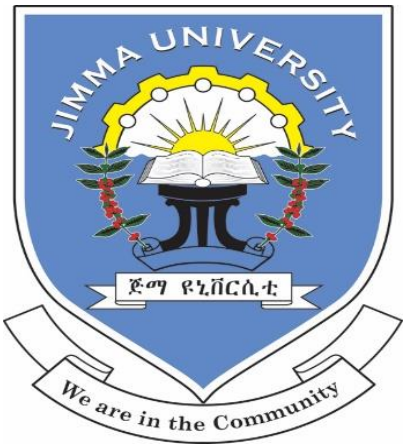
The Economic Cost of Informal Caregiving for the Inpatient*:*

The Case of Jimma University Referral Hospital, Jimma, Ethiopia.

A thesis Submitted to the School of Graduate Studies of Jimma University, College of Business and Economics in Partial Fulfillment of the Requirement for the Degree of Masters of Science in Economics

(Economic Policy Analysis).

BY; HABTAMU LEGESE FEYISA



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The Economic Cost of Informal Caregiving for the Inpatient:

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JIMMA UNIVERSITY

College of Business and Economics

Department of Economics

June 5, 2017

Jimma, Ethiopia

DECLARATION

I, the undersigned, declare that this thesis is my own work and has never been presented in any other university. All sources of materials used in this thesis have been duly acknowledged.

Declared by : Habtamu Legese Feyisa

Signature: _____

Date: 5/6/2017

CERTIFICATE

This is to certify that the thesis entitled "The Economic Cost of Informal Caregiving for the Inpatient: The Case of Jimma University Referral Hospital, Jimma, Ethiopia", Submitted to Jimma University for the award of the Degree of Masters of economic policy analysis and is a record of Valuable research work carried out by Mr. Habtamu Legese, under our guidance and supervision.

Therefore, we hereby declare that no part of this thesis has been submitted to any other university or institutions for the award of any degree of a diploma.

Main Adviser's Name	*Date*	*signature*
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This thesis is dedicated(commemorated) to my father Ato Legese Feyisa Tolla

Thank you all!

Habtamu Legese Feyisa

June, 2017

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ACRONYMS

ADL	Activities of Daily Living
BLUE	Best Linear Unbiased Estimator
BHPS	British Household Panel Survey
CV	Contingent Valuation
CHPCA	Canadian Hospice Palliative Care Assocation
Euro/d	Euro per day
Euro/H	Euro Per Hour
GDP	Growth Domestic Product
GTP	Growth and Transformation Plan
IADL	Instrumental Activities of Daily Living
JUSH	Jimma University Specialized Hospital
LTC	Long Term Care
MOFED	Ministry of Finance and Economic Development (Ethiopia)
MLE	Maximum Likelihood Estimation
OECD	Organization for Economic Co-Operation and Development
OLS	Ordinary list square
SES	Socioeconomic Status
SIB	Social Insurance Bank
VIC	Value of Informal Care
VIF	Variance inflation factor
WHO	World Health Organization
WTA	Willingness to Accept
WTP	Willingness to Pay

ABSTRACT

The demand and the supply of informal care are not limited to some specific people, country, or continent. It is one of the rotini and ongoing socio-economic problem in the world. This study analyzes the economics of informally supplied health care with special emphasis on the labor market-related opportunity cost of informal caregiving for the inpatient in Jimma university referral hospital. The study mainly used a primary data which was collected from 238 sample respondents. Empirical analysis has been performed by using the ordinary list square (OLS) and Tobit method of regression. According to the OLS and Tobit model regression result, the variable paid job experience, educational level, and employment status are statistically significant and positively related to the log of the value of informal care via the wage difference. The number of external caregivers is also positively related to the log value of informal caregiving. On the other hand, the age of informal care recipient and the interaction term (female from urban area) are also statistically significant and negatively related to the log of the value of informal care. Based on the findings, this study recommends the intervention of the government through the policy of awareness creation, financial support, work accommodation and improvement of the accessibility and facility of the hospital.

Keywords: Caregiver, Ethiopia, Informal care, Informal caregiver,Opportunity cost, Jimma, Principal.

CHAPTER ONE

INTRODUCTION

1.1. Background

Health is a state of complete physical, social and mental well-being, and not merely the absence of disease or infirmity. Health is a resource for every activity or in short life, not the object of living. It is a positive concept emphasizing social and personal resources as well as physical capabilities (WHO, 1998). The achievement of the highest possible level quality of health is very important worldwide for the economic and social sectors in addition to the health sector. This is because health is a part of human capital and it is the major resource for economic development.

There are two agents within the health sector, the health services givers and the health service receivers (patients). Patients are peoples who are affected by different types of health problems and who needs both the formal and informal type of care. According to a health specialist patients can be classified into two as; inpatient and outpatient. Inpatients are patients who need to stay in the hospital for more than a day whereas outpatients are patients who can visit their doctor with some time interval (they will not hold a bed in the hospital or in the formal health caregiving institutions). The patient can gate the formal care from health institution like from hospital, clinic and from other formal health institutions whereas they will gte the informal care from their relatives, family member and from other volunteer persons.

The term informal care and the people who provide informal care for those in need of assistance are defined differently by different researchers and institutions. According to Gould Informal caregivers are peoples who provide unpaid or arranges for paid help to a relative or friend because they have an illness or disability that leaves them unable to so somethings for themselves or because they are getting older or sicker. This kind of help could be with household chores or finances or with personal or medical needs. The person who needs help may live with you in your home, in their own home or in another place such as a nursing home (Gould.D, 2004).

On the other hand, there is also a definition that considers the heterogeneity in informal care. Heterogeneity which related to the difference in time investment and duration of care, the number of care tasks provided etc. On the basis of heterogeneity informal care is defined as a nonmarket composite commodity consisting of heterogeneous parts produced (paid or unpaid) by one or more members of the social environment of the care recipient as a result of the care demands of the care recipient (Berg et al,2004).

Informal care plays a major role in the total care provided, especially for the care of persons with chronic and terminal diseases. In a simple language, Informal caregivers are people who provide care to others in need of assistance or support (informal care recipients). An informal caregiver provides this support without requiring any payment and does so outside of the formal care sector. An informal caregiver will mostly be a family member or friend of the person receiving the care and usually, lives in the same household with the recipient of care. The informal care recipient may receive informal care from more than one person. The person who provides the majority of informal care service for the informal care recipient is called the principal or primary caregiver.

Prevalence surveys in Australia, United Kingdom, and Canada have shown that about one household in twenty has a primary caregiver, that is, a caregiver who assumes himself as responsible for the person cared for. Although both genders are involved in caregiving, women predominate in both the numbers involved and the nature of their contribution. Resident caregiving commonly involves a heavier caregiving commitment than those caregivers who live separately from the recipient of care (Goodhead & McDonald, 2007).

In most countries, a major share of health care is provided informally, meaning that it is not reflected in social statistics. Yet even though informal caregivers serve mostly without any payment, care provision can still come at a certain cost: in particular, it is time-consuming, mentally stressful, and physically exhausting, which can negatively affect the caregiver's career and health (Bettio & Verashchagina, 2010).

Although it is a firmly established empirical fact that informal care is negatively correlated with labor supply (Charmichael and Charles, 1998; 2003; Spiess and Schneider, 2003; Heitmueller, 2007), the causal relationship running from informal care provision to market labor supply is not easily disentangled from other sources of correlation (cited by Fevang et al,2008).

1.2. Statement of the Problem

Ethiopia is among countries with lowest health status in the world. This is mainly due to backward socio-economic development resulting in widespread poverty, low standard of living, poor environmental conditions and inadequate health services (MOFED, 2002). This lower level health status is followed by high numbers of inpatient who needs informal care from their informal caregivers.

Even if many community-based health care programs are based on the use of so-called informal or voluntary care as the major aspect of the program's feasibility, relatively little economic information exists about such care. This is because informal care is a less visible part of total care in terms of costs and effects, it has often been ignored in economic evaluations and subsequent policymaking (Berg et al, 2004). This is also common in Africa, where Ethiopia belongs.

"Although informal care services are not reflected in the national health accounts, never trigger a payment from an insurer, do not inflate the federal deficit, and are rarely included in any calculation of the overall cost of long-term care, they nonetheless represent a genuine opportunity cost burden." Grabowski, Norton, and Van Houtven,

According to economic theory, the costs of using one's time in a given activity consist of the benefits foregone because the same time inputs could not be used in other, also desirable, activities (the cost of foregone next best alternative). These foregone benefits, the so-called the opportunity costs of time are often empirically approximated by using the relevant individual's labor market earnings per time unit as the price of time.

Currently, the attention for informal care seems growing. There is increased insight in the amount of informal care provided and the tasks that caregivers provide. Moreover, there is growing evidence that informal care has adverse effects on informal caregivers in terms of, for example, opportunity costs, quality of life, wage, working hours, physical and mental health status etc (Berg et al, 2004).

Informal caregiving as an issue has moved into the policy spotlight over the last three decades in response to research revealing that informal caregiving can place a heavy burden on those involved, feminist concern that this burden falls disproportionately on women, and debate over whether the care of those with long term disability should be primarily a public cost or a private one (Goodhead & McDonald, 2007).

"A significant portion of informal care is provided by people of working age; an important policy question is to understand how caring affects labor market participation. Although many respondents say that their caring duties were the main reason why they left the labor market, how sure can we be that caregiving has a large negative impact on labor supply?"

Policy-makers want to know the prevalence and value of informal work because changes in informal supply are linked to public welfare and influence the social security balance sheet of the given country. Although officials in countries that publicly support informal care can gather data about care recipients from their long-term care insurance provider (it's only if they have such insurance system), these data focus on care recipients (not caregivers) and exclude those who do not apply for benefits or fit none of the entitlement requirements. As a result, most information on the magnitude of informal care is derived from surveys, often in the form of interviews with representative subsamples (Bauer & Sousa-Poza, 2015).

To the best of my knowledge, there is no research which has been done on the valuation of the economic cost of informal caregiving for the inpatient in Ethiopia. But there are a number of studies which has been undertaken on the cost of informal caregivers for a specific type of patient, disables, elders and for other kinds of care at the international level. However, as an economist, we need to do a lot in such areas because the research outcomes

can be used as the main empirical reference to formulate policy related to the health sector and policy about employees who give informal care for the inpatient.

The main focus of this paper, therefore, is to measure the impact of informal care provision on the principal informal caregivers in relation to the opportunity cost of informal care provision, to estimate the vulnerability of principal informal caregivers to hospiral acquired infection and to measure the impact of socioeconomic status of the principal informal caregiver on the value of informal caregiving.

1.3. Objectives of the Study

The general objective of this study is to present new empirical findings about the economics of informally supplied health care with special emphasis on the labor market-related opportunity cost of informal caregiving for the inpatient in the case area.

The specific objectives are;

1. To investigate the impact of socioeconomic status on the value of informal caregiving for the inpatient.
2. To analyze to what extent women principal informal caregivers incur labor opportunity costs as a result of informal care provision compared to male principal informal caregivers.
3. To measure the satisfaction of principal informal caregivers on the service being provided by jimma university referral hospital and there vulnerability to hospital acquired infection.

1..4 Significance of the Study

Study about the factors that determine the supply of informal care, including informal caregivers' opportunity costs, is of importance for health, social and labor policy. It is important for the health policy because a decline in the supply of informal care would increase the demand for alternatives that are costlier (require a huge expenditure) from a health care budget perspective. A knowledge of the determinants of the supply of informal care is crucial for the development of effective social policy programs, such as care leave facilities (SCP, 2001 cited by Berg, 2005).

Thus, the immediate outcome of this study will provide pertinent result and policy implication to policy makers. Besides, I believe that the study will add something to the existing stock of knowledge and provoke or initiate for further study in the area as it reveals the difficulty in resolving the empirical question about the cost of informal caregivers for the inpatient.

1.5. Scope and Limitation of the Study

There are a number of caregivers in Ethiopia, including caregivers for the inpatient, disables, elders, infant, mentally ill persons, chronic ill persons, terminal ill persons etc. As it is already discussed in the introduction part of this study there is heterogeneity in informal caregiving activities regarding the time spent on informal care provision and by the informal care takes provided by the informal caregivers. But in this research, we will focus only on the opportunity cost of informal caregiving for the inpatient at Jimma University referral hospital.

When aiming to measure the cost of informal caregiving in Ethiopia specifically in Jimma carers, one faces the lack of available comparable data and research in the area. In addition, due to the difficulty of collecting data from the whole parts of the country and due to the limitation of time to analyze the large sample size, this research has used a data which has been collected only from Jimma University referral hospital.

1.6. Organization of the Paper

Once we started with this brief introduction, the whole paper is organized as follows. In the second chapter, the study presents the theoretical and empirical literature regarding informal caregivers and mostly about the cost and valuation of informal caregiving. The third chapter discusses the research methodology in which the specification of the empirical model and the data issues are included. The fourth chapter presents the empirical findings and their interpretation. Finally, in the last chapter, chapter five, the study draw possible conclusions and policy implications based on the findings of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Literature Review

2.1.1 The Nature and Extent of Informal Care

Informal Caregivers are individuals who provide ongoing care (assistance) for family members and friends in need of support due to physical, cognitive, or mental conditions without pay (Canadian hospice palliative care assocation , 2016). Informal caregivers can be primary or secondary caregivers or part of an informal network of multiple informal caregivers such as siblings who share caring responsibilities for a parent. The different tasks of informal family care can be categorized into three groups: personal care with routine daily living activities; household work and emotional support; and administrative help (Triantafillou et al, 2010).

Informal caregiving task has its own natures that differ it from the formal care. Some of the natures are; Occurs in relationship context shaped by affective bonds, the tasks and responsibilities greater than normal reciprocal adult relationship and it is for undefined or hidden rewards, the tasks may include emotional support and usually the caregiving activities are unplanned and unspecified. Informal caregiving is common without respite. A unique future of informal care is that it is economically invisible or it is not easily measurable in monetary value (Goodhead & McDonald, 2007). Informal caregivers are either primary caregivers' non-primary caregivers or other informal caregivers, which includes unconfirmed primary caregivers.

The difference between household and non-household care is that the negative impact of care on well-being is higher for caregivers who live in a household together with the care recipients than the non-household informal caregivers. Due to their higher autonomy and better opportunities to retreat, caregivers who live in a household together with the care recipients, household informal caregivers cannot avoid taking care responsibilities as caregivers outside the household (Walker et al., 1995, Cited by Kehl & Stahlschmidt, 2013).

Thus, intra-household care should imply a higher time investment and mental stress because caregivers often guarantee a twenty-four hour per a day and seven days per a week availability. It could be argued that this is the case because of more physical and mental impairments of care recipients in the household (Kehl & Stahlschmidt, 2013).

In addition, caregivers often must navigate a fragmented care system with multiple doctors, insurance complexities, and various health care provider policies for home care and other supports. In essence, caregivers must become experts in medical care as well as chauffeurs. Surveys in the USA find that the elderly accompanied by a family member account for 1.4 billion trips per year (Rowe, 2012).

The demand and the supply of informal care are not limited to some specific people, country, or continent. It is one of the rotini and ongoing socio-economic problem in the world.

"There are only four kinds of people in this world: those who have been caregivers; those who currently are caregivers; those who will be caregivers and those who will need caregivers." *Rosalynn Carter, former First Lady of Canada*

Similarly, with the arguments of Rosalynn Carter, Surveys in Canada, United Kingdom, and Australia have estimated that about one household in twenty has a primary caregiver, that is, a caregiver who feels responsible for the person cared for. Though both men and women are involved in the caregiving tasks, women predominate both in the nature of their contribution and the numbers involved. Resident caregiving commonly involves a heavier caregiving commitment than those caregivers who live separately from the recipient of care.

According to research conducted in the USA, there are roughly 61 million unpaid caregivers who provide care for the elderly or disabled adults and children at some point during the year. From the total family caregivers, approximately two-thirds are female and providing care for an older relative. Today the average caregiver is a 49-year-old woman caring for her elderly mother (Rowe, 2012).

Research from Canada estimates informal care over $80 billion in economic value: this value is comparable to the manufacturing sector in labor income, and more than twice as large as the combined labor incomes from the financial, insurance and real estate industries. There is also a growing awareness that as the baby boomer population ages over the next thirty years, the need for informal caregiving will increase -- testing the limits of family and public policy alike (IFOMHLC, 2009).

Currently, the need for informal care is growing quickly due to the increase in life expectancy, accident, a high number of disease, change in lifestyle etc. Inversely the supply of informal caregivers is decreasing due to low birth rates, because children tend to live further away from their parents, and because labor market participation among women, who traditionally account the lion share by providing different informal caregiving tasks (Colombo et al., 2011). In response to the growing need for care, policymakers in several developed countries have aimed to encourage informal caregiving to reduce the financial pressure on public long-term care (LTC) systems. However, the effects of caregiving on caregivers are not yet fully understood and considered by the policy makers (Heger, 2014).

According to the four sectors of the welfare diamond, the responsibilities to care are divided between the family and informal care sector; the state or public sector; the voluntary and non-governmental sector; the care market or the private sector (Unger, 2013).

2.1.2 Timing and Informal Care (Allocation of time)

Throughout history, the amount of time spent at work has never been much higher than that spent on other activates. Even a work week of fourteen hours (eight in the case of Ethiopia) a day for six working days still lives half the total time for sleeping, eating, and other normal daily activities.

The standard neoclassical approach models the allocation of time (T), a fixed resource, between two uses: paid labor, rewarded at a fixed wage rate (W), and "leisure." Hours of work are chosen to maximize a single period function with utility dependent on leisure (L) and the consumption of goods (C), subject to a financial budget constraint imposed by the wage rate (W) and non-wage income (Latif, 2006).

Time allocation model of informal caregiving

Objective function: $U= u(c) + v(T-t_w-t_c) + x(g, t_c, t_{oc})$

Budget restriction: $c = w*t_w + A$

Time restriction: $T \geq t_w + tc$

Equilibrium condition.: $dU/dt_l = dU/dt_c = dU/dc*w$

Where; $\mathbf{c}$ = consumption, $\mathbf{t_l}$ = leisure, $\mathbf{g}$ = health of care recipient, $\mathbf{t_c}$ = own care hours, $\mathbf{t_{oc}}$ = others' care hours, $\mathbf{w}$ = wage rate, $\mathbf{t_w}$ = work hours, $\mathbf{A}$ = non-labor income, T = time budget

(Johnson/ Lo Sasso (2000).

If the caregiver is time constrained and has to divide the time between working in the labor market or providing informal care, there is a substitution effect. The scarcity of time may put pressure on the responsibility to provide care, which may lead to a reduction in the labor supply and an increase in informal caregiving hour (Heitmueller, 2007). The second effect is the income effect: as the individual increase the caregiving hours it means that he is reducing the working hours (working less generally means earning less). The income effect implies that it is more likely that caregivers remain in the labor force if caring requires extra expenditures leading to incentives to earn more by increasing labor supply (Carmichael and Charles, 2003. cited by Do, 2008).

Generally, if the substitution effect exceeds the income effect, then Informal Caregivers will choose not to work. But if the income effect exceeds the substitution effect the caregivers will remain in the labor force (Do, 2008).

Hassink & Berg (2011) reviewed more than four studies and they come up with the following arguments "From an economic point of view, the actual hours of care are determined by the care needed(demanded) by the care recipient and the opportunity costs incurred by the (potential) caregivers''. This is highly related to the concept of income effect and substitution effect.

The major and meaningful source of informal caregivers' opportunity costs is the monetary value of forgone time as a result of the care provided to the care recipient, and it is often measured by using a variable that indicates the aggregate number of hours of informal care provided (Berg et al., 2006). Another potential substantial source of caregivers'

opportunity costs is possible health loss for the informal caregivers due to caregiving or health-related quality of life (Schulz & R.Beach, 1999) .

Sometimes it is difficult to measure the monetary value of caregiving. Because some caregiver may reduce opportunity costs in terms of forgone time by combining informal care with other normal daily activities. One of the unique and favorable features of informal care is that it can be provided simultaneously with other non-market activities (unpaid works) or we can call it as "joint production" (Juster & Stafford, 1991).

Obviously, certain types of tasks are more easily combined compared to others. For instance, a caregiver can easily shop for the care recipient and his/her own household at the same time. In contrast, it is harder to combine informal care and paid work in general because in most employment relationships employees have to show up on the work floor. On some occasions, they could provide informal care during paid work time (such as arranging appointments with health care providers), but these kinds of tasks are just exceptions to the rule. A crucial implication of having to show up on the work floor is that an employed caregiver might shift the provision of informal care to the period in which she has no paid work obligations. In general terms: as long as informal care is perfectly transferable over the day or between days' joint production might partly reduce opportunity costs of informal care.

Data Collection Methods

- **Time diary method**

Time diary method is one of the gold standard methods to collect time data. This method involves asking individuals to note down the time spent on caregiving activities as the day progresses, over a set period of time. Time diaries are time-consuming to complete, which can create difficulties in recruiting study participants and can impact on the time spent caregiving (Faria et al, 2012).

- **Recall method**

The recall method involves asking individuals to report the frequency and/or amount of time spent on a particular activity in a typical day or for a period of time in the past. According to articles reviewed by Faria et al, (2012) the recall method is used frequently

because it is less time consuming and relatively inexpensive to administer. However, this method also has a number of limitations. It is particularly sensitive to reporting or recall bias, which typically results in overestimation or underestimation of the time spent on informal caregiving task by individuals.

2.1.3 The Impact of Informal Caregiving on Employment and wages of the informal caregivers

Providing informal care can influence the probability of participation in paid work or in a formal employment, as well as work hours and earnings. Caregiving can also affect economic resources if caregivers use their savings, for example, to defray the cost of care or to support their own financial needs.

A caregiver might lose flexibility at the workplace due to his/her unpredictable care duties (Leigh, 2010). This makes informal caregivers to be less job reliable, which could cause discrimination in the labor market and hence to limited job opportunities (this is the way in which discrimination effect will be expressed). These limited job opportunities may lead to a depressed wage rate and lower monetary returns of work, even if the caregiver have equal background with other employees' (all else equal). (Heitmueller, 2007; Charmichael & Charles, 2003, cited by Berg et al,2005).

Impact on Employment

When potential caregivers are of working age, the time used for informal care competes with that for paid work, meaning that the opportunity costs of informal care are often associated with paid employment (Becker, 1965). It is difficult for working-age informal caregivers to combine paid work with caregiving tasks and informal caregivers may choose to drop out paid works or reduce the work hours (if the substitution effect exceeds the income effect). This may affect their future employability and lead to permanent drop-out from the labor market (OECD, 2011).

A survey by the Australian Bureau of Statistics showed that just over half of the caregivers participated in the workforce compared to two-thirds of a matched sample of non-caregivers. Out of the total principal(primary) caregivers, only 39% participated in the workforce (Access Economics, 2005).

From the causal perspective, any negative care-work association can be explained in two ways: first, care is time-consuming, so combining it with regular employment or with paid work task is difficult; informal caregivers must reduce work hours or even drop out their jobs to provide sufficient care to the individual in need or for the informal care recipient. Second, because unemployed or part-time workers have more time, they are more likely to become caregivers. Not only are these two lines of causality equally plausible, they are not mutually exclusive and can even occur simultaneously (Michaud et al,2010).

Impact on Wage

The opportunity costs of caregiving not only relate to time spent in paid employment but may also affect wages of the caregivers. For example, potential caregivers earning higher wages face higher opportunity costs for one hour of informal care. In such a case, purchasing formal care substitutes is more attractive (income effect), implying a negative correlation between time spent on informal care and wages. Caregiving might also affect the work of the caregivers, it will reduce the performance and fewer promotions and thus it might be followed by wage penalty (Bauer & Sousa-Poza, 2015).

According to a study in the United States of America, the provision of any kind informal care has a negative effect on female workers' wages. On average the wage of female informal caregivers is lower than with that of non-caregivers by three percent. Using a Duan smearing factor to account for retransformation bias female caregivers are predicted to have a wage of $12.57 per hour compared to $12.94 for non-caregivers, or a loss of $0.37 per hour in absolute terms. Extrapolating to a year's worth of work given mean hours a week worked among workers observed in our sample was 35 and, assuming 52 weeks of paid work a year, the wage penalty accumulates to $670 in lost earnings for one year. Being a personal care task caregiver does not have a significant effect on women's wages. And the researchers do not find evidence of a wage penalty among male workers in this specification (Houtven et al, 2010).

2.1.4 Women's and Informal Care Provision

Most of the time informal care is provided by women's, literature from different countries show that the major players of the so-called informal caregiving role are women's. The

difference between the provision of informal care by men and women's, not only on the hours of care provision but also on quality and task of caregiving activities.

The total number of estimated informal caregivers in Australia for 2015 represents an overall increase from the 2005 total of 2.64 million but a slight decrease from the 2010 estimate of 2.87 million (Access Economics, 2015). The fall in numbers consists largely of a decrease in the number of male caregivers. In the contrary, the number of female caregivers has increased since 2005, while the number of male informal caregivers has decreased from 1.32 million in 2010 to 1.26 million in 2015. Women represent a far greater proportion (69.3%) of primary caregivers than men, while the majority of primary caregivers are aged between 35 and 54 years (Access Economics, 2012).

The New Zealand data, based on the census, indicates more women are involved in informal caregiving activities than men. Many research tries to get an answer to the question "why more women are in a caregiving role than men?". At the end, most of them come up with the following arguments(reasons): Some demographic reasons are that women live longer, there are more women than men, women tend to marry men older than themselves (this is dominant in Ethiopia). However, the socially constructed and gendered nature of care informs familial ties and obligations, as well as creating social expectations of women (for example that caregiving is an extension of the maternal role) (Goodhead & McDonald, 2007).

Currently, more women are in the workforce, which means they are juggling both job and family responsibilities (including informal caregiving). Recently around 58 percent of caregivers are working either full-time or part-time and thus balancing work and caregiving (Rowe, 2012). In addition, the supply of informal care is highly affected by the rising female participation in the labor force. Since 1978, the female labor force participation rate has increased from 43.4% to 58.5% (ABS, 2015). As women assume the majority of the responsibilities associated with informal care, as well as with childcare, increased female labor force participation reduces the hours available to provide informal care (Productivity commission , 2011).

2.1.5 Policy Related to Informal Caregivers

A few number of countries have a good policy that recognizes and initiates the contribution of informal caregivers. However, such policy is not adopted in every corner of our planet and it needs further modification. This section of the study present policies implemented in different countries.

Many OECD countries have implemented a number of policies that directly or indirectly target to support informal caregiver. Yet, some informal caregivers still struggle to combine their caring role with work and often suffer from mental health problems, suggesting that policies to support informal caregivers could be improved. These countries differ in the extent to which they do so, and in the set of policy or measure targeted to informal caregivers, for example in terms of cash and in-kind services, as well as initiatives to reconcile work and care (e.g. flexible work arrangements) (OECD, 2011).

Informal caregivers need a lot of supports from the government and from the community. They need financial support in order to be able to provide appropriate care and to continue the caregiver role in the long term. A few models are in place worldwide such as the long-term care insurance in Japan. Some other countries like Germany provide caregiver benefits. In addition to caregiver benefits, disability benefits for the person with dementia and social pensions also have a part to play (WHO, 2016).

Most developed countries have a policy that state financial support for the informal caregivers. Financial support may include: caregivers allowance, cash-for-care allowances paid to the dependent older person, Pension benefits for caregivers and unemployment benefits for caregivers. The major reason to provide financial support to informal caregivers is just to give recognition, to reduce income loss and to maintain the wellbeing of the caregiver (through income support payments) (Anthierens et al, 2014).

Caregiver allowance is available only in Belgium and the Netherlands. The Mantelzorgpremie is available at the level of several Belgium local authorities (provinces and municipalities). Each local authority sets its own eligibility requirements and the amount attributed to the caregiver. In the Netherlands, the mantel zorgcompliment is organized at a national level and is paid directly by the Social Insurance Bank (SVB) (in

Dutch Social Verzekerings bank). In both countries, the amount granted was reduced in order to be able to pay the allowance to an increasing number of caregivers.

In Belgium, France and the Netherlands, informal caregivers may benefit from pension contributions if and only if the care provided is encompassed in a labor market program. The labor market program corresponds in Belgium to the access to a paid leave and in France and the Netherlands to establish a labor contract between the dependent older person and the caregiver. In the Netherlands, employers are not obliged to pay social contributions within the scope of a care contract. On the contrary, in Germany and in Luxembourg, pension contributions are primarily set up as a mechanism to compensate for periods of unpaid work during which the care provider makes limited or no pension contributions (Ibid).

In Germany, the long-term care funds pay pension contribution for caregivers aged 15 years or older, who work less than 30 hours per week, provide care in the long-run (for more than two months) and whenever the dependent individual is covered by a home care plan (once home care is stopped, contributions are no longer paid). If the caregiver is in paid employment for more than 30 hours per week, he/s may choose to pay the pension contribution corresponding to the hours of care. Caregivers not receiving a full pension (e.g. disability pension) can increase their pension via these benefits. The total pension contribution depends on the hours of care provided per week and on the dependency level of the care-receiver (Ibid).

According to a recent report, two-thirds of the OECD countries have implemented leave arrangements to care for a dependent or for chronically ill persons. The leave objective (e.g. caring for a person with a long-term illness or for a palliative patient) and the array of benefits (e.g. whether receiving an income replacement or social insurance coverage) vary considerably between countries.

Beyond the government support, there is also a non-government voluntary organization which provides a lot of support for the informal caregivers. The “Caring for caregivers” network in Ireland can be used as an example. The organization comprises 109 groups of informal caregivers and 160,000 informal caregivers across the country. The group offers supportive services to the caregivers including for instance: A network of “caregivers’

clinics" dedicated to the physical and mental health of informal caregivers. Qualified nurses offer information and advice free of charge, a "caregiving in the home" program, accredited by the Irish body for further education and training. It consists of a 13-week program, including modules in nutrition, exercise, medication management, prevention of elder abuse, etc. 3,400 informal caregivers have been accredited between 2009 and 2011 (Courtin, Jemiai, & Mossialos, 2014)

According to articles reviewed by Debora,2005 a limited number of developing countries have developed policies, services or benefits to support such care, while it is reported that long-term care needs are increasing in the developing world at a rate that far exceeds that experienced by industrialized countries.

2.1.6 Economic Valuation of Informal Care; Methods and Applications

Estimating the monetary values of non-market goods and services is important for making many decisions, not only those involving public expenditure but also the private one. Even if such valuations are not explicit, decisions may still involve the use of implicit values (Pearce et al, 2002).

Different researchers have been used a different method to estimate or to measure the value of informal care (informal care provision). This section presents an overview of the dominant measures that has been used to measure the cost or the value of informal care provision (valuation methods).

There are two dominant methods of valuing time spent on informal care: Revealed preference method and Stated preference method. Revealed preference method uses real life decision data to estimate the value of informal care. This means that preference of informal caregivers is deducted from informal caregivers' decision or from the decision in the market for close substitutes of informal care and this method uses the uncompensated or Marshallian demand theory. Revealed preference method can be calculated based on opportunity cost and proxy good or replacement cost. Stated preference method applies the compensated or Hicksian demand theory and this can use contingent valuation or conjoint analysis (Berg et al, 2004).

2.1.6.1 Reveled Preference Methods

Revealed preference method uses observational data from decisions taken by individuals regarding goods or services assumed equivalent to informal care. In general, revealed preference methods use real wages or income data to derive monetary values.

- **The Opportunity Cost Method**

Opportunity cost (the value of the resources' the next best alternative uses) valuation method is one of the most important and most common in the valuation of the forgone income or time. Most study which has been conducted on the valuation of the cost of informal care used the opportunity cost method. Often, the opportunity cost method values informal care according to the following equation:

$$\textit{The value of informal care (VIC)} = t_i w_i$$

where *t;* = time spent on informal care provision by the principal caregiver i, and *W;* = the net market wage rate of informal caregiver i. If the informal caregiver is unemployed some proxy for *w;* is used (Berg & ol, 2006).

The forgone benefits are approximated by an individual's market wage rate. Thus, the value of informal care equals the market wage rate (wage per hour) of the informal caregiver multiplied with the hours spent on informal care (Berg, et al 2004).

According to the literature reviewed by Bernard van den Berg, Werner B. F. Brouwer and Marc A. Koopmanschap,2004, the appropriate nominal wage rate for a caregiver of working age might be their former wage rate (Rahmatian, 2005). For those with no previous employment experience, the average or median wage of similar individuals employed in the labor market might be used; however, it is less straightforward for care time provided by those who have retired, older people or children and young people. Beyond the average or median wage of similar individuals employed in the labor market some other studies also use the minimum wage.

The advantage of the opportunity cost method compared to its close substitute, the proxy good (replacement cost) method, is that it is not necessary to distinguish between different informal care tasks provided, which makes it easier to use. Still, distinguishing between the different types of normal time use sacrificed is necessary. Despite the recommendations

to use the opportunity cost method to value informal care, the method has some important disadvantages. Using the opportunity cost method to value informal care instead of just to indicate informal caregiver's opportunity costs leads to different values of the same commodity informal care due to one's potential wages somewhere else in the economy (Ibid).

- **The Proxy Goods Method**

Proxy good valuation method is one of the revealed preference valuation methods that can be used to value or to estimate the price(cost) of a non-market commodity(service). Many researchers have been used this method to value the cost of informal caregiving (carers). Informal caregiving involves a lot of activities, such as assessing with personal hygiene, helping with medication and doctor visits, managing finance, acting as a patient advocate, and provide emotional support etc. In order to use the proxy good valuation method, we should know the exact allocation of time among each task of the caregivers and we should have a good proxy (market substitute) for each activity of the informal caregivers. The proxy good valuation method uses the following equation:

Value of informal care(VIC) = price of (quasi) market substitute

For informal care, the relevant market substitute depends on the specific caregiving activities undertaken: help feeding would require a health care assistant, for example, whereas help taking that related to medication may require a nurse. Since these 'formal care' substitutes are paid different wage rates, different activities are valued at different prices (Faria et al, 2012).

The main problem of proxy good valuation method is that it values informal care at the price of a market substitute, e.g. professional home care, thereby assuming that informal care and professional care are perfect substitutes. And it is difficult to have a proxy for each and every activates within the informal care provision episode.

2.1.6.2 Stated Preference Methods

Stated preference method basically involves asking people how much a non-market commodity is worth. This information is collected through questioners or opinion polls (surveys). This method obtains the individual's valuation of a particular service, either by directly asking individuals to state a money value through contingent valuation or by asking

individuals to make trade-offs between different characteristics of the service, using price or cost as one characteristic, in a conjoint analysis or discrete choice experiment (Ibid).

- ***The Contingent Valuation Method***

Contingent valuation method is a valuation based on a questionnaire that offers the respondents an opportunity to make an economic decision on a good (especially for non-market goods and services). That is, the valuation is contingent upon the simulated market presented to the respondents. The advantage of contingent valuation method is that it is able to obtain option price estimates in presence of uncertainty, to value goods not previously available, to estimate all existence class benefits, Relevant ordinary (or inverse demand) curve are estimable, Relevant Hicks compensated demand or inverse demand is directly estimable (Rahmatian, 2005).

Contingent valuation method includes the following five steps or stages:

- ✓ Setting up the hypothetical market
- ✓ Obtaining bids
- ✓ Estimating mean willingness to pay (WTP) and or mean willingness to accept (WTA)
- ✓ Estimating bid curves
- ✓ And then Aggregating the data

Based on the above five steps, if we want to measure the monetary value of informal caregiver's time. We should apply contingent valuation method to value informal care by assessing an informal caregiver's willingness to accept (WTA) to provide an additional hour of informal care (Berg et al, 2005).

Despite the significant application of contingent valuation technique to measure the values of non-market goods, the method has been scrutinized and found to suffer from a large number of limitations. The following are the major limitations of this method;

- ➢ The value elicited in CV surveys are not based on real resource decisions (they are hypothetical)
- ➢ There is ambiguity on the people valuation and what people are valuing
- ➢ Problem of embedding

In addition, contingent valuation method requires survey-based data collection and this is followed by problems with protest responses. Such measure appears sensitive to framing

and is not incentive compatible. Moreover, peoples are not calibrated to value non-market goods (Pearce D. , 2002).

- ***The Conjoint Measurement Method***

Conjoint valuation method is one of the main components of stated preference valuation method and it has been used by both the academicians and professional researchers for more than 30 years. Mostly Conjoint analysis is used in consumer products, durable goods, pharmaceutical, transportation, and service industries. But also, it is useful in health economic. The conjoint analysis assesses the evaluations individuals place on the different features of a given product. These evaluations are analyzed to yield estimates of product preferences that equate to choose (market) share estimates (www.Qualtrics.com).

Most research which has been done by using the conjoint valuation methods of informal caregiving used Caregivers' willingness to accept or the extra compensation required by the informal caregivers to provide one additional hour of informal care.

The central problem in assessing the validity of WTP/WTA values obtained from any stated preference study (contingent and conjoint valuation method) is the absence of a definitive yardstick against which to compare those measures. This is not a generic problem of all cross-sectional or survey research. However, it is generally a problem for non-market goods since, with very few exceptions, actual values are unobservable (Pearce et al, 2002). Generally, both contingent and conjoint valuation methods are based on what the respondent says and mostly people say or speak about their intention than what actually happened or what they accept at the minimum requirement (in short, the problem of the difference between real and hypothetical behavior). In addition, such valuation methods are complex and time-consuming.

2.1.6.3 Other Valuation Methods of Informal Care

- ***The well-being valuation method***

The well-being valuation method is a very simple instrument that allows the study to capture all the relevant costs and benefits related to a health problem to the extent that they affect an individual's utility. In addition, and since individuals are only asked about their own situation, such a method does not suffer from biases due to strategic behavior

(hypothetical behavior) and the response rate is larger than when hypothetical questions are used (Carbonell, 2017).

The well-being valuation method can be shortly described as follows.

- ✓ First, we estimate the effect of providing informal care and of income on individual's subjective well-being.
- ✓ Then, we estimate the necessary income (compensating variation) to maintain the same level of informal caregiver's well-being after providing an additional hour of informal care.

The amount of money that can be used to maintain the well-being of informal caregivers can be taken as the monetary value of informal care. The well-being valuation method is thus based on the economic standard practice of valuing non-market commodities with shadow prices, which, in the present context, are described as the change in well-being followed by a change in the provision of the commodity informal care (Berg and Carbonell, 2007).

In short, the well-being valuation method estimates the extra compensation necessary to maintain the same level of wellbeing after providing an additional hour of informal care and we can use the value of the estimated extra compensation as the value(cost) of informal caregiving. Formally we can put by using the following equation;

$$\frac{\partial \mathrm{y}}{\partial \mathrm{c}} = \frac{\partial \mathrm{w} / \partial \mathrm{c}}{\partial \mathrm{w} / \partial \mathrm{y}}$$

Where; **y** is income of the informal caregiver, **c** for caregiving hours and **w** stands for wellbeing (constant wellbeing).

There are also another valuation mechanisms (technics) like an objective burden, subjective burden and health-related quality of life.

- ***Objective burden***

Objective burden valuation method is used to measure the cost of non-market goods (in our case the cost of informal caregiving) by relating to the physical circumstances that affect the life of the caregiver, for example having to leave their work, not being able to socialize and having to transform their physical living space.

The burden of informal caregiver can be described as the perceived impact of caregiving on the caregiver's physical, psychological, social and financial status. Studies show that, overall, caregivers report to experience a high burden, with even higher scores in caregivers taking care of persons with dementia.

- ***Subjective burden***

According to the literature reviewed by (IMTA, 2011) Subjective burden can be expressed as the impact of caregiving as perceived by informal caregivers. It is thus concerned with the caregiver's experience with their caregiving activities, which is not necessarily related strongly to their objective burden.

Subjective burden method of valuation is frequently used to measure the cost of non-market good and services (measured in informal care studies) because this method provides important information about how informal caregivers are coping with their caregiving situation. The subjective burden may also be useful in clinical settings and research on respite care for informal caregivers. "*An important note here is that subjective burden is not an economic evaluation method".*

- ***Health Related Quality of Life***

The quality of life can be defined as an individual's perception of their position in life in the context of their cultural (value systems by which they live) and in relation to their goals, expectations, standards and concerns. It also refers to a person's subjective well-being and life satisfaction which includes mental and physical health, material well-being, interpersonal relationships within and outside the family, work and other activities in the community, personal development, and fulfillment of active recreation. The impact of caregiving on the caregiver's quality of life can be influenced by the demographic attributes of the caregiver. Factors such as age, gender and caregiver's relationship with stroke survivor have been identified by some studies as predictors of quality of life among stroke caregivers (Onabajo et al, 2012).

In order to measure the burden of informal caregivers, we should focus only on the influence of providing informal care or the influence of an intervention related to the informal caregiver's quality of life. This can be assessed by relating health to informal care, measuring changes in health in the context of an intervention, or comparing quality of life

of caregivers to the quality of life of the population at large or to the non-caregivers (Berg et al, 2004).

According to the study conducted on the quality of life of Nigerian informal caregivers of community dell dwelling stroke survivors, mean scores on all quality of life domains were above average with the physical domain recording the lowest scores. Caregivers' factors of age, educational background and employment, and duration post stroke onset were significantly associated with domains of quality of life (Onabajo et al, 2012).

2.1.7 Informal Care in the case of Ethiopia

It is difficult to find a good literature which can show the extent and future of informal care provision in Africa. But there are some studies which has been conducted on the extent and future of the problems. Among the researchers which have bend done on this issue, most of them focused on the gender and burden of female caregivers.

To the best of my knowledge, there is no research about informal caregivers in Ethiopia. However, there are a large number of peoples who provide informal care. In addition, both our cultural and religious structure support such kinds of activities.

Traditional values in Ethiopia include informal care provision for elderly, disables, chronically ill persons by their younger family members. This is a common cultural tradition in much of Africa and the Middle East countries. We Ethiopia's have a huge respect for elders & we regard them as valuable members of society and mostly younger family member provides informal care for them. We have also a good culture of assisting those who need informal care because of different reasons.

Generally, informal caregiving embedded as a strong cultural norm throughout Ethiopian family life and the responsibility of providing care for those in need of assistance lay in the hands of the families and the community.

2.1.8 Positive Impacts of Informal Care

Informal caregiving is not an easy task and it is with a high level of burden. On the other hand, the marginal benefit among other things contain friendship, companionship, pleasure and the informal caregiver's perception of the utility of the care recipient from being informally cared for.

According to studies reviewed by Goodhead & McDonald (2007), the quality of the former relationship had a strong impact on how caregivers positively consider the caregiving role. Patterson's study found positive impacts for most of the women who were caregivers of elderly recipients. Generally, daughters had an improved relationship with parents, and at least one wife felt increased closeness with her husband because she felt needed. Other reported positives included: keeping the person out of residential care, being satisfied at doing a good job, undertaking caregiving as an act of love, and for some, the opportunity to move out of the labor force (paid workforce).

A Canadian study of 12 households with a total of 38 family members focused on parental caregivers of children with high and complex needs of informal care, especially who require ventilator assistance to breathe. The study found parental caregivers experienced caregiving as deeply enriching and rewarding, despite the daily stress (Carnevale et al, 2006).

Research on 34 UK elderly caregivers conducted a follow-up interview after the death of informal care recipient. Out of the total respondents, many of them registered a significant decline in the quality of their lives since their caregiving role had ended due to further reduced incomes, boredom, isolation and a sense of loss of both the person and the caregiving role (Argyle, 2001).

As it is already mentioned in the above paragraph, informal caregiving has its own positive impacts (especially psychological) but most researchers focus on the cost and burden of informal care. As a result, it is difficult to say a lot on this issue.

2.2 Empirical Review Literature

Many researchers contribute to the existed stock of knowledge by conducting different kinds of study in different parts of the world through different valuation methods. This parts of the study present some empirical facts about the cost, burden and the gender issues of informal caregiving(caregivers).

In 2002 Canadian study indicate that 70% of family caregivers acknowledge that providing care to a loved one is stressful, and 70% of family caregivers indicate that they require time

away from the responsibility of caring for a loved one. A similar study in 2007, 23% of Canadians provide informal care for a family member or close friend with a serious health problem. The impact being informal caregivers in this group of people included: out of pocket expense (using personal savings to survive) 41% and 22% of the total caregivers miss one or more month of work. In 2006, of the 26% of Canadians who said that they had cared for a family member or close friend with a serious health problem in the previous 12 months, other adverse effects reported were also: negative effect on mental health of the informal caregivers (41%) and negative effect on physical health of informal care providers (38%) (CHPCA , 2016).

The estimated cost of informal caregiving for United States of America is $ 375 billion per year, and it is more than all federal and state Medicaid expenditure in 2007 and approximately 2.7% of the US total GDP for that year. This does not include $17.1 billion annual cost of informal caregiving in terms of lost productivity to the US business due to workplace disruptions, scheduled and unscheduled absences, leave of absences, reduction from full time to part time work, opting for early retirement, and leaving work relay to be a caregiver (LA Health , 2010) .Similarly, a study by the American Association of Retired Persons Public Policy Institute estimated the total value of informal caregiving in the United States (U.S.) to be $450 billion in 2009 or approximately 3.2% of GDP (Feinberg et al, 2011).

In 2012, there were about 2.7 million caregivers in Australia who provides informal care to people require assistance with age or disability, which is equivalent to 11.9% of all Australians at that time (Access Economics, 2012).

For all caregivers in Germany, the GSOEP model without interaction term reveals a shadow price of 9.42 Euros/h at an average of eight hours provided per week (median). Due to partly exceptionally high intensity reported (15.65 hours) the mean of care, hours reaches a value of 4.92 Euros/h for an additional hour of care. When differentiating, a

shadow price between 2.75 Euros/h (mean, 28.6 hours) and 3.73 Euros/h (median, 21 hours) arises for care within the caregivers' households, whereas care for a non-household member accounts for between -0.26 Euros/h (mean, 10.66 hours) and -0.38 Euros/h (median, 7 hours) respectively (Kehl & Stahlschmidt, 2013).

Bernard Van den Ber and Ada Ferrer-I-Carbonell (2007) estimated the monetary value of providing informal care by means of a well-being valuation method. They used the compensating variation necessary to maintain the same level of well-being after an informal caregiver provides an extra hour of informal care. They collect a data from 865 Dutch informal caregivers between the end of 2001 and the beginning of 2002. In the econometric analysis, a distinction is made between the care recipients who are and the ones who are not a family member of the informal caregiver. The finding of the study indicates that an extra hour of informal care is worth about 9 or 10 Euros. This equals 8 or 9 Euros if the care recipient is a family member and about 7 or 9 Euros if not. However, when they employed contingent valuation method to the same sample an extra hour of informal care worth about 10.52 Euros per hour.

Informal care provision has its own impact on the workforce productivity. Many studies clearly show the impact of informal care provision on productivity, Studies in USA suggest that the cost of informal caregiving in terms of lost productivity to the businesses is $17.1 to $33 billion annually. Costs reflect absenteeism ($5.1 billion), shifts from full-time to part-time work ($4.8 billion), replacing employees ($6.6 billion), and workday adjustments ($6.3 billion) (Rowe, 2012).

The data provided by Voz de Mujer Survey for 2009 indicate that 16% of women provide informal care for the care of the, chronically ill, or disabled living at home, elderly. From the total number of women who do not provide such care, 64% are employed, 5% are unemployed, and 31% are inactive. Comparatively, women who are these types of caregivers, only 28% are employed and 9% are actively searching for work, while the remaining 63% are inactive (neither employed nor looking for a job). Moreover, more than 50% of the women who provide informal care spend more than 20 hours a week by providing informal care.

A study that has been conducted in the USA indicate that Personal caregivers contribute much more of their time than household helpers. Men average 481 hours and women average 622 hours of personal care. In contrast, men average only 169 hours and women average only 213 hours of household help. Among personal caregivers, 15.6 percent of men and 24.3 percent of women provide intensive care (at least 1,000 hours). Among household helpers, only 1.3 percent of men and 2.3 percent of women provide intensive care. Instead, 79.5 percent of men and 71.8 percent of women provide between 50 and 249 hours of household help (Butrica & Karamcheva, 2014).

Informal caregivers require an increase of 81% in their hourly compensation for providing 21 instead of 7 hours' informal care per week. This implies a compensation of €12.36 per hour at a mean hypothetical compensation in the presented scenarios. The researchers also found that an informal caregiver's current caregiving situation and other background characteristics were associated with the scenario Ratings (Berg et al, 2008).

Research conducted by Mohamedy et al (2010) on the determinants of disable elderly caregivers burden Ismailia, Egypt indicates that the prevalence of burden among caregivers was 37% with mean burden score was 22. The study showed a positive correlation between burden score and age of the elderly, a number of chronic diseases, and caregiver age, and a negative correlation between burden score and ADL score, MMSE score, but no statistically significance between burden score caregiving hours/d, and income.

Study on the impact of informal parental care on the labor force participation (employment status) of caregivers in Norway, Sweden and Denmark is analyzed, by using data from a longitudinal internet-based survey conducted in 2010. The output of this study indicates that informal parental care is generally unrelated to employment. However, intensive informal parental caregivers, meaning caregivers providing at least 30 hours of care per month, have a significantly lower probability of being employed. There are no gender or country differences in this effect. Further, heterogeneity cannot be rejected in the relationship between parental care and employment (Unger, 2013).

A study by Young Kyung Do (2008) in South Korea address various methodological issues by employing different functional forms of care intensity, and by accounting for the potential endogeneity of informal care as well as intergenerational co-residence. Robust

findings suggest negative effects of informal caregiving on labor market outcomes among women, but not among men. Compared with otherwise similar non-caregivers, female intensive caregivers who provide at least more than 10 hours of care per week are at an increased risk of being out of the labor force by 15.2 percentage points. Among employed women, more intensive caregivers receive lower hourly wages by 1.65K Korean Won than otherwise similar non-caregivers.

CHAPTER THREE

RESEARCH METHODOLOGY

A cross-sectional study design is employed in order to measure the cost of informal caregiving or to know the value of informal care provision, to measure the impact of socioeconomic status on the value of informal caregiving and to analyze to what extent women who provide informal care today incur labor opportunity costs compared to male principal informal caregivers. The collected data were analyzed by using both the qualitative and quantitative(econometrics) methods with the help of analysis software (STATA 13). Description of the study area (the hospital), data source and data collection method, sample size determination and sampling technique, ethical consideration & data quality control and model specification are presented in this chapter.

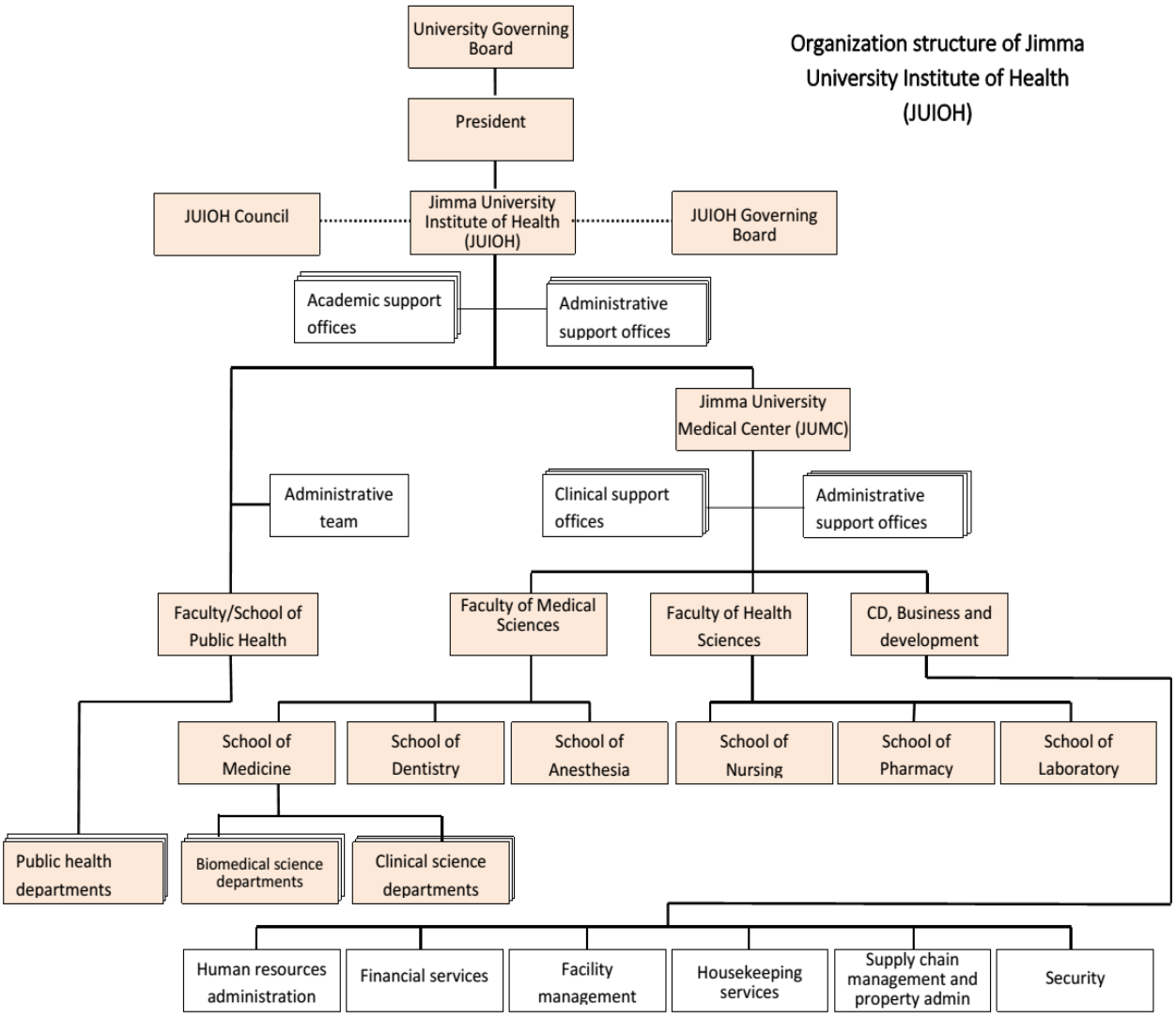
3.1 Description of Jimma University Specialized Hospital

Jimma University specialized hospital is one of the oldest public hospitals in Ethiopia. JUSH is located in Oromia region, Jimma zone, Jimma town, 352 kilometers to the southwest of the capital of Ethiopia (Addis Ababa). The hospital was established in 1930 E.C by Italian invaders for the service of their soldiers. After the withdrawal of the colonial occupants, it has been governed under the Ethiopian government by the name of "Ras Desta Damtew Hospital" and during the Dergue regime the former name was changed to "Jimma Hospital " and currently it is known by the name of Jimma University Specialized Hospital or Jimma University Teaching Hospital (Jimma University , 2016).

Jimma University specialized hospital is the only teaching and referral hospital with a bed capacity of around 590 in the southwestern part of Ethiopia and the hospital is providing services for approximately 15,000 inpatients, 160,000 outpatient attendants, 11,000 emergency cases and 4500 deliveries in a year coming to the hospital from the catchment population of about 15 million people. The customers of the hospital are from southwestern parts of Oromia, part of SNNP and from the Gambella region including the community of South Sudan refugee.

According to most publications of the university "even if JUSH is one of the oldest hospitals in the country, it had not made remarkable physical facility improvement for years. However, in the later times, it became evident that some side-wing buildings were constructed by different stakeholders at different times to respond to the ever-growing pressure of service demand and clinical teaching need derived from the public and Jimma University respectively. Especially, after transfer of its ownership to Jimma University, the University has made relentless efforts in extensive renovation and expansion work to make the hospital conducive for service, teaching, and research."

Figure 1: Organizational Structure of Jimma University Institute of Health(JUIOH)



Source; Plane office of Jimma University Specialized Hospital, 2017

3.2. Data Source and Data Collection Methods

The type of data which is employed in this research is cross-sectional data and it is collected through questionnaire from randomly selected informal caregiver for the inpatient in Jimma University specialized hospital and the secondary data were collected from Jimma University specialized hospital statstics office and from other health related organization.

3.3 Sample Size Determination and Sampling Technique

3.3.1 Sample Size Determination

The sample size of the respondent is estimated based on Yamane's formula (Yamane, 1967). All the respondents are principal informal caregivers and they are likely to provide most hours of informal care and to coordinate the care provided by other informal caregivers (Berg et al, 2004).

$$n = \frac{N}{1+Ne^2}$$

Where; **n** = sample size

N = number of total population

e = level of precision, sampling error (The 'degree of precision' is the margin of permissible error between the estimated value and the population value).

Currently, Jimma University specialized hospital has 590 beds and most of the times all of the beds occupied by inpatients. As a result, this research considers the number of principal informal caregivers to be 590. So, based on the Yamane's formula with a normal distribution, approximately 95% of the sample values are within two standard deviations of the true population value (5% of precision), the sample size becomes;

$$n = \frac{590}{1 + 590(0.05^2)}$$

$$n = 238$$

Therefore, in this study 238 respondents are used as the sample of the total population (principal informal caregiver).

3.3.2 Sampling Technique

Since the hospital has its own medical departments(wards) with respective bed numbers, a stratified random sampling technique is employed as a sampling technique. Stratified random sampling provides better results than the random sampling when the strata are more different among them and more homogeneous internally (Lagares & Puerto, 2001). In our case, there are a same type of inpatients within each ward and differs among different wards, for example, the inpatients within psychiatry ward are psychological patients whereas the inpatient within maternity is mothers with the case of pre-pregnancy, pregnancy, and birth-giving. So, they are more different among wards and more homogeneous internally or within the ward.

As result, this research take random sample proportionally to the size of each stratus (wards), i.e., if we take the **j-th** stratus with size **Nj**, and then a sample of this stratus will have size $\left(\frac{NJ}{N}\right)\boldsymbol{n}$; being **N** the size of the population and **n** the size of the sample.

In our case, **N** is 590 and n is 238, therefore, the formula will become

$$\mathbf{238}\left(\frac{\boldsymbol{Nj}}{\mathbf{590}}\right)$$

There are twelve wards(departments) at Jimma University specialized hospital and the study considers the numbers of departments(wards) as the number of strata. By using stratified random sampling the study select sample respondents from each stratum (wards).

Table 1: number of sample from each ward

no	Wards(strata)	Total Number of bed in the ward	Number of samples
1	Surgical	136	55
2	Medical	80	32
3	Neonate	39	16
4	Ophthalmology	38	15
5	Maternity	81	33
6	Gynecology and Obstetrics	26	10
7	Psychiatry	32	13
8	Pediatric	131	53
9	intensive care unit (ICU)	5	2
10	S.ped	12	5
11	Stroke	8	3
12	Recovery	2	1

3.3 Ethical Consideration and Data Quality Control

A formal letter was written by Jimma University, College of Business and Economics to Jimma University specialized hospital in order to get permission to conduct the study at the hospital and to get secondary data from the hospital statistics office. The hospital also accepts the request of the college of business and economics and the researcher. The hospital also provides all the necessary data which was demanded by this research.

As it is already discussed on the data collection parts of this research, the type of data which was employed in this research is cross-sectional data and it is collected through questionnaire from sample respondents. A questionnaire is a way of collecting information by engaging in a special kind of conversation (Olsen & George, 2004)**.** This special type of conversation requires a trained or experienced person as a result, before the task of data collection, a half day orientation was given for six data collectors and the orientation was on the purpose of the study and the ways of data collection (how to fill the questioner or the formulated data collection format?). The data collection process was also closely supervised and for some field problems correction measure has been taken by the researcher. The information which was obtained throughout the research episode has been used only for the study purpose.

3.4 The Rationales to Use the Opportunity Cost Valuation Method

Among the valuation method listed in the review literature parts, this study employed the opportunity cost valuation method. The rational to use this method is that; the opportunity cost valuation method is one of the revealed preference valuation methods and it is not necessary to distinguish between different informal care tasks provided unlike that of the proxy good valuation method.

The alternative stated preference valuation methods face a lot of limitations like; ambiguity on the people valuation and what people are valuing, they are hypothetical, peoples are not calibrated to value non-market goods, the absence of a definitive yardstick against which to compare those measures. Most of the time stated preference valuation method are based on the concept of willingness to pay (WTP) & willingness to accept (WTA) and it is difficult to conduct such kinds of study in Ethiopia because our religions and cultures does not allow us to consider our assistance or helps for inpatient, disables, elders and for the others in need informal care in monetary value. I think every research should respect the culture and religion of the people under study.

In addition, as it is already discussed on the sampling technique parts, this study employed stratified random sampling by considering each ward as strata. Currently, the hospital has twelve wards including psychiatry and neonate wards whereas stated preference valuation methods are based on the question of willingness to pay and willingness to accept and it is difficult to ask such question and to gate the appropriate answer from inpatients at psychiatry and neonate wards.

3.5 Description of the Variables and Specification of the Model

3.5.1 Description of the Variables

A. Dependent Variable

The Opportunity cost valuation method measure the value of informal care (informal care provided by the principal caregiver) by using the following formula;

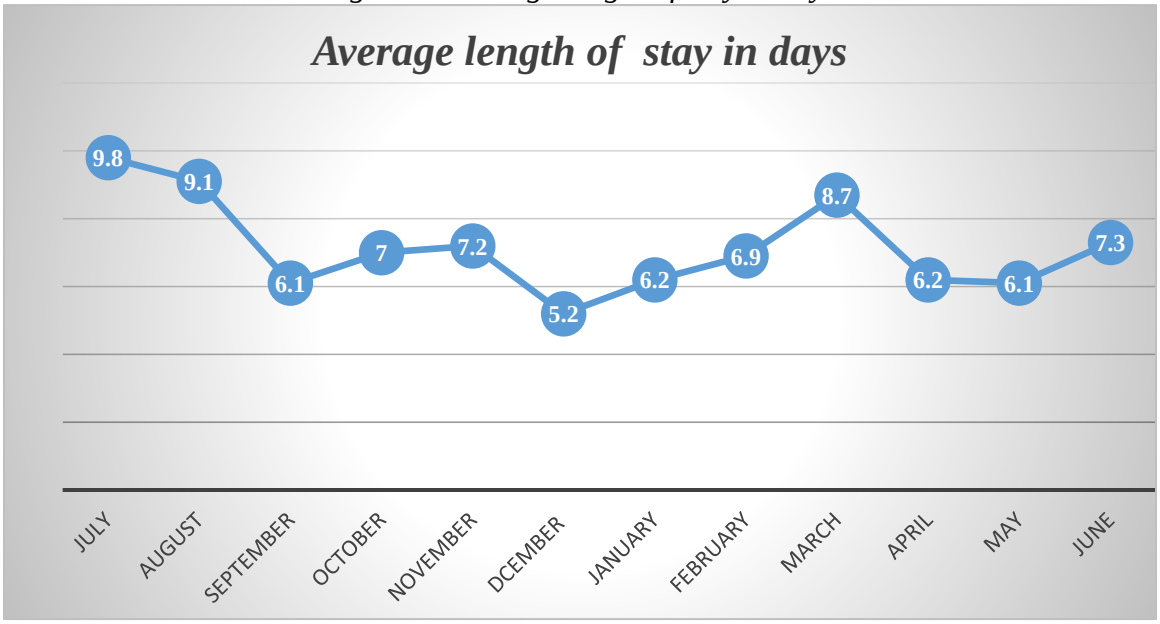
$$\textit{Value of Informal Care (VIC)} = \beta_i W_i$$

Where; $\boldsymbol{\beta_i}$ is the number of hours spent on informal caregiving task by the principal caregivers i (principal or primary caregiver is the person who provides the majority of informal care

service for the informal care recipient) and W_i is wage per hour of the given person. If the principal caregiver is unemployed, a proxy for W_i has been used. For example, for an informal caregiver who has been in the formal job or has been an employee this study used the informal caregiver's former wage rate. The appropriate nominal wage rate for a caregiver of working age might be his/her previous wage rate (Francis et al, 2009). But for the informal caregiver with zero paid job experience, the study used the minimum government employee wage per hour (4.04 birr per hour) as a proxy.

According to the report from the statistics office of Jimma University specialized hospital, the 2016/2017 GC or 2008 EC average length of stay of the inpatient within the hospital was 7.1 days. Based on the data from the statistics office of the hospital, this research also calculates the value of informal care per week.

Figure 2: Average length of stay in days



B. Independent Variables

Different factors can affect the value of informal care provided by the principal caregivers like; educational levels of the informal caregiver, number of external caregivers, age of informal caregiver and care receiver, gender, area of principal caregiver(rural/urban), paid job experience of principal caregiver, health status of the informal care recipient, employment status and marital status of the informal caregiver etc.

I. Educational Level or Educational Qualification

Education directly affect the wage of principal caregivers and since the value of informal care is determined by the wage and hours of informal care, then the educational level will affect the value of informal care provision via wage rate. According to research conducted in Ethiopia, on average those with higher education earn 93% more than those with secondary education; those with secondary education earn 47% more than those with only primary education (Grade 5-8); those with primary education; intern, earn about 76% more than those with only a grade 1-4 education; and the latter earn about 72 percent more than workers who are illiterate. As a result, this study expects a positive relation between the education level of principal informal caregivers and the value of informal care. This research categorizes educational level as illiterate (with zero educational backgrounds), primary school level (grade 1 – 8), secondary school level (grade 9 – 12), certificate/ diploma level and lastly principal caregivers with a degree and above degree educational level.

II. *Household Size and Number of External Caregivers*

Mostly informal care for the inpatients or for other in need of assistance is provided by parents and adult children. If the inpatient is from large size household, then the hours spent by the principal informal caregivers will be lower than from principal informal caregivers who provide informal care for the inpatient from small household size because the informal care provision task will be shared by the family members. But most of the time informal caregiving tasks are not solely performed by the family members there are also another non-family member informal caregivers. As a result, this research prefers to include "number of external caregivers" as one of the main variables in the model. In short, the number of extra caregivers is the number of informal caregivers for the given inpatient excluding the principal caregiver. This study expects a negative relationship between the number of external caregivers and the value of informal care provision.

III. Age of Informal Care Receiver

This is the age of informal care receiver; mostly informal care is provided to elders and they are unable to do most daily activities by them self. As a result, the principal informal caregiver for the elder inpatient will spend large hours on informal care tasks and this affects the value of informal care. This study expects a positive relationship between age

of informal care receiver and the value of informal care via the hours spent on informal caregiving tasks.

IV. Age of Informal Caregiver

This is just the age of principal caregiver and it is difficult to predict the sign of its effect on the value of informal care provision but after this study, we will be able to know the sign and size of the relationship between the value of informal care provision and the age of principal caregiver.

V. Gender (Sex) of Informal Care Recipient and Informal Caregivers

As its already discussed in the literature review parts of the study, the number of hours spent on informal care provision differs among men and women's. According to different studies conducted in different parts of the world the hours spent on informal care provision by women's is higher than with that of the hours spent on the same task by males. This study expects that if the principal caregiver is a woman it will have a positive and higher relationship with the value of informal care. In addition, the gender of informal care recipient may have its own impact on the value of informal caregiving for the inpatient.

VI. Area of Principal Caregiver (Rural/Urban)

The area of principal caregiver will have an impact on the value of informal caregiving via both the wage rate and the hours spent on informal care provision. For example, if the principal caregiver is from rural parts then his wage or salary will be lower than with that of informal caregivers from the urban area, on the other hand, he will spend a longer hour on informal care provision because most probably he will be the only informal caregiver for the inpatient. Informal caregivers at Jimma university referral hospital comes from both rural and urban parts of southwestern Ethiopia. As a result, it is difficult to predict the direction effect of area on the value of informal care provision.

VII. Experience of Principal Caregiver (Paid Job Experience)

Many studies which have been conducted in different parts of the world indicate the positive relationship between experience and wage rate. The reason is that as the employee is well experienced his productivity will increase so that the employers will pay him more than the fresh employees (this is related to the theory of marginal productivity and wage

rate). This is true especially in the countries where the formal employment opportunity is very low. As a result, this study will use the exact years of experience and the study expects a positive relationship between the paid job experience of principal caregivers and the value of informal care.

VIII. Employment Status(Occupation) of Principal Caregivers

This research includes employment status (occupation) as a categorical variable by categorizing the employment status of principal informal caregivers as unemployed, permanently employed, self-employed and temporarily employed. Researchers show the two-way relationship between informal care provision and employment status. In one hand the task of informal care provision terminate employment status of informal caregivers who belongs to the labor force, on the other hand, unemployed informal caregivers spent more hours on informal caregiving task than full time or part time employed principal caregivers. Research conducted by Round, Jones and Morris by using the 18 waves (1991-2009) of the British Household Panel Survey (BHPS) suggest that individuals must tradeoff between employment and income opportunities and caring. Increases in informal labor are likely to come at the expensive of paid labor for the informal care provider (Round et al, 2016). As a result, this study expects positive and relatively higher relationship between unemployed principal caregivers and the value of informal care provided by unemployed principal caregivers compared to the permanently, self and temporarily employed principal informal caregivers.

IX. Health Status of Informal Care Recipients

The health status of the inpatient can be measured by using a universally accepted mechanism called EQ-5D-5L questioner. The EQ-5D-5L is developed by the EuroQol group with a member from Europe, North America, Asia, Africa, Australia, and New Zealand. EQ-5D-5L provides a simple descriptive profile and a single index value for health status that can be used in the clinical and economic evaluation of health care as well as in population health surveys (Reenen & Janssen, 2015). The EQ-5D-5L will allow us to categorize the health status of the inpatient as no problem, slight problem, moderate problem, severe problem and extreme problem. This research includes the health status

variable to measure the impact of the health status of the inpatient on the value of informal care.

X. Marital Status of the Principal Caregivers

This variable indicates the marital status of the informal caregivers and most of the time it is highly correlated with the hours spent on informal caregiving tasks. This study includes marital status as an independent variable to measure the sign and size of relationship between the value of informal care and the marital status of the principal caregivers.

3.5.2 Specification of the Model

$LnVIC_i = \beta_0 + \beta_{1i}HHS + \beta_{2i}EXP + \beta_{3i}AGEP + \beta_{4i}AGER + \beta_{5i}NEC + \beta_{6i}DPE + \beta_{7i}DSE + \beta_{8i}DTE + \beta_{9i}DF + \beta_{10i}SEXCRM + \beta_{11i}DI + \beta_{12i}DP + \beta_{13i}DS + \beta_{14i}DC + \beta_{15i}DMM + \beta_{16i}DHSS + \beta_{17i}DHSM + \beta_{18i}DHSSV + \beta_{19i}DUR + \beta_{20i}FFU + U_i$

Where;

- **LnVIC**$_i$ is the log of value of informal care of the principal informal caregiver **i** per week
- **HHS** stands for the household size of the inpatient
- **EXP** is for the Job experience of principal caregiver
- **AGEP is** for the age of the principal caregiver
- **AGER** stands for the age of informal care recipient (age of the inpatient)
- **NEC** is number of external caregivers
- **DF** is dummy variable which stands for female principal caregivers

  DF =1 if the principal caregiver is female

  DF=0 otherwise (for male principal caregivers)
- **SEXCRM** is dummy variable which stands for male informal care recipient

  SEXCRM =1 if the informal care recipient is male

  SEXCRM=0 otherwise (for female informal care recipient)
- **DMM** is dummy variable which stands for married principal informal caregivers

  DMM =1 if the principal informal caregiver is married

  DMM=0 otherwise (if the principal informal caregiver is single)
- ***DUR** is dummy variable which stands for principal caregivers from urban area*

  DUR =1 if the principal informal caregiver is from urban area

DUR =0 otherwise (if the principal informal caregiver is from rural area)

- **FFU** *is an interaction term for female principal informal caregivers from urban area)*

$$FFU = DF*DUR$$

Employment status (occupation) is considered as categorical variable

- ***DPE*** is dummy variable which stands for permanently employed principal caregivers
- **DSE** is dummy variable which stands for self-employed principal caregivers
- ***DTE*** *is dummy variable which stands for temporarily employed principal caregivers*
- **DU** is base group which stands for unemployed principal caregivers

Educational level of principal caregivers (categorical variable)

- ***DI*** *is* dummy variable and it stands for illiterate principal informal caregivers
- ***DP*** is dummy variable for principal informal caregivers with primary education level
- ***DS*** is dummy variable for principal informal caregivers with secondary education level
- ***DC*** dummy variable for certificate/diploma holder principal informal caregivers
- ***DD*** is base group and it stands for Degree and above Degree holder principal informal caregivers

Health status of informal care recipient (categorical variable)

- ***DHSS*** is dummy variable and it stands for informal care recipient with slight health problem
- ***DHSM*** is dummy variable and it stands for informal care recipient with moderate health problem
- ***DHSSV*** is dummy variable and it stands for informal care recipient with severe health problem
- ***DHSE*** is base group and it stands for informal care recipient with extreme health problem
- $\mathbf{U_i}$ is the error term

Table 2: The Expected Sign of the Coefficient of the Independent Variables

Variable	**Expected Sign**
Education (categorical variable)	+(positive)
Number of external caregivers (NEC)	-(negative)
Age of care recipient(AGER)	+(positive)
Sex(Df)	+(positive)
Paid job experience(EXP)	+(positive)
Employment status	+(positive)

CHAPTER FOUR

DISCUSSION AND RESULT

4.1 Descriptive Statistics

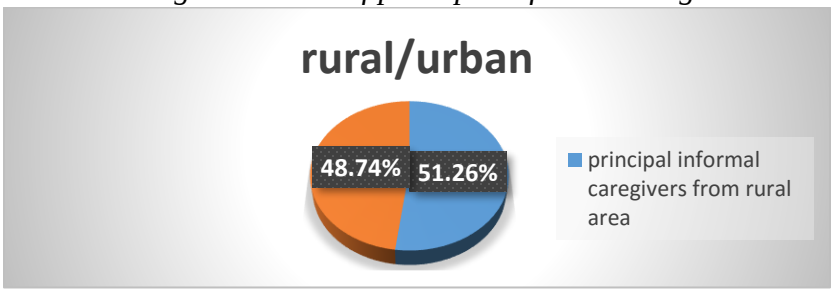
Like most of the Ethiopian referral hospitals Jimma university referral hospital is also providing a lot of health and health related services for the catchment population of about 15 million people. As its already discussed in chapter three the university hospital is providing health services for approximately 15,000 inpatients, 160,000 outpatient attendants, 11,000 emergency cases and 4500 deliveries per year with its bed capacity of 590. Based on the focus of the study a sample of 238 informal caregivers was selected randomly out of the total informal caregivers at the referral hospital and the survey was conducted within the time interval of more than two weeks from March 6 – 22/3/2017. Out of the total respondents, 146(61.34%) are male principal informal caregivers whereas the remaining 92(38.66%) are female principal informal caregivers with different socioeconomic characteristics.

4.1.1 Characteristics of the Respondents

I. Area of Principal Informal Caregivers (Urban /Rural & Jimma/Out of Jimma)

From the total number of observation 122(51.26%) are from the rural area whereas 116(48.74%) are from the urban area of southwestern Ethiopia. Of the total respondents, only 58(24.37%) of them are from Jimma town and the remaining 180(75.63%) of the respondents are from other parts of southwestern Ethiopia. Again, out of the respondents who are from outside of Jimma 122(67.7%) are from the rural area while the rest 58(32.3%) are from the urban area. In other word, out of the total respondents who are from urban area 58 (50%) of them are from Jimma town.

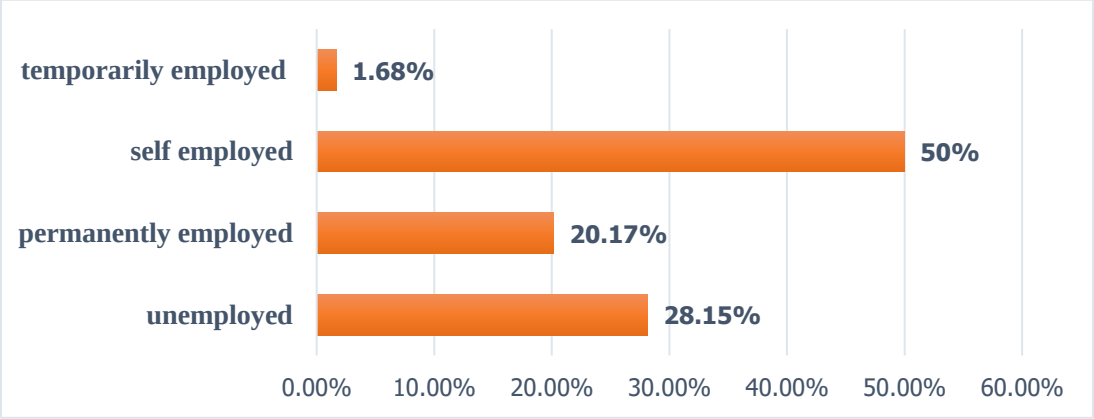
Figure 3: Area of principal informal caregivers



II. Occupation (Employment Status) of the Principal Informal Caregivers

The occupation (employment status) of the respondent can be categorized into four groups which are unemployed, permanently employed, self-employed (mostly farmers) and temporarily employed. Out of the total respondents 67(28.15%) are unemployed and out of the total unemployed informal caregivers 50(74.6%) are female and the rest 17(25.4%) are unemployed males. The fact that a high number of female unemployed principal informal caregivers shows that very little is done in terms of women employment. Permanently employed respondents are 48 (20.17%) of the total respondents and out of permanently employed respondents, 20(41.7%) of them are female. When we see the share of respondents who engaged in self-employment it covers half of the total respondents 119(50%), out of the self-employed respondents 79(66.4%) of them are from rural area and the remaining 40(33.6%) are from urban area but out of the total rural respondents only 4 of them have permanently employed. There are also four temporarily employed respondents.

Figure 4: Employment status of principal informal caregivers



Out of the total unemployed respondents, 27(40.30%) are illiterate, 28(41.80) % are with primary educational level, 10(14.92%) are with secondary educational level, 2(2.98%) are certificate/diploma holder respondents but there is no unemployed degree and above degree holder respondent. From these simple statistics, we can understand that as the educational level of the principal caregivers increases the unemployment rate of principal informal caregivers decreases.

III. Number of External Caregivers and Household Size

The number of external caregivers per one inpatient varies from zero to seven persons with a mean of 0.954 (we can consider it as one person). Out of the total respondents 86(36.13%) principal informal caregivers are the principal and the only informal caregivers for the inpatient whereas 152(63.8%) of the respondents have support from external caregivers (external caregivers who can share the informal caregiving tasks with the principal informal caregivers). Out of the total inpatient, 86(36.13%) of them have only principal informal caregivers, 107(44.96%) of the inpatients have one external informal caregiver whereas the rest 45(18.90%) of the inpatients have two and more than two external informal caregivers. The household size of the inpatient varies from 2 - 16 with a mean and standard deviation of 5.33 & 1.90 respectively.

Table 3: Household size of informal care recipients

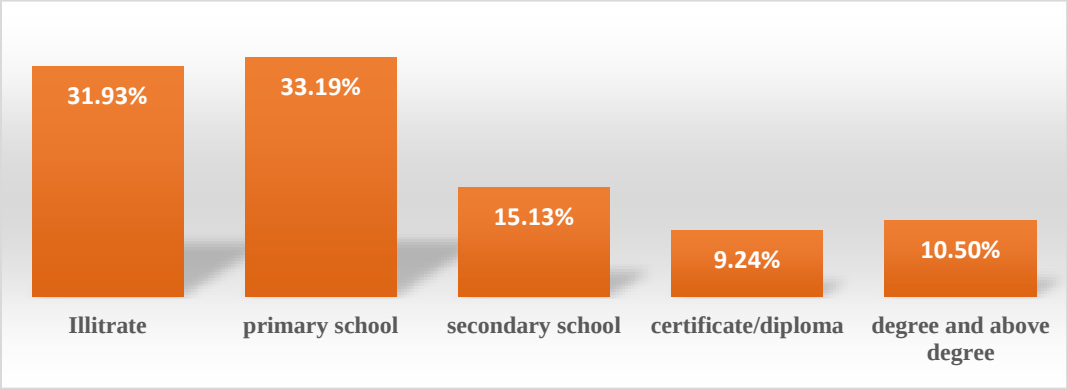
no	**Household size**	**From Urban area**	**From rural area**	**percent**
1	2 – 5	78(32.77%)	63 (26.47%)	59.24%
2	6 – 9	36 (15.13%)	54 (22.69%)	37.82%
3	10 – 16	2 (0.84)	5 (2.1%)	2.94%

IV. Educational Level of Principal Informal Caregivers

In terms of educational background, 76(31.93%) are illiterate or they are not able to read and write. Similarly, those who attained the primary school level (from grade one - grade eight) are 79(33.19%) of the total respondents and those who attained the secondary school level (grade nine - grade twelve) are 36(15.13%) of the total respondents. There are also respondents with certificate, diploma and degree level. When we see the number of certificate/ diploma holder respondents they are 22(9.24%) of the total respondents while degree and above degree count 25(10.5 %) of the total respondent. When we see the gender composition of the two extreme educational level, of the total of illiterate respondents 30(39.47%) and 6(24%) of the total degree holder respondents are female respondents and the rest are male respondents.

From the above statistics, we can understand that like that of the total respondent's male respondents are the main shareholders within the two extreme educational level. Specifically, when we see the degree holder principal informal caregivers, of the total respondents 76% of them are male and this implies that compared to the female counterpart male degree and above degree holders are highly vulnerable to be a principal informal caregiver for the inpatient. This may be a different history in the case of informal caregiving for the children, elder or for other kinds of home-based informal care. Again, when we see the area of the respondents for the two extreme educational level, out of the total illiterate respondents 61(80.27%) of them are from rural area and the remaining 15(19.73) from an urban area. On the other hand, out of the total degree and above degree holder respondents 24(96%) of them are from the urban area while the remaining one person is from a rural area.

Figure 5: Educational level of principal informal caregivers



V. Sex of Principal Informal Caregivers and Informal Care Recipient

Many kinds of literature show the dominance of women on informal caregiving activity but the story is different when we see it specifically for the task of informal caregiving for the inpatient in the case of Ethiopia. The result of this survey shows that out of the total respondents 146(61.34%) of them are male principal informal caregivers for the impatient while female principal informal caregivers are 92(38.66%) of the total respondents. When we see the rural - urban composition of the respondents, out of the total female respondents 43(46.8%) are from rural area and 49(53.2%) of them are from the urban area. The urban-rural composition of male respondents indicates that 81(55.48%) are from rural area and the remaining 65(44.52%) of male respondents are from the urban area.

Out of the total informal care recipient, 109(45.80%) of them are male inpatients and the rest 129(54.20%) of them are female informal care recipients. Out of the total female informal care recipient(inpatient), 82(63.57%) of them receive informal care from male principal informal caregivers while 47(36.43%) of them receive informal care from their female principal informal caregivers. Out of the total male principal informal caregivers, 64(43.84%) of them provide informal care for male inpatients and the rest 82(56.16%) male principal informal caregivers provide care for female inpatients.

VI. Paid Job Experience of Principal Informal Caregivers

Job experience is a continues variable and our survey result varies from 0 to 50 years of job experience with a mean and standard deviation of 8.63 & 9.15 respectively. Out of the total respondents 58(24.37%) of them are with zero-year job experience, 57(23.95%) are respondents with 1-5 years' job experience, 76(31.93%) are respondents with 6-15 years of job experience, 41(17.23%) are respondents with job experience of 16-30 and the remaining 6 (2.52%) of the respondents are with 31-50 years of job experience. When we see the direction of the relationship between job experience and monthly income of the respondent it's absolutely a positive relationship.

VII. Age of Informal Care Recipient and Age of Informal Caregivers

Out of the whole sample, the minimum age of informal care recipient is 0.008 years (three days) old infant and the maximum is 98 years old informal care recipient with a mean and standard deviation of 25.29 & 20.75 respectively.

When we see the survey data in terms of age groups of informal care recipient 26(10.92%) of them are with the age of less than one, 27(11.34%) are within the age group of (1 – 5), 19(7.98%) are within the age group of (6 – 10), 41(17.22%) are within age group of (11 – 20), the majority respondents76(31.93%) are within the age group (21 – 40), the remaining 49(20.58%) respondents are within the age group of (41 – 98).

According to the survey result, the age of principal informal caregivers for the inpatient at Jimma university referral hospital varies from 17 years old principal informal caregiver to 75 years old principal informal caregiver. Of the total principal informal caregiver respondents, 121(50.84%) are within the age group of (17 – 30) followed by 105(42.44%)

principal caregivers within the age group of 31 – 50. If we divide the age of principal caregivers into two age groups more than nineteen percent i.e. 226(92.98%) are within the age group of (17 – 50) while the remaining 12(7.02%) are within the age group of (51 – 75).

Table 4: Age Group of Principal Informal Care Givers

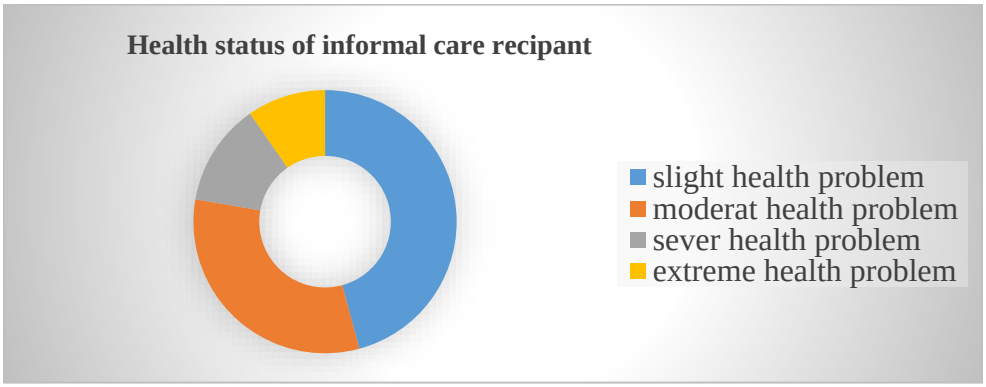
no	***Age group***	***frequency***	***female***	***male***	***Percent***
1	17 - 30	121	61	60	50.84%
2	31 - 50	101	26	75	42.44%
3	51 - 70	15	5	10	6.30%
4	71 - 75	1	0	1	0.42%

VIII. Health Status of The Informal Care Recipient

The health status of the inpatient is measured by using EQ-5D and EQ-5D is a standardized measure of health status developed by the EuroQol Group in order to provide a simple, generic measure of health for clinical and economic appraisal. EQ-5D is designed for self-completion by respondents and is ideally suited for use in postal surveys, in clinics, and in face-to-face interviews (Reenen & Janssen, 2015) but in our case, we used a face to face interview.

According to our survey result, no one is indicating "no health problem" and this is normal because the target group of the study is the inpatients, as a result, it is not expected to have a person with no health problem in our sample. Out of the total informal care recipients, 109(45.80%) are with a slight health problem, 76(31.93%) are affected by a moderate health problem, 30(12.61) of them are with severe health problem and the remaining 23(9.66%) of informal care recipients are inpatients with an extreme health problem.

Figure 6: Health status of informal care recipient



Among various factors age is one of the important predictors of health status as numerous health related studies suggest that age acts as the rate of health depreciation since the increase in age is expected to deteriorate individual's health status ((Pandey, 2009). Population aging is often referred to as an explanation for the ever-growing demand for health care resources. For any developed country, an increase in the proportion of the elderly entails an increase in per capita health care expenditure. This is undoubtedly true, given that individual health care expenditure is an increasing function of age (Sghari & Hammami, 2014). Logically the above argument is also true for developing countries but it is difficult to quantify more precisely the impact of age on health care expenditure.

Out of the total infant informal care recipients, 15(57.67%) are affected by a slight health problem and the remaining 11(42.30%) are infant inpatients with moderate, severe and extreme health problems. Again, out of the total inpatients within the age group of 11 -20, 21(51.22%) are with a slight health problem and the rest 20(48.78%) are with a moderate, severe and extreme health problem. On the other hand, when we see the health status of inpatients within the age group of 41 – 60 out of the total respondents within this age group 15(46.87%) are inpatients with slight health problem while the rest 17(53.13%) are inpatients with moderate, severe and extreme health problems.

IX. Marital Status of The Principal Informal Caregivers

From the total number of respondents38(15.97%) are single while the remaining 200(84%) are married, informal principal caregivers. Out of the total single respondents, 14(36.84%) of them are female and 24(63.16%) are single male principal caregivers. In other word, out of the total married principal informal caregivers, 78(39%) are female and the rest 122(61%) are male respondents.

Out of the total married respondents, 109(54.5%) are from the rural area while the remaining 91(45.5%) of them are from the urban area. On the other hand, out of the total single respondents, 13(34.21%) are from rural area and the rest 25(65.79%) are from the urban area.

X. The Variation of Monthly Paid Work Income(wage) of the Respondent

In order to conduct a research on the cost of informal caregiving by using the opportunity cost valuation method, we need to have monthly, weekly and hourly paid work income(wage) of the respondents. According to the survey result, the minimum monthly paid work income of the respondent is 0 (for unemployed) and the maximum one is 15,000 birr (of permanently employed) with the mean and standard deviation of 1774.041 birr and 2121.819 respectively.

Table 5: Monthly Paid Work Income Group of The Respondent

NO	**Income group**	**Frequency**	**Percentage**
1	0	67	28.15
2	1 - 500	2	0.84
3	501 - 1,000	21	8.82
4	1,001 - 2,000	85	35.71
5	2,001 – 4,000	40	16.81
6	4,001 – 5,000	11	4.62
7	5,000 - 10,000	10	4.20
8	>10,000	2	0.84

XI. The Value of informal care per week

The valu of informal care varies from 70 (of the temporarly employed respondant) to 3500 (of the permanently employed respondant) with the mean and standard diviation of 483.4586 and 449.8553 respectively. Whereas the log value of informal care varies from 4.248495 to 8.160519 with the mean and standard diviation of 5.947184 and 0.615931 respectively.

XII. *The Rate of Hospital Acquired Infection on Principal Informal Caregivers*

The medical term of hospital acquired infection is nosocomial. Most nosocomial infections are due to bacteria. Since antibiotics are frequently used within hospitals, the type of bacteria and their resistance to antibiotics is different than bacteria outside of the hospital. Most of the time the rate of hospital-acquired infection is studied only for the patients(inpatients) but actually informal caregivers are also vulnerable to such infection.

According to the principal informal caregivers self-reported data, out of the total respondents 30(12.60%) are affected by pain associated with common cold, muscular aches, backaches and they consider this pain as a result of hospital-acquired infection. This number is a very high number and it means that out of 100 principal informal caregivers around 13 of them will be affected by hospital-acquired infection and this shows the higher vulnerability of principal informal caregivers for hospital acquired infection and it is highly related to the hygiene and hostel of the hospital.

XIII. Satisfaction Rate of the Principal Informal Caregivers by the Service of Jimma University Referral Hospital for Informal Caregivers

Patient satisfaction is one of the established standards to evaluate achievement of the services being provided in the hospitals. For healthcare organization to be successful monitored clients view is a simple but important approach to assess and improve their performance (M. V. Kulkarni et al, 2011).

Like that of most Ethiopian hospitals, Jimma university referral hospital did not give that much attention to informal caregivers. Out of the total respondents, 88(36.97%) are not satisfied by the treatment and service of the hospital for informal caregivers. while the rest 150(63.03%) are satisfied by the service of the university hospital for informal caregivers. To the best of my knowledge, there is no formal rules and regulation that demands the right and fair treatment of informal caregivers in Ethiopia. In addition, from my personal discussion with the focus group, I observe that most respondents accept the burden as their fortune and even they do not want to blame on the responsible body.

XIV. Aggrievance of Principal Informal Caregivers on the Service of Jimma University Referral Hospital

The aggrievance of principal informal caregivers starts from the problems at the main gate of the hospital. According to the respondents, there are a lot of problems regarding hostel, hygiene, toilet, shower and other basic and necessary service provision. One of my respondent said that "I have been in this hospital for the past 60 days and I have not take shower trough out those days" this is not because my respondent is the one who affected by shower phobia rather it is because of lack of shower within the hospital and because of the health status of the inpatient that he provides informal care too. Most principal informal caregivers also aggravate on the health service rendezvous of Jimma university referral hospital because as they stay more and more days in the hospital they incur additional cost and this disturb their wealth.

4.2 ECONOMETRICS ANALYSIS

In this section of the study, the ordinary list square **(OLS)** and **Tobit** method of model estimation are presented and the estimation results are interpreted, compared and discussed in detail.

4.2.1 The OLS Estimation Results

Before totally accepting and interpreting the ordinary list square (**OLS**) regression result we need to test the fulfillment of the five basic assumption and some other conditions for **OLS** regression. According to the basic assumption any **OLS** regression result should be tested for Linearity, randomness of the sample observation (In this assumption we mean that the sample should consist of n-paired observations that are drawn randomly from the population, the number of observations should be greater than the number of parameters to be estimated and it also include the assumption that state the independent variables (X's) are no stochastic, whose values are fixed), the assumption of zero conditional mean, the assumption no perfect collinearity (multicollinearity test) , the assumption of homoskedasticity (heteroskedasticity test) and omitted variable bias test.

4.2.1.1 The Assumption of Normality and Normality Test

If we assume that all assumptions including the normality assumption hold, we will have a multiple linear Gaussian model (parametric model), and a solution is to use the Maximum Likelihood Estimate **(MLE)**. In this case, the Maximum Likelihood Estimator for the parameters coincides to the ordinary least squares **(OLS)** estimator but if we assume that only the first five main assumptions of the multiple linear regression models except for the assumption of normality hold, we have a semi-parametric multiple linear regression models, the **MLE** is unfeasible. In this case, the only solution is to use the ordinary least squares estimator (**OLS**) (Hurlin, 2013).

One of the major non-graphical tests for normality is the Shapiro-Wilk test and it tests the hypothesis that the distribution is normal, in this case, the null hypothesis is that the distribution of the residuals is normal.

Table 6: Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
e	238	0.93678	10.981	5.561	0.00000

In the above Shapiro – Wilk test table the p-value is 0.0000 (which is below 0.05 threshold) as a result we reject the null hypothesis.

Yes, of course, it is widely but incorrectly believed that the **t-**test and linear regression are valid only for normally distributed outcomes. The **t**-test and linear regression compare the mean of an outcome variable for different subjects. While these are valid even in very small samples if the outcome variable is normally distributed, their major usefulness comes from the fact that in large samples they are valid for any distribution (Lumley et al, 2009).

In addition to small samples, most statistical methods do require distributional assumptions, and the case for distribution-free rank-based tests is relatively strong. However, in the large data sets typical in public health research, most statistical methods rely on the central limit theorem, which states that the average of a large number of independent random variables is approximately normally distributed around the true population mean. It is this normal distribution of an average that underlies the validity of the **t**-test and linear regression, but also of logistic regression(Ibid).

4.2.1.2 The Assumption of Homoskedasticity and Heteroskedasticity Test

The properties of the estimators of the regression coefficients depend on the properties of the disturbance term in the regression model. One of the major Gauss–Markov conditions states that the variance of the disturbance term in each observation should be constant. To put it in another way, the probability of the error term reaching a given positive (or negative) value will be the same in all observations. This condition is known as homoscedasticity, which means "same dispersion" (Dougherty, 2017). If the homoskedasticity assumption is not satisfied, then there is heteroskedasticity, or disturbances are heteroskedastic.

Most of the times a models estimated with cross-sectional data are affected by the problems of heteroskedasticity. When there is heteroskedasticity, the **OLS** method is not the most appropriate because the estimators obtained are not the best, i.e. the estimators are not

BLUE in addition the covariance matrix of the estimators obtained by applying the usual formula is not valid when there is heteroskedasticity (and/or autocorrelation). Consequently, the **t** and **F** statistics based on the estimated covariance matrix can lead to erroneous inferences.

It is possible to test the problem of heteroskedasticity through different methods but in our case, we used the ***Breusch-Pagan test*** to detect the problem of heteroskedasticity and the result of the test presented below

Table 7: Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity			
Variables: fitted values of LnVIC	*chi2(1)*	*30.47*	*There is Heteroskedasticity*
Ho: Constant variance	*Prob > chi2 =*	*0.0000*	*problem*

The null hypothesis is that residuals are homoskedastic. Here we have *Prob > chi2* with the value of zero, as a result, we reject the null and concluded that residuals are heteroskedastic. In short, the above Breusch-Pagan tests suggest the presence of heteroskedasticity in our model. The problem with this is that we may have the wrong estimates of the standard errors for the coefficients and therefore their **t-**values.

By default, Stata assumes homoskedastic standard errors, so we need to adjust our model to account for heteroskedasticity. To do this we use the option robust in the regress command and robust regression will adjust our model to account for heteroskedasticity.

4.2.1.3 The Assumption of no perfect collinearity and Multicollinearity Test

An important assumption for the multiple regression models is that independent variables are not perfectly multicollinear. Multicollinearity is a case of multiple regression in which the predictor variables are themselves highly correlated. In other word multicollinearity, can be defined as a situation in which there is an exact (or nearly exact) linear relation among two or more of the input variables.

One of the major problems of multicollinearity is that the individual **P** values can be misleading (a **P** value can be high, even though the variable is important). The second problem is that the confidence intervals on the regression coefficients will be very wide.

The confidence intervals may even include zero, which means one cannot even be confident whether an increase in the independent variable value is associated with an increase, or a decrease, independent variable. Because the confidence intervals are so wide, excluding a subject (or adding a new one) can change the coefficients dramatically and may even change their signs (Paul, 2017)

Table 8: Variance Inflation Factor

Variable	***VIF***	***1/VIF***	***Variable***	***VIF***	***1/VIF***
DI	*9.18*	0.108900	*DSE*	*2.72*	0.367540
DP	*8.63*	0.115817	*DUR*	*2.66*	0.376169
DS	*4.38*	0.228373	*DHSSV*	*2.23*	0.449042
DPE	*4.29*	0.232950	*DC*	*2.05*	0.487607
EXP	*3.84*	0.260362	*DMM*	*1.45*	0.691833
DHSS	*3.53*	0.283394	*DTE*	*1.31*	0.761137
FFU	*3.29*	0.304133	*AGER*	*1.29*	0.773917
DHSM	*3.29*	0.304373	*NEC*	*1.21*	0.825052
AGEP	*3.21*	0.311787	*HHS*	*1.18*	0.850628
DF	*2.90*	0.344766	*SEXCRM*	*1.18*	0.889864
Mean VIF……..3.19					

A VIF > 10 or a 1/VIF < 0.10 indicates trouble. In our case, all VIFs are below ten and the mean VIF is 3.19, as a result, there is no multicollinearity problem.

4.2.1.4 The Impact of Omitted Variable Bias and Model Specification

If we miss out an important variable it does not only mean our model is poorly specified it also means that any estimated parameters are likely to be biased as result testing for omitted variable bias is important for our model. In order to know the presence of omitted variable in our model we used Ramsey RESET test.

Table 9.1: Ramsey RESET test using powers of the fitted values of LnVIC

Ramsey RESET test using powers of the fitted values of LnVIC		
Ho: model has no omitted variables	*F (3, 214) = 2.51* *Prob > F = 0.0595*	*The model has no omitted variable bias*

The null hypothesis is that the model does not have an omitted-variables bias, the p-value is 0.0595 higher than the usual threshold of 0.05, so we fail to reject the null and conclude that we do not need more variables.

Another method that can be used to test the problem of model specification is the linktest. The linktest basically checks whether we need more variables in our model by running a new regression with the observed *Y (csat)* against *Yhat (csat_predicted)* and *Yhat-squared as* independent variables. In this test, we will focus on the significance of *hatsq.*

Table 9.2: Linktest

lnvic	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
_hat	.4180721	.8946306	0.47	0.641	-1.344449	2.180593
_hatsq	.0477015	.0732297	0.65	0.515	-.0965691	.1919722
_cons	1.76195	2.71985	0.65	0.518	-3.596455	7.120355

The null hypothesis is that there is no specification error. Since the **p**-value of **_hatsq** is not significant then we fail to reject the null and we can conclude that our model is correctly specified or we do not have any model specification problem.

4.2.2 Ordinary List Square Regression Result and Interpretation

reg LnVIC HHS EXP AGEP AGER NEC DPE DSE DTE DF SEXCRM DI DP DS DC DMM DHSS DHSM DHSSV DUR FFU, r

Table 10: The Robust Ordinary List Square Regression Result

Robust regression result ** Statistically significant at the level of 1%* *** Statistically significant at the level of 5%* **** Statistically significant at the level of 10%* ***D** stands for dummy variable*				Number of obs = 238 F (20, 217) = 25.34 Prob > F = 0.0000 R-squared = 0.6508 Root MSE = .38039			
LnVIC	**Coef.**	**Std. Err.**	**t**	**P>t**	**Significance Level**	**[95% Conf. Interval]**	
Household size	.0135481	.0154061	0.88	0.380		-.0168166	.0439128
Job experience	.0150993	.0048653	3.10	0.002	**	.0055101	.0246885
Age of caregiver	.0030381	.0033972	0.89	0.372		-.0036577	.0097338
Age of care recipient	-.0038735	.0013954	-2.78	0.006	**	-.0066239	-.0011232
no of external caregivers	.0530841	.0294897	1.80	0.073	***	-.0050389	.111207
Employment status (categorical variable) with the base group of unemployed caregivers							
permanently employed self employed temporarily employed	.2999512 .3113555 -.5198813	.1099688 .0787262 .199993	2.73 3.95 -2.60	0.007 0.000 0.010	** * **	.0832074 .1561896 -.9140587	.5166949 .4665214 -.1257038
D of female care givers	.0295701	.0720233	0.41	0.682		-.1123846	+ .1715249
D of male care recipient	-.0312071	.0534614	-0.58	0.560		-.1365772	.074163
Educational Background (categorical variable) with the base group of degree and above degree holders							
Illiterate caregiver Primary educational level Secondary educational level Certificate/ diploma level	-1.044354 -.8651739 -.6927833 -.544963	.183352 .1702418 .162947 .1350094	-5.70 -5.08 -4.25 -4.04	0.000 0.000 0.000 0.000	* * * *	-1.405733 -1.200713 -1.013945 -.8110606	-.6829756 -.5296347 -.371622 -.2788655
D of married care giver	.0803971	.0716934	1.12	0.263		-.0609075	.2217017
Health status of the informal care recipant (categorical variable) with the base group of extrem health problem							
Slight health problem Moderate health problem Sever health problem	.0750794 -.047035 -.0304732	.099569 .0976328 .1121303	0.75 -0.48 -0.27	0.452 0.630 0.786		-.1211669 -.239465 -.2514771	.2713256 .145395 .1905307
D of caregiver from urban area	.3038221	.1144845	2.65	0.009	**	.0781781	.5294662
Interaction (female*urban area)	-.2185009	.1193041	-1.83	0.068	***	-.453644	.0166423
Constant(intercept)	6.078214	.2271498	26.76	0.000	*	5.630512	6.525917

Ordinary least squares **(OLS)** estimates of the parameters of the model are presented in the above *table 9* and it is with the $\mathbf{R^2}$ value of **0.65**. It means that the independent variables used in the model were able to explain **65%** of the variation in the dependent variable.

t- statistics are calculated, with the null hypothesis that a parameter is zero, which means that the estimated variable has no effect on the dependent variable given that the other variables are in the model. According to the above robust **OLS** regression result **D** illiterate caregiver, **D** of the primary educational level, **D** secondary educational level, **D** of certificate/ diploma level, **D** of self-employed and the constant (intercept term) are statistically significant at the level of **1%**. Job Experience, the age of care recipient, **D** of permanently employed, **D** of temporarily employed and **D** of caregiver from urban area are statistically significant at the level of **5%** whereas **a** number of external caregivers and the Interaction term (female*urban area) are statistically significant at the level of **10%.**

On the other hand, Household Size, Age of caregiver, **D** of female caregivers, **D** of male care recipient, **D** of married caregiver, **D** of slight health problem, **D** of moderate health problem and **D** of extreme health problem are statistically insignificant.

According to the above **OLS** regression result, the variable job experience of the principal informal caregiver is positively relation with the value of informal care for the inpatient and it is statistically significant at 5%. By definition job experience related to the value of informal care via wage rate but not via the hours spent in informal care. In short we can interpret the coefficient of job experience for the **OLS** model as " Other things remain constant on average the opportunity cost or the value of informal care per week (which is measured in Birr) of the principal informal caregiver with one extra year of job experience is greater than with that of the others by 1.50%" or simply we can say that as the job experience of the principal informal caregiver increase by one year then his/her value of informal care per week will increase by 1.50%.

Age of the informal care recipient (the inpatient) is statistically significant at 5% and it has a negative relationship with the value of informal care. According to the OLS regression coefficient of the age of informal care recipient as the age of informal care recipient increase by one year on average the opportunity cost (value of informal care per week) of principal informal caregiver for the given inpatient will decrease by 0.387%.

The number of external caregivers is statistically significant at 10% and surprisingly it is positively associated with the value of informal care fo the principal informal caregiver. According to the OLS regression result as the number of informal caregiver for a given patient increase by one person (not percent) on average the value of informal care will increase by 5.30%. This result needs further study, but from my personal observation, informal care recipient from high-income level household have a large number of informal caregivers compared to informal care recipient from low-income household.

In the above model employment status have four categories which include unemployed principal informal caregivers, permanently employed principal informal caregivers, self-employed principal informal caregivers and temporarily employed principal informal caregivers. From the four employment status category, the unemployed principal informal caregiver is considered as the reference group and all the remaining groups are compared with them. Yes, by definition occupation or employment status is related to the value of informal care through wage variation because of occupational status. With ceteris Paribus assumption if the principal informal caregiver is permanently employed on average his/her opportunity cost (value of informal care per week) will be higher than with that of the unemployed principal informal caregivers by 29.99% and if the principal informal caregiver is self-employed then his/her opportunity cost will be higher than with that of the unemployed principal informal caregivers by 31.13%. On the other hand, if the principal informal caregiver is temporarily employed then his/her opportunity cost (value of informal care per week) will be lower than with that of unemployed principal informal caregivers by 51.98%.

Generally spiking educational level has a positive relation with wage rate, it is also related to the value of informal care via wage and it is statistically significant at 1%. Within the educational level, we have five categories which include illiterate, primary educational level, secondary educational level, certificate/diploma level and principal informal caregivers with a degree and above degree educational level. In the above OLS regression degree and above degree holder principal informal caregivers are considered as the base group and all other principal caregivers with the remaining educational level are compared with them.

With ceteris paribus assumption if the principal informal caregiver is illiterate then his/her value of informal care will be lower than with that of the degree holder principal caregiver by 104.43%, if the principal informal caregiver is with primary educational level then his/her value of informal care per week will be lower than with that of the degree holder principal caregiver by 86.51%, if the principal informal caregiver is with secondary educational level then his/her value of informal care per week will be lower than with that of the degree holder principal informal caregiver by 69.27% and if the principal informal caregiver is with certificate / diploma level then his/her value of informal care per week will be lower than with that the degree holder principal informal caregiver by 54.49%.

As it is presented in the methodology part of this study Jimma university referral hospital provide its service for both the urban and rural part of the catchment area population.This study found that the area of principal informal caregiver is statistically significant at 5%. Other things remain constant if the principal informal caregiver is from the urban area then his/her value of informal care per week will be higher than with that of principal caregivers from the rural area by 30.38%.

Like Household Size, Age of caregiver, the gender of care recipient, marital status of caregiver and health status of informal care recipient, the gender of principal informal care recipient is also statistically insignificant. But the interaction of the area and the gender of principal informal caregiver is statistically significant at 10%. According to the interaction term coefficient if the principal informal caregiver is female from urban part of the catchment area, then her value of informal care for the inpatient will be lower than with

that of female principal informal caregivers from rural area by 21.85% or in other word the value of informal care by female principal caregivers from rural area is higher than with that of female principal informal caregivers from urban area by 21.85%.

Generally the sign (direction) of relationship between the log value of informal care and some of the independent variable like; educational level and experience of the principal caregivers is similar with the hypothesis drawn at the variable description parts of the study. On the other hand independent variables like; age of informal care recipient, employment(occupational) status and number of external caregivers have a different relationship with the log value of informal care compared to the hypothesis drawn at the variable description parts of the study.

4.2.3 The Tobit Model

One of the important kind of limited dependent variable is a corner solution response. Such a variable is zero for a nontrivial fraction of the population but is roughly continuously distributed over positive values. The Tobit model is quite convenient for these purposes. Typically, the Tobit model expresses the observed response, ***y***, in terms of an underlying latent variable (Wooldridge, 2013).

Since the intention of this research is to measure the opportunity cost of informal caregiving for the inpatient and because opportunity cost varies from zero to positive numbers, it is possible to employ Tobit model, more specifically the one-limit Tobit model (left censor limited Tobit model).

From *table 10* we can understand that the regression coefficient of the Tobit model is the direct copy of the **OLS** regression estimates and the interpretation of the coefficient is similar with the ordinary list square regression result interpretation. Sigma is the estimated error of the estimation and its comparable to the root mean squared error of the OLS regression result.

*Table 11: **OLS** and **Tobit (MLE)**Estimation of the value of informal caregiving **(LnVIC)***

Independent Variables	**OLS** coefficient	**Tobit** coefficient
HHS	.0135481	.0135481
EXP	.0150993 **	.0150993 **
AGEP	.0030381	.0030381
AGER	-.0038735 **	-.0038735 **
NEC	.0530841 ***	.0530841 ***
DPE	.2999512 **	.2999512 **
DSE	.3113555 **	.3113555 **
DTE	-.5198813 **	-.5198813 **
DF	.0295701	.0295701
SEXCRM	-.0312071	-.0312071
DI	-1.044354 *	-1.044354 *
DP	-.8651739 *	-.8651739 *
DS	-.6927833 *	-.6927833 *
DC	-.544963 *	-.544963 *
DMM	.0803971	.0803971
DHSS	.0750794	.0750794
DHSM	-.047035	-.047035
DHSSV	-.0304732	-.0304732
DUR	.3038221 **	.3038221 **
FFU	-.2185009 ***	-.2185009 **
_cons	6.078214 *	6.078214 *
Log-likelihood value	.-	-96.676873
R^2 & Pseudo R^2	0.6508	0.5643
sigma	-	.3632249

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY RECOMMENDATION

5.1 SUMMARY AND CONCLUSION

Informal caregiving is an issue that transcends national boundaries and it is a provision of informal care by persons of all ages (usually unpaid) to someone with a chronic illness, disability or other long lasting health or care need, outside of a professional or formal employment framework.

In this study, an attempt has been made to measure the value of informal care for the inpatient and to identify the direction of the relationship between the value of informal care and socioeconomic factors of the principal informal caregivers. The study use 238 sample respondents as a source of primary data and the respondent vary on their employment status, educational level, gender, age, area etc. out of the total number of observation 122(51.26%) are from rural area while 116(48.74%) are from urban part of Jimma university referral hospital catchment area (specifically, southwestern Ethiopia).

Out of the total respondents 67(28.15%) are unemployed and out of the total unemployed informal caregivers 50(74.6%) are female and this fact shows the presence of a high number of female unemployed principal informal caregivers. Based on the above fact we can conclude that very little is done in terms of women employment. The remaining 171(71.85%) are employed principal informal caregivers with different employment status like Permanently employed, self-employed and temporarily employed respondents.

According to the research observation inpatients from a reach family has more than one principal informal caregivers but on average inpatients from low-income family have one and the only principal informal caregivers. The household size of the inpatient varies from 2 - 16 with a mean and standard deviation of 5.33 and 1.90 respectively and there is no correlation between the number of informal caregivers and household size.

In terms of educational background, 76(31.93%) are illiterate or they are not able to read and write. Similarly, those who attained the primary school level are 79(33.19%) of the total respondents and those who attained the secondary school level are 36(15.13%) of the total respondents. There are also respondents with certificate, diploma, degree and above degree educational level. Regarding the gender composition of principal informal caregivers many kinds of literature show the dominance of women on informal caregiving activity but according to own survey result out of the total respondents the majority which is 146(61.34%) of them are male principal informal caregivers for the impatient while female principal informal caregivers are 92(38.66%) of the total respondents.

Out of the total inpatient respondents, informal care recipient with the minimum is 0.008 years (three days) old infant and the maximum is 98 years old informal care recipient with a mean and standard deviation of 25.29 and 20.75 respectively. On the other hand, the age of principal informal caregivers for the inpatient varies from 17 - 75 years. The paid job experience is also varying from respondents to respondents and specifically, it varies from 0 to 50 years of job experience. Even if there are five categories in the health status variables, in our case we have only inpatients with a slight health problem, moderate health problem, severe health problem and informal care recipient with an extreme health problem. Out of the total inpatients respondents no one is indicating “no health problem” and this is normal because the target group of the study are the inpatients at Jimma university referral hospital.

The paid work income of the principal informal caregivers highly varies compared to the hours spent on informal caregiving tasks. According to the survey result, the minimum monthly paid work income of the respondent is 0 (for unemployed) and the maximum one is 15,000 birr (of permanently employed) with the mean and standard deviation of 1774.041 birr and 2121.819 respectively. But the hours spent on informal caregiving task is relatively common for all types of the informal care recipient.

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Before the regression result interpretation, we have done different statistical tests like normality test, heteroscedasticity test, multicollinearity test and significance test like **t** test, **F** test and omitted variable test , linktest etc. According to the OLS regression result the variable paid job experience, educational level, and employment status (except for temporarily employed respondents) are positively related with the log of the value of informal care via the wage difference. Surprisingly, the number of external caregivers is also positively related to the log value of informal caregiving. On the other hand, the age of informal care recipient and the interaction term (female from urban area) is negatively related to the log of value of informal care.

Generally spiking, in Ethiopia informal caregiving is not a new concept practically but it seems a new theoretically. There is no government policy which considers the burden of principal informal caregiver and the service which is provided by Ethiopian hospitals did not consider the need of principal informal caregivers. Totally we can say that there is no good environment for informal caregivers in Ethiopia and we need to change this situation by promoting the government and non-government organization to have policy and strategies regarding principal informal caregivers. For example, the Ethiopian government has a five-year growth and transformation plan (GTP) which include the improvement of the health sector. Even if it is difficult to achieve such objective without the active involvement of the principal informal caregivers, the role and importance of informal caregivers did not mentioned within the health section of the Ethiopian growth and transformation plan. So, whenever we plan to achieve something in the health sector we need to clearly state the role of principal informal caregivers and we need to help them.

5.2 POLICY RECOMMENDATION

There are different types of caregivers who provide informal care for different types of inpatients and the diversified nature of informal caregiving followed by the diversified need of support from the community, government and non-government organizations. Based on the findings of the study and by considering the experience of developed countries the following policy recommendations are expected to address the needs of principal informal caregivers with respect to awareness creation and respite care, financial assistance, workplace accommodation and hospital facility. The Ethiopian federal government, can provide vital leadership by:

- **Awareness Creation and Respite Care**

Information needs to include understanding the characteristics and course of the disease and what resources are available to principal informal caregivers, along with training in how to care for the inpatient, how to prevent and deal with the challenging behavior of the inpatient and to protect themselves from transmittable disease. In addition, the concerned body should support the principal informal caregivers by providing advice, counseling and respite support.

- **Policy Related to Workplace Accommodation**

It is difficult to combine formal paid work and the task of informal caregiving, especially for individuals providing a high intensity of care. The following policy are recommended to reduce the dual pressure from work and care for employed caregivers and to improve the employment of principal informal caregivers.

Leaves for caregivers: There are two types of leave arrangement for principal informal caregivers which is paid leave (short-term care leave) and unpaid leave (Long-term care leave). In most developed countries paid care leave is limited to less than one month but the unpaid leave may down to one year but it should depend on the intensity of caregiving obligation.

Flexible work arrangements: In addition to leave from work, a flexible working arrangement may help carers to remain in the labor force and accommodate care needs through balancing care obligations and work by providing carers sufficient income and a social network through work.

- **Improving the Accessibility and the Facility of Hospitals**

In order to provide the necessary service every hospital should be designed based on hospital science and it should compliance the need for informal caregivers. In our observation, many principal informal caregivers suffer from lack of sufficient amount of toilet, shower and hostel, therefore, Jimma university referral hospital should solve this minor but worthy things.

Of the total respondents, only 58(24.37%) of them are from Jimma town and the remaining 180(75.63%) of the respondents are from other parts of southwestern Ethiopia. Therefore, the Ethiopian ministry of health should work hard to improve the health service provided at the locality(kebele), district(wereda) and city level.

- **Financial Assistance**

Caregivers need financial assistance in order to be able to provide appropriate care and to continue the caregiver role in the long term. The main aim of financial support is reducing income loss via income support payments. The financial support for principal informal caregivers can take different forms like;

Caregiver's allowance: is a payment to people on low incomes who are looking for a person who needs support because of age, disability or illness (including mental illness) and it aims at giving some recognition for informal caregivers and not to providing a direct remuneration for the care provided.

Cash-for-care benefits to the inpatient: It is more beneficial for those inpatients who do not have family at all. The amount of the benefit for the care recipient depends on care needs and it should be investigated whether a formal contract can be established between the informal caregiver and the owner of the cash-for-care allowance.

Unemployment benefits for caregivers: If the principal informal caregiver decides to stop working in order to provide the care we need to compensate them through unemployment benefit. But, unemployment benefits should be maintained under certain conditions if a person provides informal care either during unemployment period or during unpaid leave.

- The Ethiopian government should also include the role and importance of informal caregivers to achieve the objective mentioned on the health aspects of Ethiopian growth and transformation plan.

5.3. FUTURE RESEARCH DIRECTION

The demand and the supply of informal care are not limited to some specific people, country, or continent. It is one of the rotini and ongoing socio-economic problem in the world and here in Ethiopia we have also the culture of providing informal care for those in need of assistance. But, this study examines only the cost of informal caregiving for the inpatients, as a result, almost all variation on the value of informal care is because of variation in wage rate than variation in the hours spent on informal caregiving takes. Thus, Future research should be conducted on the cost of home-based informal caregiving.

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Appendix

1. Questioner on the Economic Cost of Informal Caregivers for the Inpatient

The purpose of this study is just to measure the cost of informal caregiving and to indicate the contribution of informal caregivers for the economy in monetary value. This is purely an academic research and has nothing to do with governmental or non- governmental organization. You are selected randomly from those informal caregivers within Jimma University specialized hospital. Therefore, I kindly request you to give me a genuine answer for the following questions. Your genuine answer will help me to come up with the best policy recommendation that can give care for the caregivers (caring for the caregivers).

. ***Thank you for taking part in the survey.***

Habtamu Legese Feyisa

Postgraduate student @ Jimma University

I. Questions that concern about informal caregiver (principal informal caregiver).

1. Do you provide care or support on a voluntarily basis to a family member, friend or other acquaintance who needs help due to physical or mental health problems at Jimma University specialized hospital?

☐ Yes ☐ No

2. If your answer for question number one is **YES**, then are you a principal caregiver for the inpatient? (principal caregiver is the one who perform most tasks for the inpatient and he/she spent more time with the inpatient compared to other caregivers).

☐ Yes ☐ No

3. Sex of the principal caregiver?

☐ Female ☐ Male

4. Marital status of the principal caregiver?

☐ Single ☐ Married ☐ Divorced ☐ Widowed

5. How old are you? _____ years

6 **A**. Where are you from? _____ (please specify)

☐ From Jimma ☐ Outside of Jimma

6 **B.** Are you from urban area or from rural area?

☐ Am from Urban area ☐ Am from Rural area

7. If your answer for question number six is "**Outside of Jimma"** then are you the only one to provide informal care for the given inpatient?

☐ Yes ☐ No

8. What is your relationship with the inpatient?

☐ The inpatient is my partner ☐ The inpatient is my mother or father

☐ The inpatient is my mother-in-law or father-in-law ☐ The inpatient is my daughter or son

☐ The inpatient is another family member ☐ The inpatient is my friend

☐ The inpatient is my neighbor

☐ Other (please specify): _____

9. What is your highest attained educational level?

☐ Illiterate ☐ primary school (1-8) ☐ Secondary school (9-12) ☐ Certificate/ Diploma ☐ Degree & more than degree

10. Occupation status

☐ Permanently employed ☐ Temporarily employed

☐ Self-employment ☐ Unemployed

11 **A**. If you are **self-employed**, how much is your monthly or yearly income that you obtain from self-employment.

A. _____Birr per month or B. _____Birr per year

11 **B.** If your answer for question number ten is **"Permanently employed" or Temporarily employed"** then how much is your wage per month after tax? _____

12. If your answer for question ten is **"Unemployed"**, then have you been in the labor force (have you been employee)?

☐ Yes ☐ No

13. If your answer for question eleven is **Yes**, then how much was your former wage per month after tax? _____ Birr per month.

14. On average how many hours do you spend on informal care tasks per day? _____

15. Job experience (for how many years have you been in the labor force?) _____

16. For how many days have you been in this hospital to provide informal care for the given inpatient? _____

17. Besides your care or support, does the inpatient also receive care from other informal caregivers?

☐ Yes, from _____ [number] other informal caregivers,

☐ No, I am the only informal caregiver

18. Are you satisfied by the service of Jimma University specialized hospital, especially by its service for the informal caregivers?

☐ Yes ☐ No

19. what do you suggest to improve the service of the hospital for the informal caregivers?

II. The next questions concern about the informal care recipient or the person you provide informal care to.

20. Sex of the inpatient?

☐ Female ☐ Male

21. How old is the inpatient (age of informal care recipient)? _____ years

22. Can the inpatient be left alone?

☐ No, the inpatient needs continuous surveillance

☐ Yes, the inpatient can easily be left alone for several hours (or more)

23. Household size of the inpatient. _____ (number).

III. Questions related to health status of informal care recipient (the inpatient)

MOBILITY

I have no problems in walking about	1☐
I have slight problems in walking about	2☐
I have moderate problems in walking about	3☐
I have severe problems in walking about	4☐
I am unable to walk about	5☐

SELF-CARE

I have no problems washing or dressing myself	1☐
I have slight problems washing or dressing myself	2☐
I have moderate problems washing or dressing myself	3☐
I have severe problems washing or dressing myself	4☐
I am unable to wash or dress myself	5☐

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

I have no problems doing my usual activities	1☐
I have slight problems doing my usual activities	2☐
I have moderate problems doing my usual activities	3☐
I have severe problems doing my usual activities	4☐
I am unable to do my usual activities	5☐

PAIN / DISCOMFORT

I have no pain or discomfort	1☐
I have slight pain or discomfort	2☐
I have moderate pain or discomfort	3☐
I have severe pain or discomfort	4☐
I have extreme pain or discomfort	5☐

ANXIETY / DEPRESSION

I am not anxious or depressed	1☐
I am slightly anxious or depressed	2☐
I am moderately anxious or depressed	3☐
I am severely anxious or depressed	4☐
I am extremely anxious or depressed	5☐

Thank you for your time and information

2. OLS regression result

```
. reg lnvic hhs exp agep ager nec dpe dse dte df sexcrm di dp ds dc dmm dhss dhsm dhssv dur ffu,r

Linear regression                               Number of obs =     238
                                                F( 20,   217) =   25.34
                                                Prob > F      =  0.0000
                                                R-squared     =  0.6508
                                                Root MSE      =  .38039
```

lnvic	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
hhs	.0135481	.0154061	0.88	0.380	-.0168166	.0439128
exp	.0150993	.0048653	3.10	0.002	.0055101	.0246885
agep	.0030381	.0033972	0.89	0.372	-.0036577	.0097338
ager	-.0038735	.0013954	-2.78	0.006	-.0066239	-.0011232
nec	.0530841	.0294897	1.80	0.073	-.0050389	.111207
dpe	.2999512	.1099688	2.73	0.007	.0832074	.5166949
dse	.3113555	.0787262	3.95	0.000	.1561896	.4665214
dte	-.5198813	.199993	-2.60	0.010	-.9140587	-.1257038
df	.0295701	.0720233	0.41	0.682	-.1123846	.1715249
sexcrm	-.0312071	.0534614	-0.58	0.560	-.1365772	.074163
di	-1.044354	.183352	-5.70	0.000	-1.405733	-.6829756
dp	-.8651739	.1702418	-5.08	0.000	-1.200713	-.5296347
ds	-.6927833	.162947	-4.25	0.000	-1.013945	-.371622
dc	-.544963	.1350094	-4.04	0.000	-.8110606	-.2788655
dmm	.0803971	.0716934	1.12	0.263	-.0609075	.2217017
dhss	.0750794	.099569	0.75	0.452	-.1211669	.2713256
dhsm	-.047035	.0976328	-0.48	0.630	-.239465	.145395
dhssv	-.0304732	.1121303	-0.27	0.786	-.2514771	.1905307
dur	.3038221	.1144845	2.65	0.009	.0781781	.5294662
ffu	-.2185009	.1193041	-1.83	0.068	-.453644	.0166423
_cons	6.078214	.2271498	26.76	0.000	5.630512	6.525917

4. Tobit regression result

```
. tobit lnvic hhs exp agep ager nec dpe dse dte df sexcrm di dp ds dc dmm dhss dhsm dhssv dur ffu, ll(0)

Tobit regression                                Number of obs   =        238
                                                LR chi2(20)     =     250.38
                                                Prob > chi2     =     0.0000
Log likelihood = -96.676873                     Pseudo R2       =     0.5643
```

lnvic	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
hhs	.0135481	.0134389	1.01	0.315	-.0129386	.0400348
exp	.0150993	.0050543	2.99	0.003	.0051377	.0250609
agep	.0030381	.0040639	0.75	0.456	-.0049716	.0110477
ager	-.0038735	.0012925	-3.00	0.003	-.006421	-.0013261
nec	.0530841	.0252761	2.10	0.037	.0032672	.1029009
dpe	.2999512	.1215716	2.47	0.014	.060345	.5395574
dse	.3113555	.0776716	4.01	0.000	.1582721	.4644389
dte	-.5198813	.2099385	-2.48	0.014	-.9336501	-.1061124
df	.0295701	.0823434	0.36	0.720	-.132721	.1918613
sexcrm	-.0312071	.0500947	-0.62	0.534	-.1299389	.0675248
di	-1.044354	.1530324	-6.82	0.000	-1.345967	-.742742
dp	-.8651739	.1469137	-5.89	0.000	-1.154727	-.5756208
ds	-.6927833	.1375029	-5.04	0.000	-.9637885	-.4217782
dc	-.544963	.1164094	-4.68	0.000	-.7743951	-.315531
dmm	.0803971	.0772777	1.04	0.299	-.0719099	.2327041
dhss	.0750794	.0887683	0.85	0.399	-.0998746	.2500334
dhsm	-.047035	.0915365	-0.51	0.608	-.2274447	.1333748
dhssv	-.0304732	.1058584	-0.29	0.774	-.2391101	.1781638
dur	.3038221	.0767999	3.96	0.000	.1524567	.4551875
ffu	-.2185009	.104801	-2.08	0.038	-.4250537	-.011948
_cons	6.078214	.2246892	27.05	0.000	5.635373	6.521055
/sigma	.3632249	.0166481			.330413	.3960367

5. Omitted variable test (Ovest)

```
. ovtest

Ramsey RESET test using powers of the fitted values of lnvic
       Ho:  model has no omitted variables
                F(3, 214) =      2.51
                 Prob > F =      0.0595
```

6. Model specification test (Linktest)

```
. linktest
```

Source	SS	df	MS	Number of obs =	238
				F(2, 235) =	219.56
Model	58.5676455	2	29.2838228	Prob > F =	0.0000
Residual	31.3432938	235	.133375718	R-squared =	0.6514
				Adj R-squared =	0.6484
Total	89.9109393	237	.379371052	Root MSE =	.36521

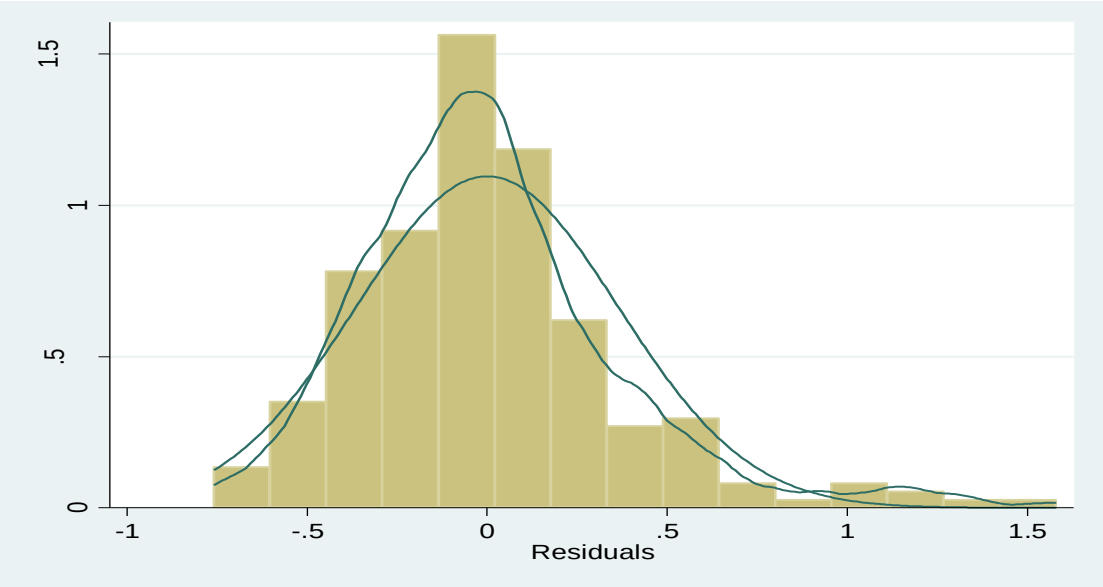
lnvic	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_hat	.4180721	.8946306	0.47	0.641	-1.344449	2.180593
_hatsq	.0477015	.0732297	0.65	0.515	-.0965691	.1919722
_cons	1.76195	2.71985	0.65	0.518	-3.596455	7.120355

7. Normality test (Swilk e)

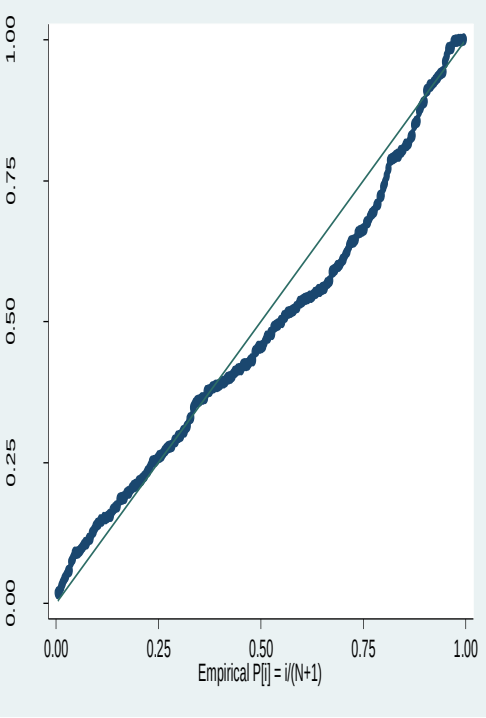
```
. swilk e

                    Shapiro-Wilk W test for normal data
```

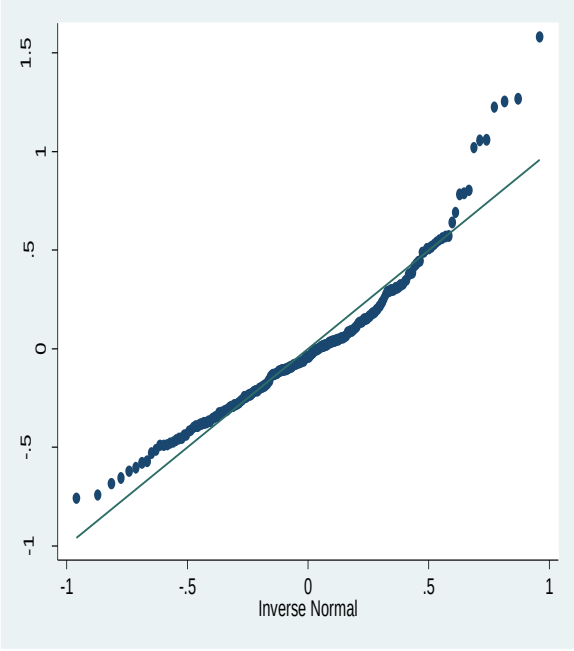
Variable	Obs	W	V	z	Prob>z
e	238	0.93678	10.981	5.561	0.00000

8. histogram e, kdensity normal



9. pnorm e ***qnorm e***





10. corr hhs exp agep ager nec dpe dse dte df sexcrm di dp ds dc dmm dhss dhsm dhssv dur ffu (obs=238)

	hhs	exp	agep	ager	nec	dpe	dse	dte	df	sexcrm	di	dp	ds
hhs	1.0000												
exp	0.1733	1.0000											
agep	0.1224	0.7675	1.0000										
ager	0.1283	0.0076	0.0197	1.0000									
nec	-0.0036	-0.0820	-0.0194	0.0790	1.0000								
dpe	-0.1760	-0.0748	-0.0680	0.0558	0.1595	1.0000							
dse	0.2455	0.5081	0.2572	0.0799	-0.1434	-0.5026	1.0000						
dte	-0.0401	-0.0806	-0.0660	-0.0082	0.1663	-0.0657	-0.1307	1.0000					
df	-0.0797	-0.3450	-0.1695	-0.1005	0.0339	0.0311	-0.4314	-0.0367	1.0000				
sexcrm	0.1945	-0.0450	-0.0127	-0.0599	-0.0662	-0.0837	0.0253	-0.0546	0.0496	1.0000			
di	0.0606	0.1689	0.2953	-0.1745	-0.1129	-0.3443	0.1802	-0.0194	0.0115	-0.0327	1.0000		
dp	0.0365	-0.0487	-0.1428	0.0297	-0.1539	-0.3098	0.1695	-0.0922	-0.0282	0.1221	-0.4828	1.0000	
ds	0.0682	-0.0446	-0.1035	0.0891	0.0454	-0.0368	0.0469	-0.0552	0.0743	-0.0115	-0.2892	-0.2976	1.0000
dc	-0.0863	-0.0872	-0.0933	0.1402	0.1019	0.4180	-0.2901	0.2968	0.0446	-0.0895	-0.2186	-0.2250	-0.1347
dmm	0.0460	0.2977	0.3687	-0.2823	-0.0232	-0.0668	0.1835	-0.1215	0.0162	0.0784	0.2740	-0.0825	-0.0401
dhss	-0.0319	0.0345	-0.0208	-0.0548	-0.0004	0.0424	-0.0590	0.0110	0.0669	-0.1341	0.0216	-0.0749	0.0356
dhsm	-0.0058	-0.0443	-0.0026	-0.0540	-0.0426	0.0825	-0.0721	-0.0194	-0.0440	0.0578	-0.0052	-0.0043	-0.0628
dhssv	-0.0264	-0.0013	-0.0203	-0.0215	0.0202	-0.0647	0.0760	0.0488	-0.0415	0.0320	-0.0429	0.1355	-0.0897
dur	-0.1615	-0.1216	-0.0693	0.0569	0.2241	0.4317	-0.3026	0.0687	0.0891	0.0316	-0.3974	-0.2054	0.2687
ffu	-0.0684	-0.1554	-0.0680	-0.0365	0.0275	0.2035	-0.2888	-0.0674	0.6497	0.0228	-0.1762	-0.1007	0.2141

	dc	dmm	dhss	dhsm	dhssv	dur	ffu
dc	1.0000						
dmm	-0.1777	1.0000					
dhss	-0.0022	0.0553	1.0000				
dhsm	0.0303	-0.0705	-0.6296	1.0000			
dhssv	0.0536	-0.0418	-0.3491	-0.2601	1.0000		
dur	0.2983	-0.1487	-0.0865	0.0533	0.0349	1.0000	
ffu	0.1915	-0.0286	0.0435	-0.0435	0.0217	0.5289	1.0000