Spring 5-19-2016

Household Shocks and Transition into Marriage: Evidence from Rural Ethiopia

Boyd K. Tembo
CUNY Hunter College

Household Shocks and Transition into Marriage: Evidence from Rural Ethiopia

By

Boyd K Tembo

Submitted in partial fulfillment
of the requirements for the degree of
Master of Arts in Economics
Hunter College of the City of New York

2016

Thesis sponsor:

April 21, 2016
Date

Professor Partha Deb
First Reader

April 21, 2016
Date

Professor Jonathan Conning
Second Reader

To the Almighty God without, whom I probably would have not achieved much in life.

ACKNOWLEDGEMENT

I would like to start by thanking my parents for the material, financial and emotional support they rendered in pursuit of my education and that of my siblings. The financial difficulties that the family endured helped me focus on the more important things in life.

My wife (Irene) and children (Nyemba and Kachila) have been very supportive during my time of study. However, sometimes during study time I had to learn to accommodate questions about Justin Bieber and One Direction from the girls.

I cannot forget the efforts of the faculty members in Economics Department under whose tutelage I was from 2011, when I first registered as a non-matriculated student. I am forever, indebted to Professors Partha Deb and Jonathan Conning for their references and encouragement in transferring to matriculation status. I also pay gratitude to all faculty members, who were always willing to answer my questions, whenever I sought clarification. Professor Karna Basu's review comments on the thesis draft were timely and equally very valuable.

Gratitude also goes to my colleagues Geoffrey Clark, Elisha Cohen, Kwabena Donkor, Geoffrey Hammer and Sheena Williams with whom I frequently interacted and exchanged notes on various issues and who were forever so helpful. I am also very grateful to Yu-Li Ko and Professor Nadia Doytch of Rensselaer Polytechnic Institute and Brooklyn College respectively, who at the 66th Annual Meeting of the New York State Economics Association gave invaluable feedback during presentation of an abridged version of this study.

Various family members have contributed in their own small ways towards my career. Geoffrey Phiri and Anita Dumba, who in my adolescence, took me into their custody and groomed me into a good citizen. And not forgetting my late grandmother Josephine Kanyaka, who always saved a portion of the proceeds of her annual maize harvest for my school needs.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

This study uses panel data modelling to examine the effect of non-agricultural and agricultural household shocks on a subject's transition into marriage. The primary hypothesis to be tested is that household shocks do not have a positive and significant correlation with a subject's transition into marriage. The general expectation is that a shock that disturbs the economic status of a household could lead to bereaved underage children transitioning into marriage earlier than usual. The study also tests for gender bias in the effects. A number of studies have been conducted in which the impact of household shocks on school outcomes and health of vulnerable children has been assessed[1]. This paper builds on the pioneering work of Beegle and Krutikova (2008), who conducted a similar study in Tanzania. Our study is based on panel data collected from 15 villages during the Ethiopia Rural Household Survey (ERHS)[2]. The sample is a cohort of children (aged between 5 and 25 years old at baseline) and whose marital status is assessed again in 2009. The study finds that an agricultural shock and parental morbidity have a positive and statistically significant correlation with a male subject's transition into early marriage compared to a female's. The latter do not seem to be significantly impacted by the experience of a household shock. Suffice to say, that there is no statistically significant correlation between parental death and transition into marriage for both genders of subjects in the study. The findings of this study may be important in influencing public policy on early child marriage, social safety nets and education in Ethiopia.

[1] Ainsworth et al. (2005), Beegle and Krutikova (2008), Mather (2011a,b)

[2] [The] data have been made available by the Economics Department, Addis Ababa University, the Centre for the Study of African Economics, University of Oxford and the International Food Policy Research Institute (IFPRI). Funding for data collection was provided by the Economic and Social Research Council (ESRC), the Swedish International Development Agency(SIDA)and the United States Agency for International Development (USAID); the preparation of the public release version of [the] data was supported, in part, by the World Bank are not responsible for any errors in [the] data or for [the] use or interpretation (Dercon and Hoddinott, 2011)

1. INTRODUCTION

Household shocks such as death of a parent(s), prolonged illness of a parent(s) or loss of assets from an agricultural disaster can among other things cause a financial and psychological imbalance in a home (Cosic and Deb, 2010). The imbalances can in-turn lead to (i) a child prematurely leaving school, (ii) failure to be enrolled in school, (iii) disturbance of the child's way of life by relocating (Yamano and Jayne, 2004) to a poorer household, (iv) even suffering poor health (Kadiyala et al., 2009).

In other cases, a family may opt to arrange their child an early marriage as a means of survival due to either economic or social pressures. The latter is particularly plausible in the case of a girl child. In situations, where maternal mortality has a greater impact on a child's welfare it may be the case that a male child may opt to start a family earlier as a way of seeking extra labour for the family (Jensen and Nielsen, 1997), or could lead to a delay as they seek to re-establish themselves economically (Fafchamps and Quisumbing, 2005).

Other factors remaining the same, the situations presented above could lead to an increase in the proportion of early marriages in a community. However, the plausibility of this argument is premised on the assumption that early marriage is an exception rather than the norm in the villages in the sample. There is also debate on whether the marriages are forced (Alemu, 2008) or voluntary (Oleke et al., 2006).

The generally acknowledged minimum age-at-first marriage in Ethiopia is currently 18 years (Erulkar and Muthengi, 2009). However, incidences of early marriage have been a source of concern in developing countries, Ethiopia inclusive. For example, EGLDAM (2003) (cited in Alemu, 2008) reported that, "at national level 62% of Ethiopian women aged 20-49 get married before the age of 18 (p.1)." While economic factors may partially explain this trend, societal pressures have had a role to play as well (Alemu, 2008). In this era of high HIV prevalence in some developing

countries, increased premature prime-age mortality or prolonged morbidity could worsen the situation.

The purpose of this study is to establish whether there exists a statistically significant correlation between household shocks and a subject's transition into early marriage in Ethiopian society. I use individual level data from 15 villages in Ethiopia. Based on the presumed financial imbalance that household shocks may have on a household, this paper shall test the hypotheses that:

1. Death of a parent(s) does not increase a subject's probability of early marriage.
2. Prolonged illness of a parent(s) does not increase a subject's probability of early marriage.
3. Major agricultural shocks do not increase the probability of a child's early transition into marriage.
4. Village and regional fixed-effects and not household shocks may have more influence on a child's early transition into marriage.

This investigation has been influenced by an earlier longitudinal study by Beegle and Krutikova (2008), who investigated the correlation between the timing of marriage and the death of a parent in households in Tanzania. According to their findings, there was a positive and significant correlation between the timing of marriage and paternal orphan hood for girls (ibid).

Unlike Beegle and Krutikova (2008), in addition to parental mortality this study attempts to measure the influence of other household shocks such as parental morbidity and agriculture shocks on a child's transition into early marriage. The significance of this study is that it could help refine the process of identifying the determinants of early childhood marriages in parts of rural Ethiopia. In so doing, it could assist authorities and other interested social groups fighting early childhood marriages in Ethiopia to better target their reform and poverty safety net strategies. Further, early childhood marriages have implications on the health and education of

the concerned children and possibly their offspring. Other factors held constant, the health and education effects may negatively affect Ethiopia's human capital development.

The paper is organised as follows: In Section 2, we describe the setting of the study by presenting some country specific economic data as well as the human capital characteristics of the population of Ethiopia. A review of literature relevant to the study is undertaken in Section 3 followed by a description of the data that is presented in Section 4. Section 5 presents the model and methodology used to arrive at the results that are presented and analysed in Section 6. Lastly but not the least, the conclusion is presented in Section 7.

2. THE SETTING

Ethiopia is located in the North-Eastern part of Africa commonly referred to as the 'Horn of Africa.' It is surrounded by the Republic of Sudan and the Republic of South Sudan to the west, Kenya to the south, Somalia to the east and Eriteria and Djibouti to the north. The nation's capital is called Addis Ababa and is the seat of the federal Government. A second administrative location is based in Dire Dawa. In addition to the two there are 9 regional administration authorities (Figure 1) in Tigray, Affar, Amhara, Oromiya, Somali, Benishangul-Gumuz, Southern Nations Nationalities and Peoples (SNNP), Gambela and Harari (Government of Ethiopia and USAID, 2013).

In 2014, Ethiopia had a reported population of approximately 97 million people of which only 19% lived in urban areas with the rest leaving in rural areas (World Bank, 2015). The country's average population growth rate in 2014 stood at 2.5% (ibid). According to the Ethiopian Demographic and Health Survey (EDHS) 2011, a large proportion of the Ethiopian population is under the age of 15" (p.13). Female-headed households account, for 25% of the population (Government of Ethiopia and USAID,

2013), while life expectancy at birth currently stands at 63 years of age (World Bank, 2015).

Ethiopia is predominately an agro-based country with very little manufacturing taking place. In 2014, agriculture contributed 41.9% to the Gross Domestic Product (GDP) although services have grown significantly (23.3% - 43.4%) since 1991 (World Bank, 2015). The country's GDP in 2014 stood at $56.61 billion with an average annual growth rate of 10.3%. The major export is coffee, which is mainly grown on a subsistence basis by individual families. According to Bloomberg (2014), coffee export revenues for the period 2014-15 were estimated at $900 million. Other significant exports include leather, hides and skins and khat. Like many other sub-Saharan African countries, Ethiopia's import basket mainly comprises capital goods and fuel. The country is very drought-prone with one of the worst droughts to hit the country being experienced in the 1980s. Images of millions of people afflicted by starvation were common place in various global news media.

In the 1970s, there was a civil war, which negatively impacted literacy rates in Ethiopia. But the situation has improved significantly since 1994 due to introduction of universal primary education programs for children between the ages of 7-14 years (World Bank, 2005). This was also done as part of the country's implementation of the Millennium Development Goals (MDGs). The Ethiopian general education system comprises three years of kindergarten, eight years of primary, two years of junior high school and two years of senior high school (Ethiopian Ministry of Education, n.d.). There is a tertiary education sector too. The official age for commencement of formal education is seven years but like most other sub-Saharan African countries it is not uncommon to find late starters.

HIV prevalence rates in Ethiopia are relatively low at 1.5% in the 15-49 years age group (Government of Ethiopia and USAID, 2013). The study also reported higher prevalence rates between women and men in the age group 15-39. Rural HIV prevalence rates stood at 0.6% compared to 4.2.

3. LITERATURE REVIEW

The literature presented in this section is not exhaustive of what is available on the subject area. As such the author used on a best efforts basis literature that was considered suitable and helpful in arriving at a meaningful and probably useful conclusion. For ease of reading, the literature has been grouped into various themes as indicated by the headings of each.

3.1 Parental mortality and marriage

Early marriage has been an area of concern in Ethiopia. According to Alemu (2008), marriage in Ethiopia can be broken down into three types namely: Promissory, Child Marriage and Adolescence. However, what is clear is that the forms of marriage may vary from one community to another and circumstances (Dercon and Hoddinott, 2011). But, the payment of either bride price or receipt of dowry is important in formalising the process in some cultures (Dercon and Hoddinott, 2011). There is a high prevalence of early marriages in Ethiopia although ratios vary by region (Alemu, 2008).

One reason why the high prevalence of early marriages is a source of concern is the negative implications that they could have on health and coupled with the socio-economic consequences for Ethiopia. For example, loss of income (in the absence of alternative sources) can lead to lower investment in education (Beegle et al., 2006; Beegle and Krutikova, 2008) and as such have negative implications on good health. The problem with most of these marriages is that they are imposed on the children, especially the girls (Win, 2009). For example, some are literary abducted by either their suitors or the suitor's family (CNN, 2013). One drawback with most writings on this topic is the focus on the girl child. This would seem to imply that male children enjoy the prospect of early parenthood, which brings with it a lot of additional responsibilities, especially after

offspring arrive. So far there is insufficient evidence to prove this. But again, as found by Fafchamps and Quisumbing (2005) male children tend to wait longer as they prefer to accumulate basic assets prior to marriage.

Sometimes, when a parent dies the surviving children may become substitutes for the deceased adult's labour (Beegle et al., 2006; Senbet, 2010). But, it could be argued that such consequences can exist even in the absence of orphan-hood. This is plausibly true in communities that have a low life expectancy, where again children are taught household chores at very tender ages. There are household income effects (Cosic and Deb, 2010; Deb and Rosati, 2002; Jensen and Nielsen, 1997) as well as cultural ones, where a child is expected to help out with certain household tasks regardless of whether they are orphans or not.

3.2 Marriage as risk management

Marriage is also seen as a way to share risk especially following an income shock (Rosenzweig and Stark, 1989). As argued prior, early marriage could lead to a child dropping out of school even without a parental death occurring in the household. The health and income effects come into play here too. Female orphans are more likely to get married early especially, if originating from poorer households. In an Indian study, Sekhri and Storeygard (2011) found a positive correlation between dowry payments and periods of agriculture shocks suggesting that girls are more likely to be married off in times of crisis. The preferred destination tends to be to families living in areas with more favourable climatic conditions (ibid). This finding resonates with Beegle et al. (2007), who suggested that a girl's socio-economic worth increased in times of crop shocks and raised the probability of marriage.

3.3 Early marriage and health consequences

Statistics have put the average age of early marriage in the range of 15-17 years of age (Bongaarts, 2007; Government of Ethiopia and USAID, 2013). Among the reasons advanced for the vice is prime-age-adult mortality

(Beegle et al., 2006; Beegle and Krutikova, 2008; Yamauchi, 2007). Yet others have linked early marriage to HIV prevalence rates (Clark, 2004).

Bongaarts (2007) conducted an ecological analysis of Demographic and Health Survey (DHS) data from 33 sub-Saharan African countries and found a positive and significant correlation between HIV prevalence and age-at-first marriage of adult women. This implies that ceteris paribus the longer a woman takes to be married the higher the chances of having multiple partners and as such contracting HIV. In addition, the study also found a lower median age-at-first marriage in rural compared to urban areas.

However, this argument and its related finding would seem to intimate that it is alright for men to marry late as they are implied to be less likely to have multiple partners compared to older women but the same should not apply to women. Caution is advised in interpreting these results as the high prevalence of HIV does not necessarily indicate when the infection took place. For example, it could have taken place either at the first sexual encounter or even after marriage.

Similarly, evidence from South Africa in a study by Yamauchi (2007) indicates that "education reduces the probability of early marriage but increases the probability of contracting HIV".

However, it can be argued that the correlation could be influenced by unobservable factors such as the culture and norms of the community under study. The findings may not hold in highly conservative societies, where pre-marital sex is frowned upon (Lindstrom et al., 2009). There is also a possibility of endogeneity between parental mortality and marriage as shall be explained below.

Beegle and Krutikova (2008) use panel data from Kagera in Tanzania and challenge the view that marriage protects against promiscuity and therefore, reduces the probability of an individual contracting HIV. Among the proponents of the latter hypothesis have been Oleke et al. (2006) and Clark (2004). However, this may not be true as it assumes that the husbands do not stray. The latter view is supported by the findings of Clark (2004)

(cited in (Beegle and Krutikova, 2008)) from studies conducted in Zambia and Kenya, where the prevalence of HIV/AIDS was found to be higher among married women. Suffice to say, that under strict assumptions it is plausible that other things remaining constant the chances of contracting HIV are reduced, if a woman is married.

In a study on 'education and health' Vogl (2012) posits a positive link between parental education and a child's health. The argument is that educated parents tend to be healthier than the less educated ones and therefore, are more likely to have healthier children. Therefore, one of the benefits of increasing the level of education is that, it assists in delaying a child's transition into an early marriage arrangement. By implication there is therefore, a benefit in a child avoiding early marriage by extending their stay in school. However, the validity of the foregoing argument can be questioned. It would seem there is a presumption that uneducated people do not know the benefits of good health. But this may not necessarily be true. Sometimes, there is also debate on what the meaning of being 'educated' is especially as applied to non-English speaking natives.

3.4 Parental mortality and school outcomes

Parental mortality has been found to have a negative impact on a child's schooling outcomes. The hypothesis is that parental death may have a negative economic impact on a household resulting in the children among other things leaving school prematurely.

Using Complementary Panel Survey (CPS) data for Malawi, Ueyama and Yamauchi (2009) find that maternal and double orphans compared to paternal and single orphans respectively are more negatively impacted by parental mortality. The major impact among this group was found in the 12+ years age group, whose probability of enrollment declined with age. "No significant difference was found in grade progression" (p.25). However, household

income seems to have a significant effect on enrollment of maternal orphans.

Mani et al. (2009) used the same data set as this study to examine the determinants of school outcomes in Ethiopia. Among their findings was the evidence of "a huge out-migration among high school age females due to early marriage (p.6)". This finding is corroborated by Ezra and Kiros (2001) (as cited in (Mani et al., 2009)), who found that 79% of women in Ethiopia left school and initial households due to marriage. Studies by Bongaarts (2007) and Government of Ethiopia and USAID (2013) established the average age-at-first marriage in a range of 15 to 17 years old. As noted earlier, this is contrary to the country's legal age of marriage of 18 years old. Nonetheless, it is imperative to note the possibility of endogeneity between education and transition into marriage. For example, if a child drops out of school that could increase the likelihood of an early transitioning into marriage. But it is also possible that a child drops out of school either prior to the parents arranging a marriage for them or the children eloping. Therefore, the argument would be that because a child quit school they got married rather than that they quit school because they got married. This is highly likely in the case of a girl child.

Other studies on parental mortality and morbidity found a negative but insignificant correlation between the former and school outcomes (Mather, 2011a,b). In the latter studies, there is mixed evidence of gender bias against school enrollment for girls, although school progression was not affected. For example, gender bias against females was evident in Zambia but not Mozambique. Mather (2011a,b) thus supports targeted subsidies as a solution to the problem of bias. A number of methodological questions arise from Mather's studies some of which are covered here. First, it is our opinion that there may be some error in the measurement of the 'cause of death,' as this is a matter of speculation by a non-expert respondent. What if the cause of death was cancer and not HIV/AIDS? Second, Mather uses distance measures that do not necessarily capture school

effects. Using distance to main road suggests that student generally first walk to the main road and then along it in order to get to school. Suffice to say that the route that rural children take to school is a function of among other things the location of the school. In villages, the route would typically be foot paths rather than along the main road. Third, the sample comprised only of children of age 10 or greater.

Himaz (2009) reported in a Young Lives study conducted in Ethiopia that maternal death has a more pronounced effect on school enrollment although there was no evidence of gender bias. As a measure of school quality Himaz (2009) used reading, writing and mathematical scores. It is, however, not clear from the paper how far achievement can be a sign of the quality of education without controlling for a child's natural talents.

Similarly, results from a pioneering study on parental mortality conducted in North-Western Tanzania, Ainsworth et al. (2005) found that maternal orphans aged 7-10 years old experienced lower school enrollment. This finding could justify Mather (2011a,b)'s use of a sample of children aged 10 and over. One of the reasons cited for low enrollment is the parents' perception of "overcrowding in schools" (Ainsworth et al., 2005, p.422). But, one can argue that overcrowded schools may not be a good reason not to enroll a child as it does not necessarily improve when the child enters school later. Counter-factually, delayed enrollment may be a cause of overcrowding as older kids are given priority (more like the prisoner's dilemma). Coping mechanisms do help buffer some of the long-term impacts of the death of an adult. However, orphans discriminated against are likely to be one's imposed on the host family rather than ones adopted out of compassion. Notwithstanding, the decision to adopt or not may be driven by the perceived economic benefits of the adoption hence the possibility of discrimination arising as the orphans can be viewed as additional labour.

In Ethiopia's Amhara region 50% of girls were married by age 15, and 80% were married by age 18 (Alemu, 2008). This increases the likelihood of

girls either leaving school or not attending at all in order to get married. Therefore, the longer a female child stays in school the lesser are the chances of early marriage and the higher the chances of the child becoming more economically empowered, *ceteris paribus*. As earlier indicated early marriage, among the female gender may also result from societal pressure (Alemu, 2008). In such cases a female child who exhibits signs of physical maturity generates imminent interest for marriage. But, it can be argued too that poor health could impede a child's physiological development thus possibly leading to a delay in marriage. When children engage in early marriage, it may *ceteris paribus* have implications on human capital development, bargaining power and educational attainment (Ueyama and Yamauchi, 2009). However, the reduction in human capital development and educational attainment can also affect the boy child. The impact on a female child is somewhat mitigated by Ethiopia's new education policy that allows married women to return to school (Lindstrom et al., 2009).

In a study using DHS data in Kenya, Ikamari (2005) found a positive and statistically significant relationship between education and a woman's age-at-first marriage. He also found that urban areas showed a higher age-at-first marriage. He further posited that "marriage is an important institution both for the individual and the society at large" (p.4). However, despite the perceived individual and societal importance of marriage, some child and adolescent wives do not have a pleasant memory of their marriages (CNN, 2013). Early marriage also has fertility implications for a country.

3.5 Human capital development

Parental mortality or morbidity has implications on human capital development, when such calamity leads to a child either not enrolling or just dropping out of school altogether. The logic of the argument is that ceteris paribus the presence of both parents provides economic stability to a household thus securing a child's passage to higher education. A more

educated child is expected to enjoy better health, earn more money and make better health decisions in life, especially for women (Todaro and Smith, 2011; Rose and Al-Samarrai, 2001). The combination of an educated and healthy population is expected to lead to development of a country's human capital.

However, the foregoing theory has been contradicted by some research findings. For example, Girma and Kedir (2005) in their study on returns to education in Ethiopia found that "education contributes more to the earnings of individuals at the lower end of the income distribution" (p.2). Returns are also perceived to be higher for primary school level education (Psacharopoulos, 1994) due to absence of non-farm level jobs (World Bank, 2005).

Becker (1973) found a positive correlation between "marriage and income, human capital and relative difference in wage rate" (p.813). One of the key assumptions here was that the utility maximisation objective holds (ibid). However, in a situation like that of Ethiopia, where some early marriages tend to be forced (Alemu, 2008) the hypothesis of marriage being a way of raising utility may not hold. Instead in these circumstances it could lead to dis-utility.

4. DATA

4.1 Origins of the Data

The data used in this study comes from the Ethiopia Rural Household Survey (ERHS). The survey follows a panel of households from 1989 to 2009. During the period of the survey, the structure of the questionnaire has evolved with time to capture more attributes of the sample. The attributes covered include income, consumption, credit, education, children's and women's activities and household assets.

The panel originally comprised of 1477 households from 15 villages but has at the 2009 survey reduced to slightly over 1300. It is imperative

to note here that the 15 villages were chosen more on the basis of available funding and the perceived ease to follow-up on the respondents (Dercon and Hoddinott, 2011). Households are identified by Region, Woreda (district) and the Peasant Association (village unit). This information is available from community leaders tasked with the responsibility of keeping records for each village. The sample does not include communities that are nomadic owing to the practice of pastoral farming. This should be taken into account in interpretation of any results based on this data. Nonetheless, the 15 villages are considered representative of the arable farming communities in Ethiopia in terms of characteristics such as religion, tribe and marriage customs (Fafchamps and Quisumbing, 2005). The villages (PAs) from which data was collected are shown in Table 1. Community level data is also collected and where necessary has been used in the interpretation of results in this study.

The original data was collected using a combination of qualitative fieldwork, secondary sources as well as interviews. Households in the sample were randomly selected using stratified sampling. Characteristics considered in the stratification included the farming system and gender of the head of household.

In this study, a subject's marital status in 2009 is used as the dependent variable. A noted limitation of the data is the absence of either the year-of-first marriage or age-at-first marriage information, which would have been better variables to use in an analysis of the nature of our study. Most of the previous studies have mainly focused on parental mortality and its impact on school outcomes, child health and child labour. Further, the studies on early marriage have generally focused on the health and educational consequences.

4.2 Description of the sample

In this study, a sample of children will be followed from 1999 to 2009, which is Round 5 to Round 7 of the survey respectively. The panel is

short and represents two data points (1999 and 2009) in the study rather than a 10-year time series. A total of 1120 subjects (representing 2240 observation points) aged 5-25 years are in the baseline sample (Table 2).

The dependent variable in the study is 'married' and is binary in nature taking a value of 1 if applicable and 0 otherwise.

Age of child, age squared, gender of child, household size, economic status (poor or not), household shock (either adult death or agro-linked shock or prolonged parental illness), peasant association (village), region and year are all regressors. The justification for use of the preceding regressors will be covered in the next section, where the methodology is presented.

Table 2 presents a summary of the statistics on key variables used in the study. Notwithstanding the visual, it is worth commenting on some of the notable features of the data used in the study.

A review of the dependent variable married reveals that approximately 14.5% (Table 2) of the subjects in the study were married by the end of the 10-year period under consideration. This could be considered a relatively low percentage and contradicts earlier expectations of a much higher proportion of married individuals (Alemu, 2008) by the end of the study period. A further analysis of the married subjects, reveals that 57.5% of them were aged between 15 and 25 years old inclusive.

In addition, this study reviewed the subjects by gender and found that 66.7% of the females in the sample were married by the end of the study period. The latter statistic being high could raise suspicion of polyandry in Ethiopian society. However, while cases of polygyny are frequent in some parts of Ethiopia (Gibson and Mace, 2007), incidences of polyandry are rare owing to the highly conservative nature of Ethiopian society. Therefore, the high proportion of married women is unlikely a reflection of polyandry but probably more likely due to the fact that not all the husbands may have been captured in the sample of study. For example, a woman in the sample could be aged 30 (in 2009) and married but

with a 50-year old husband, who would clearly be outside the sample of interest. Suffice to say, that although the sample used in the study may be small the result may have implications on the Government's strategy in implementing policies that protect children against early marriages. The latter situation could in the long-run have a negative impact on Ethiopia's human capital development, if the vice is not curbed.

The average age of the sample in the study was 18 years old with almost 55.8% of them being male children. It can also be seen from Table 2 that 52.8% of the households had less than 8 persons. The average household non-food expenditure (*ln_nfe*) was 6.69 birr.

Also worth mentioning are the statistics on the household shock variables *agriculture, death* and *ill* respectively. Overall, Table 2 shows that 44.5% of the sample came from households that had experienced a significant agricultural related shock. The result corroborates the earlier statement about the frequency of droughts and floods in Ethiopia. The data also shows that an average of 5.8% of the households suffered a parental death. Time allowing, it would be interesting to compare this statistic with that of households in urban Ethiopia. Comparatively, 15.9% of the households experienced prolonged illness of at least one parent. It was not possible to decipher from the data as to what proportion of these cases of prolonged parental illness ended in death. There may therefore, be some correlation between death and illness just like there is a possibility of some correlation arising from the relationship between agriculture shocks and death.

5. METHODOLOGY

5.1 Generation of the sample

In generating the sample, the first step was to assess the wave files and identify all the variables of interest in the years 1999 and 2009 respectively. After merging and cleaning-up of the relevant files, all the

households that had experienced the respective household shocks either before or in the year 1999 were stripped-out. A sample comprising individuals of aged 5 years old to 25 years old, inclusive was retained. Contrary to other studies (Ikamari, 2005; Beegle and Krutikova, 2008), this study opted to include children above the age of 14 years owing to the fact that (i) the proportion of subjects who were married before the age of 25 is very low and (ii) for all intents and purposes in Ethiopian society many of unmarried individuals tend to live in their parent's homesteads and therefore, not necessarily independent prior to marriage. To be able to proceed, a unique identification variable id was created for each individual in the sample.

For purposes of analysing the effects of the regressors on marriage, the sample was split into male and female respectively.

5.2 Econometric methods

A suitable methodology for this study would have been the use of survival analysis with a time-to-event dependent variable (Kleinbaum and Klein, 2012). Survival analysis also has the benefit of properly accounting for sample attrition owing to censoring. The dependent variable marriage in a survival analysis model is a time variable that measures the span between orphan-hood and change of a child's marital status. However, owing to incomplete information on time of event in the ERHS survival analysis could not be used.

This study uses ordinary least squares regression with individual, household and village controls as the first analytical approach. The second analytic approach is a fixed effects regression. This method allows for more powerful control for observed and unobserved individual, household and village time-invariant characteristics.

5.3 Ordinary Least Squares

The basic regression presented in this study is a pooled OLS model that regresses marriage on the matrix of household shocks $\boldsymbol{S}$ in three individual equations for each gender:

$$M*_{ijt} = \boldsymbol{S}_{ijt}\,\theta + \upsilon_{it} \tag{1}$$

where, $M*$ = prob(Marriage = 1), S = Matrix of shock events (either agricultural, death or illness) and subscripts i = Child, j = Household and t = Time.

However, it is important to control for the possibility of other variables that may influence the outcome thus requiring a multivariate analysis.

The individuals in the study are situated in 15 villages in different regions of the country therefore, raising the possibility that the model may suffer from Omitted Variable Bias (OVB). The latter may be caused by social factors such as cultural norms (Stock and Watson, 2003). In addition, owing to the fact that the panel is being tracked over two cycles it was appropriate to also fit a fixed effects model. The basic model (1) specified above is modified to include matrices comprising dummy variables that shall capture individual and village-specific effects.

$$M^{*}_{ijt} = \boldsymbol{S}_{ijt}\,\beta + \boldsymbol{X}_{ijt}\,\theta + \boldsymbol{Z}_{ijt}\,\theta + \upsilon_{it} \tag{2}$$

where, S = Matrix of shock events (either agricultural, death or illness), X = Matrix of individual-specific covariates, Z = Matrix of village-specific effects and subscripts i = Child, j = Household and t = Time.

The model measures the probability of a subject entering into marriage after having experienced a household shock as defined in this study. The dependent variable measures the probability of a subject being

married within the 10-year study period given the existence of a shock or combination thereof.

Age is used as a regressor in order to capture the time variant influence of the variable on the individuals in the sample on the probability of marriage. The expected relationship between age and probability of marriage is positive implying that the older the subject gets the more likely they are to get married. Further, it can be noted that the relationship between marriage and age is unlikely to be linear. As such the age variable is squared so that the function is a quadratic rather than linear.

The influence of a child's household economic status has been modelled into the equation via the non-food expenditure variable *nfe*. The natural log form of the variable is used in this case. The higher the natural log of *nfe* the better the economic status of the household of originally other factors held constant. A threshold is then set below, which a household is considered 'poor'. This is the dummy variable that is then used in the model.

In other cases, the size of a household may matter with the expectation that children from large households would have a higher probability of transitioning to marriage earlier other factors held constant. In the equation, household size is modelled as the binary variable *hhs* taking a value of 1 for households with less than 8 people and 0 otherwise.

A child's gender may influence a parent's decision to allow them to marry (Beegle et al., 2007; Sekhri and Storeygard, 2011; Rosenzweig and Stark, 1989). Here, the females are expected to be positively correlated with probability of marriage all else held constant.

There is a possibility that the decision to marry could be influenced by other social factors. In this regard, a village dummy variable shall be included as a control. In addition, the influence of time variations such as Government policy pronouncements that could affect the likelihood of

early marriage has been controlled for by inclusion of a year dummy variable.

5.4 Fixed Effects

This study involves individuals and therefore, it is imperative to recognise the existence of individual attributes that are time-invariant. Examples of such attributes include an individual's gender, tribe, race or motivation to mention just a few. Suffice to say that these attributes may be either observable or unobservable in the subjects of study.

Our interest in the study is to investigate the effect of time-variant factors on the dependent variable and as such it is imperative to control for any influences of unobservable time-invariant factors. There is a possibility that unobservable attributes could be correlated with the regressors and as such introduce OVB. "Individual-specific effects increase in number as the sample size approaches infinity" (Cameron and Trivedi, 2005) (p.726). By using a fixed effects regression model, the effects of unobservable time-invariant attributes of the individuals are removed so that only the influences of the time-variant attributes are measured. By so doing, we shall only be interested in the changes in marital status arising from a child's within variation. A key assumption in the fixed effects model is the "exogeneity of the regressors conditional on the unobserved effect" (Wooldridge, 2010) (p.266). The fixed effects model is therefore, represented by the following equation:

$$M*_{ijt} = \boldsymbol{S}_{ijt}\,\beta + \boldsymbol{X}_{ijt}\,\theta + \boldsymbol{C}_i\,\theta + \upsilon_{it} \qquad (3)$$

where, S = Matrix of shock events (either agricultural, death or illness), X = Matrix of other time-variant covariates, C = Matrix of unobservable effects and subscripts i = Child, j = Household and t = Time.

In the section that follows, the results of the regression models based on pooled OLS and fixed effects regression methodology are presented beginning with the basic model.

6. RESULTS

6.1 OLS Basic

In the basic model, we use OLS to measure the impact of the three household shock variables on a subject's transition into marriage and the results are reported in Tables 3 and 4 for the male and female gender respectively. In Table 3, the results show that for the male gender each of the shocks are positively correlated with transition into marriage and are statistically significant albeit at 0.1%. This implies that other factors held constant the household shocks individually are likely to influence decisions concerning a male child's transition into marriage.

In assessing the impact of the individual household shocks on the transition into marriage for the girl child, the results in Table 4 indicate that there is only a positive correlation with marriage in the case of an agricultural shock. In the latter case, a girl child's likely transition into marriage is increased by 2.7% all else held constant but is statistically insignificant. This result may all factors held constant reaffirm the findings of Sekhri and Storeygard (2011), Beegle et al (2007) and Ezra and Kiros (2001) alluded to earlier. But caution is also advised in interpreting the results as they may be influenced by endogeneity in the model.

Overall, the results are in line with expectations in as far as the resultant exogenous shock that the events may bring to the household economic position (Parker et al., 2009; Beegle et al., 2007; Rosenzweig and Stark, 1989). However, in the case of an agricultural shock it could be argued that the wide spread nature of such an event would imply that families may not be very keen to take on extra headcount as the basic needs

would tend to be in short supply. But critical in furthering this argument would be availability of data on the timing of marriage in the proximity of the calamity. Unfortunately, timing of marriage data is unavailable in the ERHS.

6.2 Inclusion of control variables

The results in Tables 5 and 6 are of the pooled OLS model that aims to capture the effects of individual and village factors in addition to household shocks, household size and economic status. The village factors are captured through the Peasant Association dummy variable *pa*. The result suggests that *ceteris paribus* agriculture as well as parental illness shocks and marriage are positively correlated and statistically significant (at 5%) for the male gender. The variables *agric* and *illness* increases a male child's likelihood of transitioning into marriage by 8.7% and 7.9% respectively *ceteris paribus*.

Comparatively speaking, the age of male subjects is negatively correlated with marriage and is statistically significant at 5% (Table 5), while a positive but statistically insignificant correlation exists in the case of the female gender *ceteris paribus*. The finding is contrary to the expectation that age would be positively correlated with marriage for both gender (Muthengi and Erulkar, 2011; Alemu, 2008; Bongaarts, 2007). The situation may be attributed to a possible correlation with household economic status. Suffice to note that, while *death* is statistically insignificant for the male gender (Table 5) all the shock variables are statistically insignificant for the female gender (Table 6). Although statistically insignificant, the negative correlation between *illness* and a female child's transition into marriage may *ceteris paribus* corroborate the labour supply argument (Parker et al, 2009; Beegle and Krutikova, 2008; Rosenzweig and Stark, 1989).

A notable change in the results is the finding that for both gender there is now a positive correlation between household size and transition

to marriage. In addition, for the male gender, the results show a statistically significant (at 5%) correlation between household size and the likelihood of marriage. The study found that *ceteris paribus* in a situation, where the household experiences an agricultural shock, household size increases by 3.4% (Table 5) the probability of a male subject transitioning into early marriage. The results also show that in two cases (Table 5) and six cases (Table 6) respectively village-specific effects are positively and significantly correlated with transition into marriage. The finding hints at the possible influence of cultural, religious and generally village level factors that may have been captured in the error term in the basic model *ceteris paribus*. From a policy perspective, this finding could help in the implementation of targeted initiatives aimed at discouraging possible trends of early marriages in the concerned villages.

6.3 Fixed Effects regression

Tables 7 and 8 reflect results of a fixed effects model by gender. It is imperative to highlight that in this model, in addition to the exogenous household shocks, we measure the impact of the household's economic status and size of household on a child's transition into marriage. We note from the results (Table 7 and 8) that although the respective shock variables increase the likelihood of marriage for children of both gender the more significant impacts are among the females.

In the case of the females (Table 8), parental illness all else held constant increases the likelihood of marriage by 7.8% and is significant at 5% level of significance. In interpreting the latter result, caution may need to be exercised as there is a possibility of a variation in effects by household and gender of afflicted adult (Mather, 2011b).

An agricultural shock has a positive and significant (at 1%) impact on a girl child’s transition into marriage increasing the likelihood by 4.4% *ceteris paribus*. Interestingly, *death* has no significant effect on a girl child's transition into marriage *ceteris paribus*. The latter result is

contrary to expectations and could *ceteris paribus* reflect the negative labour supply effects of parental death resulting in delayed progression into marriage (Beegle and Krutikova, 2008; Rosenzweig and Stark, 1989; Parker et al, 2009). Also worth noting is that contrary to expectations neither household size nor economic status have any statistically significant impact on the transition into marriage for both gender *ceteris paribus*. In addition, the household size and economic status have negative signs. The inverse relationship between household economic status and marriage in the case of the male child suggests that boys from poor families married at a comparatively older age than their female counterparts. This could be so in order for the boys to acquire a sound economic base before marrying.

7. CONCLUSION

Early marriage can have negative consequences on the society. Such consequences range from health to education outcomes and have been found to have a negative impact on a country's human capital development. This study set out to investigate the impact of household shocks on a child's transition into marriage in 15 villages in Ethiopia. The transition mechanism was that the household shocks could disturb the economic position of a household leading to acceleration in a child's transition into marriage. This could be true in societies were marriage is an important social safety net.

Using panel data modelling and analysis, the study finds that the correlation between household shocks and marriage is generally positive but its statistical significance varies from one gender to the other. In most of the models run, the results also suggest that agricultural shocks and paternal morbidity have a positive and highly significant impact on the likelihood of a subject's early transition into marriage. This finding raises the need for concerted efforts in educational and social safety net

programs during times of calamity. The result does not, however, imply that the agricultural shocks cause early marriage but that based on the data, children from households that were severely impacted by agricultural shocks were more likely to be married earlier compared to the rest.

The results presented in this study are not at all conclusive and would benefit from more refined data, which would enable a researcher to model using survival analysis. In addition, we note from the analysis above that the OLS regression presented less statistically significant results compared to the fixed effects model. This situation may be attributed to how OVB is dealt with by the two models. As highlighted earlier, subjects' unobserved characteristics could be correlated with the regressors in the models and as such their influence needs to be stripped out of the regressions for more efficient estimators. Although in OLS regression OVB can be controlled by inclusion of more variables, it does not necessarily take care of the influence of time-invariant characteristics. As observed above, fixed effects models provide a better control of the effects of time-invariant attributes as they measure only the effects on the dependent variable of changes in time-variant characteristics or what is better referred to as within-variation.

REFERENCES

Ainsworth, M., Beegle, K., and Koda, G. (2005). The impact of adult mortality and parental deaths on primary schooling in North-Western Tanzania. *The Journal of Development Studies*, 41(3):412-439.

Alemu, B. (2008). Early Marriage in Ethiopia: Causes and Health Consequences. *Exchange on HIV/AIDS, Sexuality and Gender*, (1):4-6.

Becker, G. S. (1973). A Theory of Marriage: Part I. *Journal of Political Economy*, 81(4):813-846.

Beegle, K., De Weerdt, J., and Dercon, S. (2006). Orphanhood and the long-run impact on children. *American Journal of Agricultural Economics*, 88(5):1266-1272.

Beegle, K., Dehejia, R. H., and Gatti, R. (2007). *The Consequences of Child Labour: Evidence from Longitudinal Data in Rural Tanzania*. http://users.nber.org/rdehejia/ papers/bdgk.pdf. Accessed: 10.21.2013.

Beegle, K. and Krutikova, S. (2008). Adult mortality and children's transition into marriage. *Demographic Research*, 19(42):1551-1574.

Bloomberg (2014). *Ethiopia Coffee Export Earnings May Rise 25% on World Supply*. http://www.bloomberg.com/news/articles/2014-08-20/ethiopia-coffee-export-earnings-may-surge-25-on-world-supplies.html . Accessed: 3.7.2016.

Bongaarts, J. (2007). Late marriage and the HIV epidemic in sub-Saharan Africa. *Population Studies*, 61(1):73-83.

Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics: methods and applications*. Cambridge university press.

Clark, S. (2004). Early Marriage and HIV Risks in Sub-Saharan Africa. *Studies in Family Planning*, 35(3):149-160.

CNN (2013). Girl Rising - Stories of girls fighting to go to school. *Film* aired on (6.17.2013).

Cosic, D. and Deb, P. (2010). The Effects of Mortality Shocks on Household Spending on Education, Health and Nutrition. In Fuentes-Nieva, R. and Seck, P., editors, *Risk, Shocks and Human Development On The Brink*, 207-220. Palgrave Macmillan.

Deb, P. and Rosati, F. (2002). Determinants of Child Labor and School Attendance: The Role of Household Unobservables. *Technical Report*, Hunter College: Department of Economics.

Dercon, S. and Hoddinott, J. (2011). The Ethiopian Rural Household Survey 1989-2009: Introduction. *mimeo*, International Food Policy Research Institute (IFPRI).

EGLDAM (2003). *Old beyond imagings: Ethiopia, Harmful Traditional Practices*. http://nctpefgm.net/downloads/obi.doc . Accessed: 7.31.2013.

Erulkar, A. S., & Muthengi, E. (2009). Evaluation of Berhane Hewan: a program to delay child marriage in rural Ethiopia. *International Perspectives on Sexual and Reproductive Health*, 6-14.

Ethiopian Ministry of Education (n.d.). *About the Ethiopian Education System*. http://www.moe.gov.et/English/Information/Pages/Genedu.aspx. Accessed: 10.9.2013.

Ezra, M. and Kiros, G.-E. (2001). Rural Out-migration in the Drought Prone Areas of Ethiopia: A Multilevel Analysis. *International Migration Review*, 35(3):749-771.

Fafchamps, M. and Quisumbing, A. R. (2005). Marriage, bequest, and assortative matching in rural Ethiopia. *Economic Development and Cultural Change*, 53(2):347{380.

Gibson, M. A. and Mace, R. (2007). Polygyny, Reproductive Success and Child Health in Rural Ethiopia: Why marry a married man? *Journal of Biosocial Science*, 39:287{300.

Girma, S. and Kedir, A. (2005). Heterogeneity in returns to schooling: Econometric evidence from Ethiopia. *The Journal of Development Studies*, 41(8):1405-1416.

Government of Ethiopia and USAID (2013). Ethiopia Demographic and Health Survey 2011. *Report*, GOE and USAID, Addis Ababa.

Himaz, R. (2009). The impact of parental death on schooling and subjective well-being: Evidence from Ethiopia using longitudinal data. *Young Lives*, Working Paper 44, University of Oxford.

Ikamari, L. D. (2005). The effect of education on the timing of marriage in Kenya. *Demographic Research*, 12(1):1-28.

Jensen, P. and Nielsen, H. S. (1997). Child Labour or School Attendance? Evidence from Zambia. *Journal of Population Economics*, 10(4):407-424.

Kadiyala, S., Quisumbing, A., Rogers, B., and Webb, P. (2009). The impact of prime age adult mortality on child survival and growth in rural Ethiopia. *World Development*, 37(6):1116-1128.

Kleinbaum, D. and Klein, M. (2012). Introduction to Survival Analysis. In *Survival Analysis, Statistics for Biology and Health*, 1-54. New York: Springer.

Lindstrom, D.P., Kiros, G.E., and Hogan, D.P. (2009). Transition into first intercourse, marriage, and child-bearing among Ethiopian women. *Genus*, 65(3).

Mani, S., Hoddinott, J., & Strauss, J. (2009). Determinants of Schooling Outcomes: Empirical Evidence from Rural Ethiopia. *Fordham University, Department of Economics Discussion Paper*, (2009-03).

Mather, D. (2011a). Working-Age Adult Mortality, Orphan Status, and Child Schooling in Rural Mozambique. *Working Paper 117, Michigan State University, Department of Agricultural, Food, and Resource Economics*.

Mather, D. (2011b). Working-Age Adult Mortality, Orphan Status, and Child Schooling in Rural Zambia. *Working Paper 118, Michigan State University, Department of Agricultural, Food, and Resource Economics*.

Muthengi, E. and Erulkar, A. (2011). Delaying early marriage among disadvantaged rural girls in Amhara, Ethiopia, through social support, education, and community awareness. *Transition to Adulthood Brief 20*.

Oleke, C., Blystad, A., Marie Moland, K., Bjorn Rekdal, O., and Heggenhougen, K. (2006). The varying vulnerability of African orphans. The case of the Langi, Northern Uganda. *Childhood*, 13(2):267-284.

Parker, D. C., Jacobsen, K. H., and Komwa, M. K. (2009). A Qualitative Study of the Impact of HIV/AIDS on Agricultural Households in Southeastern Uganda. *International Journal of Environmental Research and Public Health*, 6(8):2113-2138.

Psacharopoulos, G. (1994). Returns to investment in education: A global update. *World Development*, 22(9):1325-1343.

Rose, P. and Al-Samarrai, S. (2001). Household constraints on schooling by gender: Empirical evidence from Ethiopia. *Comparative Education Review*, 45(1):36-63.

Rosenzweig, M. R. and Stark, O. (1989). Consumption Smoothing, Migration, and Marriage: Evidence from Rural India. *Journal of Political Economy*, 97(4):905-926.

Sekhri, S. and Storeygard, A. (2011). The Impact of Climate Variability on Crimes against Women: Dowry Deaths in India. *Technical Report, Working Paper*.[3, 4].

Senbet, D. (2010). Determinants of child labor versus schooling in rural Ethiopia. *European Journal of Social Sciences*, 17(3):414-425.

Stock, J. H. and Watson, M. W. (2003). Introduction to econometrics. Addison Wesley, Boston.

Todaro, M. P. and Smith, S. C. (2011). Economic Development. Addison Wesley, Boston.

Ueyama, M. and Yamauchi, F. (2009). Marriage behavior response to prime-age adult mortality: Evidence from Malawi. *Demography*, 46(1):43-63.

Vogl, T. S. (2012). Education and Health in Developing Economies. *Technical Report*, Princeton University.

Win, H. I. (2009). Mothers of Ethiopia Part II: Escaping Early Marriage. http://www.hu ngtonpost.com/hanna-ingber-win/mothers-of-ethiopia-part b 301245.html. Accessed: 7.31.2013.

Wooldridge, J. M. (2010). Econometric Analysis of Cross Section and Panel Data. MIT Press.

World Bank (2005). Education in Ethiopia: Strengthening the Foundation for Sustainable Progress. World Bank.

World Bank (2015). World Economic Indicators. http://www.worldbank.org. Accessed:3.7.2016.

Yamano, T. and Jayne, T. S. (2004). Measuring the impacts of working-age adult mortality on small-scale farm households in Kenya. World Development, 32(1):91-119.

Yamauchi, F. (2007). Marriage, schooling, and excess mortality in prime-age adults: Evidence from South Africa. *Technical Report*, International Food Policy Research Institute (IFPRI).

Figure 1: Administrative Regions of Ethiopia

Table 1: Sample Distribution by Region and PA

	REGION				
PA	**Tigray**	**Amhara**	**Oromia**	**SNNPR**	**Total**
Haresaw	178				178
Geblen	98				98
Dinki		78			78
Yetmen		158			158
Shumsheha	154				154
Adele Keke			182		182
Korodegaga			172		172
Trirufe/Ketchema			174		174
Imdidir				96	96
Aze Deboa				210	210
Adado				154	154
Gara Godo				138	138
Doma				74	74
Bako Tibe			258		258
Sodomo			116		116
N	**276**	**390**	**902**	**679**	**2240**

Source: Calculated from ERHS 1999 and 2009

Table 2: Summary Statistics

Variable	Mean	Std. Dev.	N
Year	2004	5.001	2240
Age	17.991	6.447	2240
Age Squared	365.21	251.486	2240
Female Child	0.442	0.496	2240
Married	0.145	0.352	2240
Parental Death	0.079	0.270	2240
Agricultural Shock	0.445	0.497	2240
Parental Illness	0.159	0.366	2240
Parental Death	0.058	0.234	2240
ln_Non-Food Expenditure	6.688	1.224	2051
Household Size	0.528	0.499	2240

Source: Calculated from ERHS 1999 and 2009

Table 3: OLS Model - Male Gender

	Agric	Death	Illness
Shock	0.113***	0.092***	0.178***
	(0.016)	(0.021)	(0.027)
_Cons	0.037***	0.072***	0.070***
	(0.010)	(0.009)	(0.008)

Source: Calculated from ERHS 1999 and 2009

Standard errors in parentheses

*p<0.05, **p<0.01, ***p<0.001

Table 4: OLS Model – Female Gender

	Agric	Death	Illness
Shock	0.027	-0.037	-0.038
	(0.026)	(0.036)	(0.055)
_Cons	0.207***	0.225***	0.222***
	(0.018)	(0.014)	(0.014)

Source: Calculated from ERHS 1999 and 2009

Standard errors in parentheses

*p<0.05, **p<0.01, ***p<0.001

Table 5: OLS Model – Male Gender

	Agric	Death	Illness
Shock	0.087*	0.021	0.079*
	(0.042)	(0.034)	(0.039)
Age	-0.017*	-0.016*	-0.014*
	(0.007)	(0.007)	(0.007)
Age_squared	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
Household Size	0.034*	0.032*	0.026
	(0.016)	(0.016)	(0.016)
Poor Household	-0.003	-0.001	-0.001
	(0.018)	(0.018)	(0.018)
Peasant Associations			
Geblen	-0.004	-0.004	-0.008
	(0.025)	(0.025)	(0.025)
Dinki	0.069	0.050	0.050
	(0.052)	(0.052)	(0.052)
Yetmen	0.013	0.007	0.008
	(0.028)	(0.029)	(0.028)
Shumsheha	0.065	0.053	0.049
	(0.035)	(0.035)	(0.035)
Adele Keke	0.183***	0.176***	0.170***
	(0.037)	(0.037)	(0.037)
Korodegaga	0.036	0.027	0.022
	(0.029)	(0.028)	(0.028)
Trirufe/Ketchema	0.002	-0.014	-0.029
	(0.027)	(0.028)	(0.029)
Imdidir	-0.030	-0.045	-0.049
	(0.039)	(0.039)	(0.038)
Aze Deboa	-0.039	-0.042	-0.048
	(0.028)	(0.028)	(0.027)
Adado	0.088*	0.076*	0.071
	(0.036)	(0.037)	(0.037)
Gara Godo	0.057	0.053	0.054
	(0.038)	(0.038)	(0.037)
Doma	0.035	0.033	0.033
	(0.045)	(0.045)	(0.046)
Year			
2009	-0.094*	-0.025	-0.035
	(0.043)	(0.022)	(0.022)
_cons	-0.013	-0.016	-0.016
	(0.053)	(0.054)	(0.052)

Source: Calculated from ERHS 1999 and 2009
Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 6: OLS Model – Female Gender

	Agric	Death	Illness
Shock	0.072	0.003	-0.090
	(0.050)	(0.031)	(0.050)
Age	0.013	0.013	0.014
	(0.008)	(0.008)	(0.008)
Age_squared	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
Household Size	0.080***	0.079***	0.085***
	(0.024)	(0.024)	(0.024)
Poor Household	0.009	0.009	0.008
	(0.022)	(0.022)	(0.022)
Peasant Associations			
Geblen	-0.052	-0.052	-0.054
	(0.057)	(0.057)	(0.057)
Dinki	0.278***	0.264**	0.263**
	(0.081)	(0.080)	(0.080)
Yetmen	0.077	0.077	0.075
	(0.052)	(0.052)	(0.052)
Shumsheha	0.068	0.052	0.050
	(0.057)	(0.059)	(0.058)
Adele Keke	0.191**	0.190**	0.199***
	(0.058)	(0.058)	(0.058)
Korodegaga	0.257***	0.252***	0.256***
	(0.075)	(0.075)	(0.076)
Trirufe/Ketchema	0.168**	0.158*	0.164*
	(0.065)	(0.065)	(0.064)
Imdidir	-0.074	-0.078	-0.081
	(0.049)	(0.049)	(0.049)
Aze Deboa	-0.062	-0.063	-0.058
	(0.049)	(0.049)	(0.049)
Adado	0.220***	0.213***	0.216***
	(0.060)	(0.060)	(0.059)
Gara Godo	0.111*	0.112*	0.111*
	(0.053)	(0.053)	(0.053)
Doma	0.057	0.055	0.055
	(0.067)	(0.067)	(0.067)
Year			
2009	-0.302***	-0.240***	-0.225***
	(0.049)	(0.027)	(0.025)
_cons	-0.327***	-0.326***	-0.332***
	(0.069)	(0.069)	(0.069)

Source: Calculated from ERHS 1999 and 2009
Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 7: Fixed Effects Model - Male Gender

	Agric	Death	Illness
Shock	0.142***	0.159***	0.222***
	(0.017)	(0.030)	(0.034)
Household Size	-0.014	0.011	-0.015
	(0.028)	(0.029)	(0.029)
Poor Household	-0.047	-0.008	-0.013
	(0.025)	(0.025)	(0.025)
_Cons	0.065**	0.067**	0.083***
	(0.022)	(0.023)	(0.023)

Source: Calculated from ERHS 1999 and 2009

Standard errors in parentheses

*p<0.05, **p<0.01, ***p<0.001

Table 8: Fixed Effects Model - Female Gender

	Agric	Death	Illness
Shock	0.044**	0.018	0.078*
	(0.015)	(0.027)	(0.034)
Household Size	-0.038	-0.036	-0.043
	(0.028)	(0.028)	(0.028)
Poor Household	-0.013	-0.002	-0.002
	(0.024)	(0.023)	(0.023)
_Cons	0.231***	0.241**	0.242***
	(0.026)	(0.026)	(0.026)

Source: Calculated from ERHS 1999 and 2009

Standard errors in parentheses

*p<0.05, **p<0.01, ***p<0.001