructions:

- No need of writing name
- Where boxes are available please tick (√) in the box.
- Where boxes are unavailable write the letter(s) and/or answers on the spaces provided.

Thank you for your cooperation!!!

Part I: Household Characteristics/related to specific objective No.2

1. Age of head_____(in years)
2. Sex of head Male ☐ Female ☐
3. Educational level of head

   Illiterate ☐ Writing& Reading ☐ primary ☐ Secondary ☐

   Diploma ☐ degree and above ☐
4. House ownership

   Owner ☐ Rent ☐ Others ☐
5. How many classes of house division of rooms?

   1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 and above ☐
6. Occupation of head

   Private ☐ NGO ☐ Government ☐ Not at work ☐
7. Marital Status of head:

   Married ☐ Single ☐ widow ☐ Separated ☐
8. Total family size: _____ (in number)
9. Do you have separate kitchen house?

   Yes ☐ No ☐
10. Who is/are more responsible to fulfill cooking appliances in your family?

    Females ☐ Males ☐
11. Who is/are more responsible to prepare food in your family?

    Females (mainly the mother and/or daughters) ☐ male and female ☐

    Males ☐
12. Who is/are more the responsible for electric payment in your family?

    Females ☐ Males ☐

    Children ☐ Males and Females ☐

Part II: Questions about income level/ related to specific objective No.2

13. What is the basic source of your income?

A. Employer B. Home Rent C. Remittance D. Petty Trade E. Pension F. Business Owner out of trade G. If other specify

14. Do you have other source of income as an additional as those mentioned in Question 13 please mentions it?
15. What is your total monthly average income?

A. 1000-3000 ETB B. 3000-5000 ETB, C.5000-7000 ETB D. Above 700 ETB

16. Have you ever get any subsides other from the local Administrative or NGO level to support your life? If yes? What was the support?
17. Is your partner brought additional income to you? If yes mention the amount?
18. To which rank level of wealthy conditions are you?

A. Very poor B. Poor C. Middle D. Better-off

Part III: Questions about Electrical cook stoves /expenditures/ related to specific objective 2/

19. . _____Did you purchase 'Electric cook' stove?

A. Only Injera mitad B. Other cook stoves C. Both cook stoves

20. Do you use Electric power to cook your food?

A. yes B. No

21. If yes, how many Electric mitad do you have for baking injera and bread?
22. Do you use electric stoves to cook food?

A. Yes B. No

23. If yes, how many electric stoves do you have to cook food?
24. Of the different food cooking practice, which food practice takes longer time?

A. Injera baking B. Bread Baking C. Water heating D. Wote cooking E. If other mention it.

25. Which type of electrical cook stove is the main source of energy for cooking and heating for your family? **Related to Specific objective No.3**

A. Iron hot plates B. Induction stove C. Glass ceramic cook tops

D. Spiral hollow steel tube electric stove E. Open resistor type F. Clay with Iron plates.

26. How money birr did you requested to pay for electric in month period?

A. Under200 birr B. Between 200- 400 birr C. Above 400- 700 birr D. b/n700-1000 birr

E. above 1000 birr

27. How do you Judge your monthly Electric expenditure as compared to your usage?

A. The cost is proportional to the usage. B. The cost is less as compared to the usage

C. The cost is high as compared to the usage D. The cost is very high as compared to the usage.

28. How do you judge the cost of the monthly expenditure for people like you?

A. The cost is proportional to my income. B. The cost is less as compared to my income

C. The cost is high as compared to my income D. The cost is very high as compared to my income.

Part IV: Electrical injera mitad and cook stove adoption and other related issues / related to specific objective No.1

29. Do you have information about the health, economic and environmental benefits of using 'Electrical injera mitad and cook' stove?

Yes ☐ No ☐

30. _____Which source of information do you think that the most likely accessible, as compared to others, for the urban households regarding to 'Electrical' stove? Choose one.

A. government bodies such as EPE experts and other workers

B. media like radio

C. Electric stove producers

D. social associations, neighbors

E. others

31. _____Which place do you think is the most accessible, as compared to others, to users

(Mainly mothers) to be informed about new technologies?

a. Religious places (church, mosque)

b. work places

c. Market places

d. During meetings (e.g. formal, informal meetings) e. others

If you did purchase Electrical stoves, please state your opinion for each given reason to purchase by using 1= strongly disagree 2= disagree 3= neutral 4= agree 5= strongly agree

	Reason	1	2	3	4	5
32	Electrical stove save money					
33	Electrical stove is cleaner					
34	Electrical stove is well convenient to use					
35	Electrical stove is quicker					
Separate kitchen room and adoption						
36	Having separate kitchen room influences on 'Electrical' stove purchasing decision					
37	The larger size of Electrical stove is one reason to have a separate kitchen					

Part V: Price of Electrical stove and opinion / related to specific objective No.1

38. What is the price of one item Electric injera mitad and cook stove in your locality in average?_____(in birr)

39. What would you say about its cost?

Cheap ☐ Fair ☐ Expensive ☐

Part VI: policy and strategy promoting factors / related to specific objective No.4

Please state your opinion for each given statement using the following scales: 1= strongly disagree 2= disagree 3= neutral 4= agree 5= strongly agree

	Items	1	2	3	4	5
40	The nearby government policy and strategy (through different agents experts EEPC can influence Electrical stove purchasing decision					
41	Access of electric supply in urban settlement can influence Electrical stoves using decision					
42	By providing services (e.g. awareness creation, price electric regulation, policy and strategy can affect urban household's electrical stove adoption decision					
43	By providing supports (e.g. material, technical, financial incentive for electric power supply for households) policy and strategy can affect electrical stove adoption					
44	Providing different types of electric stoves availability and affordable with cost can influence probability of adoption electrical stove decision					

Part VI: Social factors/ related to specific objective No.1

45. Are you member of different social organizations in your locality, at least three and above?

Yes ☐ No ☐

46. Are you active participant in local associations and activities? Chairman, secretary and/or coordinator.

Yes ☐ No ☐

Please state your opinion for each given statement using the following scales: 1= strongly disagree 2= disagree 3= neutral 4= agree 5= strongly agree

	Items	1	2	3	4	5
47	Membership to different social organizations in the community can influence Electrical stove purchasing decision.					
48	By social organizations there were be information exchange that can affect Electrical stove purchasing decision.					
49	Earlier adopter of 'Electrical' stove can influence the others Electric stove adoption decision by speaking what is the reality of using it.					
50	Neighbors have influence on the others Electrical stove adoption decision.					

Part VII: Barriers from the respondents' point of view /related to specific objective No.2

51. _____Which number contains the first four most likely barriers to purchase Electrical stove in your locality, from your point of view?

A. lack of awareness about 'Electrical' stove's benefits

B. family reluctance (e.g. spouse's lack of wereingness)

C. higher price of the stove

D. problem of separate kitchen house

E. High price tariff of electric supply

1. a, b, c & d
2. b, c, d & e
3. a, c, d & e

Appendix 2 Collinearity statistics

Table A.1 multicollinearity by VIF

Collinearity Statistics			
Variable	Tolerance	VIF	1/VIF
Age	.950	1.053	1.0526
sex	.950	1.060	1.0526
Education	.976	1.025	0.9756
House ownership	.954	1.048	0.9541
Room number	.930	1.075	0.9302
Marital status	.953	1.049	0.9532
Family size	.924	1.082	0.9242
Separate kitchen	.957	1.045	0.9569
Income source	.956	1.046	0.9560
Monthly income	.974	1.027	0.9737
Price of stove	.931	1.074	0.9310
Mean VIF		1.053	

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