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Smallholder Household Characteristics and Offspring's Primary Education in Mozambique

(モザンビークにおける小規模農家世帯の特性とその子どもの初等教育に与える影響)

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SUMMARY

Apart from the daily hardness of farming, smallholder farmers are among the most disadvantaged groups, living in a survival cycle and relying on low earnings. In general, smallholder agriculture depends on family members' labor, and it produces for direct and short consumption. Parents, communities, and countries are trying to move away from sustenance agriculture, or to increase production and incorporate it into local and global markets. Despite this, the majority of the African population subsists on agriculture. The people dependent on agriculture also rely on it as the source of income used in all other household investments. Sending children to school is one of the investment decisions, if not the critical one, that parents have to make. However, investing in education is never a one-time decision, and it does not only involve school fees. The household has to evaluate and remake its choice at least yearly, and, most importantly, it has to consider the opportunity costs attached to the decision of keeping children enrolled. For the poor, this is clearly much more burdensome due to the lack of a regular income stream. Under these conditions, children may be pushed away from school, or never have a chance to enroll. In fact, the universalization of primary education by 2030 defined in the Sustainable Development Goals (SDG) has to consider that there are at least 250 million children and youths out of school in the world. According to UNESCO, Sub-Saharan Africa (SSA) has the highest rates: 20% of children aged 6 to 11, and roughly 60% of youths aged 15 to 17, are out of school. Thus, at the same time that the learning gap between the rich and the poor countries, the advantaged and disadvantaged families/groups increases, children in most developing countries do not enroll, or if they do, they enroll late, and, from the beginning, their odds of at least finishing primary education are significantly low.

Located in SSA, Mozambique shares most of the characteristics and problems of the region. The recent Mozambique "General Population and Housing Census 2017" data depict that 67% of the population live in rural areas, and the primary-sector employs 67% of the active labor. Close to 40% of the population 15 years old or older is illiterate. The statistics of the younger groups are not any better. Although the net enrollment rate in primary schools is 94%, the completion rate is

only 46%; 39% of children and youth aged 6 to 17, and 66% of children aged 6 and 7 are out of school. The crucial fact is not that these numbers are high, but that, in the period 2007-2017, they went upward. The link between the largest portion of the population living in rural areas and educational outcomes indicators translates into people living on subsistence agriculture and cyclical survival production, high levels of illiteracy and poverty, that early on increases the probability of pulling their offspring out of school and of pushing them into agriculture or to seek low paying off-farm jobs.

The ongoing debate on the best predictors of school enrollment and educational attainment has settled on the fact that demand and supply side factors matter. The set of characteristics from either side and the degree of importance of each of them is what the discussion revolves around lately. Still, due to data unavailability most of the debate and general understanding we have about human capital formation comes from developed countries. Although there is vast literature on the influence of parental occupations and parental education on schooling, in the case of Mozambique, where the majority of the population works in agriculture for sustenance, it makes more sense to further investigate the differences that may exist in children's schooling among smallhoder agriculture households and households not dependent on agriculture. Furthermore, given the general low parental education levels in developing countries like Mozambique, studies have not paid attention to how parental beliefs and aspirations influence the decision of sending children to or keeping them in school.

From the discussion and debate of the previous literature, three main research questions were developed for this study: 1) How do family characteristics influence children's school enrollment and educational attainment in farming and non-farming households in Mozambique primary education? 2) How do family characteristics influence school attendance and educational attainment in primary education in smallholder households in Mozambique? 3) How does parental expectation influence children's school attendance and educational attainment in smallholder households in Mozambique primary education? The overall objective of this study was to investigate the impact of family background factors on children's school enrollment and educational attainment in primary education in Mozambique, with focus on smallholder

households. Based on the six sub-questions of the study, three main hypotheses were developed, as follows: 1) Children living in households dependent on agriculture enroll less and attain fewer years of schooling than their peers not living on agriculture. Additionally, male-headed households and boys are positively associated with schooling (but enrolment and attainment are mediated by pupils' age); 2) There is no significant difference in school attendance between male-headed households and female-headed households, as well as between boys and girls. However, in female-headed households or under constraint, boys attend school more than girls. Related to educational attainment, male-headed households or those who receive remittances positively correlate with educational attainment. Boys are more likely to finish primary education; and 3) Parental expectation negatively influences school attendance if parents consider agriculture a business, or the head does not have an off-farm job, because the household will be more likely to undervalue education. Lastly, parental expectation positively influences educational attainment if the head has an additional off-farm job, or does not consider agriculture a viable business, because offspring will be more likely to not engage in farming in the future.

This research applied the expectancy-value method, considering the assumption that parental expectations guide the decision of investing on education, and, as a signaling mechanism, influence offspring's attitudes towards the importance of schooling. To examine the differences among households dependent and not dependent on agriculture, the study uses the General Population and Housing Census data (2007). The remaining research questions are answered by the Smallholder Household Survey 2015: Building Evidence-base on the Agricultural and Financial Lives of Smallholder Households data, collected by the Consultative Group to Assist the Poor (CGAP). Depending on the nature of the dependent variable (binary or ordinal), the study employed either the probit model or the proportional odds model.

The results of the first research question indicate that, compared to those not dependent on agriculture, children subsisting on farming significantly are less likely to enroll and finish primary education. However, occupation seems to have an insignificant role among female heads (pupils enroll and finish school almost equally irrespective of where the head is employed). Overall, compared to boys, girls have disadvantage in enrollment and attainment; however, gender

differences are not systematic. In fact, among the wealthier households or in female-headed households, pupils enroll and finish primary education equally. Gender imbalances are accentuated in disadvantaged male-headed households and rural areas. In Mozambique, there is an inverse U-shape relationship between age and enrollment. Pupils enroll more as they become older, but from the age of 12, they also start to sharply dropout of school. Thus, the observed positive association between age and the likelihood of finishing primary education. The environment of female-headed households is strongly associated with better schooling. Children living with female heads outperform their peers living with male heads, irrespective of the location and occupation. This result is important because the latest census data indicate that 34% of families in Mozambique are headed by women. Lastly, pupils who speak Portuguese at home enroll more often and are more likely to finish primary school than those speaking native Mozambican languages.

From the smallholder households' dataset, the estimation results of the second research question confirm some of the patterns presented above. Even among farmers, children from better-off households attend more and are more likely to finish primary education. However, a closer look reveals some interesting details. Farming households that live above the poverty line (in this study defined at $1.25/day) positively correlate with schooling. When measured by quintiles of the household wealth index, children from the top two quintiles are more likely to attend school and finish primary. However, the negative effect on the less affluent quintiles is stronger in the middle quintiles, second and third, not in the first. This is linked to other surprising results. Pupils from households that report to receive remittances are less likely to attend school and have lower odds of finishing primary school (including lower primary). Previous studies drew assumptions on the fact that adults (parents and adult siblings) migrate and remit back home. In the case of Mozambique, related to the fact that older pupils attend less and dropout more, remittances are negatively correlated with schooling because children are the ones who migrate to urban areas or work in informal paid jobs in rural areas. In fact, studies in Mozambique have found that 70% and 90% of urban and rural children, respectively, are engaged in one paid job by the age of 15. Consistent with the results of the first research question, children in female-headed households are

more likely to attend school and finish the cycles of primary education than their peers from male-headed households.

The third research question applies the expectancy-value method. It is appropriate in the case of smallholder farmers because most parents did not even finish primary education, and, by occupation, all primarily rely on agriculture. Estimating offspring's schooling as a function of parental expectations is a better mechanism of assessing the path through which households demand education. Two variables proxied parental expectations. The first one is if the household head has an off-farm activity or not. The assumption is that the income generated by having a secondary job would increase the demand for education, thus would be the dominant effect. However, the results oppose this hypothesis. Children in households where the head does not have a secondary job are more likely to attend school and finish primary education. This is a significant contribution to the literature because it shows that the low-paying jobs in rural or suburban areas do not provide enough income to keep children enrolled and increase their educational attainment. In addition, it shows that household heads who spend more time at home develop higher aspirations for their children's education. Uneducated parents entirely reliant on agriculture may become significantly aware of their limited options for generating a regular salary. The second proxy applied is if the household head considers agriculture a business or not. The assumption was that household heads who consider agriculture a viable business would undervalue education. In the short run, children whose parents see farming as a business attend more school than their peers. It may be that the household heads who consider agriculture a business, do it in respect to themselves, not their offspring; thus, in principle, have higher expectations for the schooling of their children. However, in the long run, the data validate the hypothesis: children from households where agriculture is considered a business are less likely to finish primary.

In a nutshell, family factors determine schooling and educational attainment in Mozambique. The specific characteristics that make female-headed households to become better environments for schooling even among the most disadvantaged households should be deeply investigated, and applied to raise children's school participation. Measured by the two proxies used in this study, higher parental expectations among smallholder farmers positively correlate

with schooling. However, even when parents start with high expectations, due to monetary constraints and the opportunity cost of schooling over time, as pupils become older, they drop out to participate in the informal markets and low-paying jobs, or to continue in sustenance agriculture, perpetuating the cycle of uneducated children and youth, that, like their parents, in the future, will head poor households.

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LIST OF ABBREVIATIONS

CDF	Cumulative Distribution Function
CGAP	Consultative Group to Assist the Poor
Covid-19	Coronavirus Disease 2019
ECE	Early Childhood Education
EFA	Education for All
EVT	Expectancy-Value Theory
FAO	Food and Agriculture Organization
FRELIMO	Liberation Front of Mozambique
GPHC 2017	General Population and Housing Census 2017
GPHC 2007	General Population and Housing Census 2007
GDP	Gross Domestic Product
GoM	Government of Mozambique
KMO	Kaiser-Meyer-Olkin test
IFAD	International Fund for Agricultural Development
ILO	International Labor Organization
IPUMS	Integrated Public Use Microdata Series
LAC	Livestock and Agriculture Census
LoI	Language of Instruction
LPM	Linear Probability Model
MCTESP	Ministry of Science, Technology, Higher Education, and Technical Professional Training
MDG	Millennial Development Goals
MINEDH	Ministry of Education and Human Development
MoEC	Ministry of Education and Culture
MZN	Metical (Mozambique Currency)
NIS	National Institute of Statistics

OLM	Ordinal Logit Model
OLS	Ordinary Least Square
OOSC	Out of School Children
PARPA	Action Plan for the Reduction of Absolute Poverty
RENAMO	Mozambique National Resistance
SSA	Sub-Saharan Africa
SES	Socioeconomic Status
SDG	Sustainable Development Goals
SNS	National System of Education
UIS	UNESCO Institute for Statistics
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UPE	Universal Primary Education
WDI	World Development Indicators

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CHAPTER 1

INTRODUCTION

1.1 Background

The level of a country's human capital significantly influences investment decisions and economic growth (Kanayo, 2017; Galor, 2011). On average, one more year of schooling, even in primary and secondary education, continues to have private and societal returns; more significantly, the returns on education in low-income countries for girls and secondary schooling have been steadily increasing (Psacharopoulos and Patrinos, 2018). Thus, households invest in their offspring's schooling, and governments invest in improving educational systems to increase the odds of successful educational outcomes. Better educated people are more capable of adapting to the fast changes in the required skills and technologies, and the instable markets of modern times. Meanwhile, education systems, especially in developing countries, not only are slow in respect to change, but also have been characterized by a learning crisis (Languille, 2014; Nakajima et al., 2018). Additionally, the learning crisis itself hides, at least, two aspects. Firstly, like any societal phenomenon, the educational crisis is calculated as an average, which reduces the real magnitude of the problem, especially in the bottom quintiles. Studies have been showing that the gap in learning outcomes between rich and poor countries, better-off and worse-off families, advantaged and disadvantaged groups has been widening year after year (Reardon, 2011; Burchinal et al., 2011; Langsten & Hassan, 2018; Autor et al., 2019). Secondly, focus on educational achievement, unarguably relevant, masks the root problem faced by most of the developing countries: children from poor households do not enroll; or if they do, they enroll late and their odds of finishing primary school are extremely low.

According to UNESCO, out-of-school children (OOSC) top 250 million, of which over a fifth are primary school aged. The majority of these children are located in developing countries. For example, in Sub-Saharan Africa (SSA), 1/5 of children aged 6 to 11, and roughly 3/5 of youths

aged 15 to 17, are out of school, which accounts for the highest rates in the world.[1] With people's incomes being rapidly reduced by the ongoing unprecedented global pandemic, these numbers are going to shift upward. Also due to the pandemic, the supply side of education is going to worsen too (technology adoption incapacity). Thus, to achieve an acceptable level of SDG 4 by 2030 requires, more than ever, scrutinization of school practices and family decisions, fast trial-and-error evaluation, and research of both supply and demand side issues.

The prediction of educational outcomes can quite quickly become tautologic. For example, for a long time it has been well known that demand and supply side issues have significant impact on educational outcomes. Yet, year after year most school outcomes in developing countries (or among the most disadvantaged groups) are negatively influenced by inputs of education systems that are well below the desirable targets. Despite governments having a monopoly on provisions of education, the supply side issues continue to lack efficient assessments and solutions. Although not always convincingly statistically significant, family characteristics are found to be the best predictors of schooling. As transmission channels of skills, they combine both "nature" and "nurture" (Björklund et al., 2007; Holmlund et al., 2011). One argument in favor of this hypothesis is that family factors, most of the times aggregated into socioeconomic status (SES), constitute a set of primordial components of child development (cognitive and non-cognitive, socioemotional development, and even health and lifestyle: see more in Bradley & Corwyn, 2002). As summarized by Heckman (2006), the differences in skill formation are due to the lack of stimulation that children should receive inside the household at an early age.

When modeling schooling from the demand side, researchers have to face the reality of a group of variables that can easily be ascertained, and others that are simply hard to measure, let alone obtain. As a consequence, it is known that SES has a positive impact on offspring education (Björklund & Salvanes, 2011), but the magnitude of its power is much trickier to predict. Among the issues that can be raised is that a variable or a set of variables that account for a positive and significant outcome in one given community/society, may be insignificant or even have the

[1] Data extracted from UNESCO and UIS data (2022).

opposite interpretation in another. Additionally, and maybe more importantly, the data availability is still a standalone issue. Optimal research requires an experimental or quasi-experimental setting of longitudinal data that include within-household and across-household variations. One such example is the study conducted Björklund et al. (*op cit.*) that estimates the factors that explain income differences in Sweden (also see Black et al., 2005b). They employ nine combinations of siblings, including twins (and twins of the same sex), adopted children, and siblings raised in different households. Such a dataset is unavailable in the majority of developing countries. Therefore, development studies face data and variable-selection constraints a priori.

The three leading SES variables have been parental education, income, and occupation. Parental education is shown to enhance the education of offspring and, therefore, lower intergenerational inequalities (Oreopoulos et al., 2006; Carneiro et al., 2007; Dickson et al., 2016). In the case of Turkey, parental education is found to be important in girls' enrollment (Smits & Hosgör, 2006). In Malawi, Shimamura and Lastarria-Cornhiel (2010) found that while father education did not influence school attendance, mother education increased the probability of attendance for both boys and girls (also see Zhao & Glewwe, 2010). However, there is no strong support for a causal interpretation of the relationship between parental education and children educational outcomes (Black et al., *op cit.*). A similar result is found in Dubow et al. (2010). Their results indicate that parental education does not have a direct impact on child outcomes later in life (education attainment and occupation), but it does have an indirect influence on aspirations and expectations. Despite these ambiguous results, unarguably there is a positive effect of parental education on children's schooling. Studies have shown that compared to mothers with high-school education, those with college education spend more time with their children (Kalil et al., 2012), and, more significantly, it seems that more educated parents supply more "quality" time during the interaction with their offspring (Hsin & Felfe, 2014), as well as an increased involvement in school matters (Cheadle & Amato, 2011).

From the stand point of an individual, occupation and income are closely related to education. In ever-changing modern economies, these links grow closer and closer. Highly educated people are more flexible when profound changes occur in the job market. Studying the

implications of the great recession of 2007-2009 in the US, Hoynes et al. (2012) show that men,[2] Blacks, Hispanics, youths, and low-educated people heavily suffered from layoffs and unemployment. Disadvantaged groups are more likely to be employed in fluctuating industries, and therefore are hit the most when there are cycle changes. Although Heinrich (2014) talks about the negative aspects (e.g. stress and disruption in interaction with children) that parental employment, especially for mothers, may exert on child development, it is arguable that these negative aspects do really offset the negative influence of unemployment and credit constraints on development and education attainment of a child among the low-income households. According to Erola et al. (2016), in the case of Finland, the father's status accounted for 50% of children's achievement. Ultimately, occupation also mirrors the aspirations of offspring. Giannelli and Rapallini (2018) found that having at least one family member employed in a math-related activity increased pupils' achievement in math. In the case of Turkey, children's school participation was not only influenced by parental income, but also by father occupation (Smits & Hosgör, *op cit.*).

One big challenge of trying to predict the variables that can positively affect educational outcomes in Africa, Latin America, and some parts of Asia is a combination of negative aspects starting from the household level: low parental education, families without any stream of income, parents and small children engaged in agriculture or other low paying activities. For example, Yamano et al. (2005) found that, in Uganda, education is a decisive factor to enter non-farm activities. Even when a population does not deal directly with agriculture, breaking the cycle of intergeneration inequalities is not an option for the vast majority. In fact, of all considered employed people in SSA, 89% are in the informal sector (ILO, 2020).

The general population census data indicate that 2/3 of Mozambique's population live in rural areas (INE, 2017). Additionally, the primary sector[3] (which includes agriculture) is the major 'employer'. Despite the 12% decline observed between 2007 and 2017, this sector still employs 67% of the working population. And the truth is that the majority engage in sustenance and survival

[2] In the case of men, it is due to over-representation in highly volatile job sectors (e.g. construction).
[3] In the case of Mozambique, the primary sector comprises agriculture, forestry, fishery, and mining.

smallholder farming.[4] Other socioeconomic indicators show that the illiteracy rate is still high. Thirty nine percent of people over 15 years old are illiterate. By gender, the illiteracy rate for women is at 49%, while for men it is 27%. Differences by location are more pronounced: illiteracy in urban areas is 19% while in rural areas it is 51%; illiterate men in urban areas make up 11% and women 26%, while, in rural areas, men are 3.3 times and women are 2.4 times more likely to be illiterate than their urban counterparts.

For young people, the numbers are correspondingly low. Although the net enrollment rate for primary education is 93%, the gross enrollment rate for lower-secondary[5] education is 33%. One of the reasons is that the completion rate in primary is 49%, which translates into high dropout rates before completing elementary education. The completion rate in lower-secondary education is only 23%. Normally, the poor performance of any country's educational system is due to a joint set of problems in both the demand and supply sides. For example, from the late 1990s, the recognition of school being very costly for the poor in the low-income countries resulted in the abolition of school fees and the introduction of free school meals in primary education, and a heavy investment in school infrastructure (see Ogawa & Nishimura, 2015). Like in any developing country, education problems in Mozambique are explained by both demand and supply side issues. Consequently, the Government of Mozambique (GoM) revised the educational policy in 2003-2004 to:

- address the supply constraints in rural areas;
- relieve the demand constraints by lowering direct costs to households (which resulted in abolition of direct school fees for primary education in 2003);
- raise quality through the new curriculum; and
- increase quality and efficiency through the semiautomatic promotion policy, which would reduce repetitions, thus reducing the pupil-teacher ratio.

[4] Apart from small-scale farmer and smallholder farmer, the term peasant is also commonly used.
[5] Mozambican education system is 5-2-3-3-4: lower-primary, upper-primary, lower-secondary, upper-secondary, and higher education. The first 10 years are designated *basic education*.

As a direct result, three years later, enrollment in primary education registered an "accumulated growth" of 38% (World Bank, 2009). However, from 2012, the indicators flatten and slowly go down. The rate of out-of-school children, including first grade, is still high. In the 2017 national census, 73% of children aged 6 and 66% aged 7 were out of school.[6] Although these numbers do not tell whether these pupils would eventually enroll in school or not, the fact that the majority of them are 1 to 2 years late in enrolling in the first grade is disconcerting. Subsequent research has shown that late entrants are early leavers too (Tamusuza, 2011; Wils, 2004). The education system itself has seen more decentralization, community participation and local-based accountability (*op. cit.*). However, as shown above, this performance has not continued in recent years. It is true that the supply side still faces a lot of issues on its own, namely, high teacher absenteeism,[7] a significant number of unqualified teachers, especially in rural areas, and internal inefficiency, resulting in pupils taking twice the time to complete one educational level (JICA, 2015; and Bold et al., 2017). However, Table 1.1, which presents a survey of the reasons cited by parents for not sending their children to school, tells an interesting story.

The combined supply side issues account for only 22% of these reasons. The unexpected revelation from the survey is not that the demand side issues are rated high, but that 50% of parents either say school is useless or they have no interest in school. According to the International Labor Organization (2013), globally, 60% of working children engage in family agricultural production without pay. The data in Mozambique, like in any other African country, indicate that families in rural areas are highly likely to be illiterate, or have fewer years of schooling, live on sustenance farming, with high levels of poverty and cyclical survival production that push their offspring into agriculture at a young age, or to seek low paying off-farm jobs. In fact, of the considered employed labor, 68 to 95% work in the informal sector (Balchin et al., 2017). Thus, research showing how these disadvantaged groups make investment decisions for their offspring can lead to optimal government interventions which will ultimately improve enrollment rates and educational success.

[6] Data from GPHC 2017 (INE, 2017).
[7] Although it shows a decreasing trend, high absenteeism in Mozambique is one of transversal demand and supply problems. Teachers and students sometimes are equally absent, which makes it difficult to understand which of the two causes the other. See more discussion on this issue in Bassi et al. (2019).

Table 1.1 Reasons Cited by Parents for Not Sending Children to School

Reasons	Percentage (%)
School is useless/no interest	50
Other problems	12
School is very costly	9
School is very far	8
Got married	6
Works (at home or outside)	4
No available places	4
Pregnancy	3
Failed	2
Next grade does not exist	1
Reached the desired grade	0.5
Child is very young	0.5

Source: Created by the author based on Mambo et al. (2019:4)

1.2 Problem Statement

Education is a complex and dynamic structure (Heckman, *op cit*.). The dynamic nature of education is, at least, two-dimensional: time and space-dependent. Although societies usually do not change very quickly, educational systems change at an even slower rate. Additionally, educational problems are, at the same time, both global and highly local (especially when it is time to address them). Research has successfully shown that family characteristics are highly significant in the variance of explanatory factors. The equality of opportunities for children starts with the key factors that make up the family background (Rustichini et al., 2017; Björklund & Salvanes, 2011). In situations where children have disadvantaged "innate ability", a targeted household investment can be effective (Loughran et al, 2010). Socioeconomic factors influence children's schooling differently from one country to another (Lyu et al., 2019). Studies focusing on the debate of schooling and educational outcomes find that: i) it is more straightforward to spot an effect

between household factors and children outcomes than revealing and explaining the mechanism behind that effect (Chevalier et al., 2013), and ii) there is a necessity of urgent interventions to tackle inequalities in enrollment, attendance, and achievement, which largely disfavor low-income households, poor children, and disadvantaged groups (see the review of the recent literature in Conn, 2017; Ganimian & Murnane, 2016). The adoption of universal primary education (UPE) programs increased enrollments. However, dropouts, low attendance, and poor achievement still characterized most countries in SSA (Sabates et al., 2013).

Ultimately, investing in education is never a one-time decision (Yamano et al., 2005), and it is a by-product of the expected outcomes. Additionally, although primary education is free of charge in most, if not all, countries, secondary education and ensuring that children attain more years of schooling is not (Assaad & Krafft, 2015). Shimamura and Lastarria-Cornhiel (*op cit*.) examine schooling in rural Malawi and Smits and Hosgör (2006) in rural Turkey. Shi et al. (2015) and Yi et al. (2012) estimate the factors contributing to dropouts in rural China, while Zhao and Glewwe (*op cit*.) study the determinants of educational attainment among the poorer households. Some studies evaluate the impact of interventions such as school meals and conditional cash transfer on children's attendance (Galiani & McEwan, 2013; Afridi, 2011). Other studies examine the effectiveness of the UPE policies and their outcomes on the African continent (Langsten & Hassan, 2018; Lucas & Mbiti, 2012a; Tamusuza, 2011). The recommendation of many studies is to continue researching household investment in education. There are still unknown variables, behaviors, and effects within the educational juncture. In addition, the ongoing debates have not closely examined the children's education differences observed among households that depend on sustenance agriculture in most of the African continent. This research fills this gap by investigating children's enrollment and attainment using a unique dataset of smallholder households for the case of Mozambique.

The underinvestment in education in developing countries or among the most disadvantaged households is due to socioeconomic constraints, namely low parental education and income. Most of the time, the perceived returns to the schooling of these communities are low (Mambo et al., *op cit*.; Jensen, 2010). Meanwhile, findings suggest that, indirectly, socioeconomic

factors influence children's academic achievements through parents' beliefs and behavior (Davis-Kean, 2005). Through parental expectations about schooling, children's poverty and social mobility can be predicted (DeBacker & Routon, 2017); even children's learning behavior is related to parental academic expectation (Loughlin-Presnal & Bierman, 2017). This relationship, firstly, captures household expectations and, secondly, the direction of the household investment. Parents with high expectations signal to children that they value achievement (Yamamoto & Holloway, 2010). Initially, the provision of cash transfer can work, but it seems that households slightly back down and keeping children in school, especially as they become older, is offset by the opportunity cost (Li et al., 2016; Shimamura & Lastarria-Cornhill, *op cit*.). Junior high schoolers in rural China received information about the importance of enrolling in senior high school. It did not increase enrollment, but, unexpectedly, increased dropouts (Loyalka et al., 2013).

Starting from Eccles et al. (1983), a broad range of literature has studied family SES through the expectancy-value model. The central idea of this model is that self-perceived values and expectations influence performance and choice of the duty to engage. The expectations and values of the individual are affected by the perceptions and expectations of other people. Therefore, school performance is affected by parental and teacher expectations and by children's perception of those values and their own ability (for more discussion, see Wigfield & Gladstone, 2019; Simpkins, 2012). Early parental expectations have long-lasting effects on schooling (Murayama et al., 2016; Froiland et al., 2012). Parents influence perceived ability; and in later years, this affects the child's performance (Loughlin-Presnal & Bierman, 2017; Jacob & Wilder, 2011). Research has also found that parental expectation responds to the child's endowments, and conversely, it may increase inequalities among siblings (Briley et al., 2014).

The expectancy model is ideal for estimating educational success in developing countries because one long-ignored fact is that in rural and agricultural settlements, the terms occupation and income have to be contextualized in order to capture the 'real' environment. The reality is that in these communities, occupation as a farmer means practicing a survival activity, which often produces barely enough sustenance for household consumption (Myeki & Bahta, 2021), let alone surplus crops for selling and generating any stream of income. Additionally, parental education

cannot be heavily relied on, since the majority of parents did not study beyond a few years of primary education. Therefore, the decision to invest in education, although more deterministic in the lives of the poor, is also costly for them (Inoue et al., 2015). Under these constraints, a sensible estimation method has to consider proxy variables that influence the investment decisions within the household. Such an approach, for example, can predict parental aspirations and expectations and how they affect enrollment and attainment. Disadvantaged households have higher optimism about their children's school outcomes (DeBacker & Routon, *op cit*.). Skeptical households tend to underinvest in education and households with high optimism are more likely to overinvest. Besides, disadvantaged households face, first, the opportunity cost dilemma of income gains versus income loss. Second, even where the early years of schooling are free, there are other indirect costs that a household must incur. Before considering the direct school success optimism, in the context of the smallholder households, the parental expectation is for the children to either continue in agriculture or to move to off-farming activities. In the existing body of literature, the mechanisms through which parental expectation influences school enrollment and attainment in farming households remain unexplored.

Therefore, two gaps will be filled. Firstly, the study applies whether the parents want their children to continue in agriculture or not as a proxy to the household's expectations. The assumption is that if the child's future path is to continue in agriculture, there is a higher probability of underinvesting in schooling. Secondly, a proxy applied for parental expectation is if the household head has an off-farm job/activity. The unbiasedness of this variable is that parents who have no other job than farming are unlikely to have chosen to stay at home. Because of monetary incentives, the assumption is that children from households in which the head has a second job, off-farm, will be more likely to enroll and remain longer at school. Even if the Mozambican Government continues expanding schools and improving the quality of teachers and the teaching materials, the most disadvantaged children will still be out of school because of a combination of factors on the family side not well understood. Therefore, a deep understanding of investment decisions, barriers, and future plans of smallholders, who by far constitute the largest population

group in the country, can guide future policy planning and ensure that targeted interventions are successful.

1.3 Research Questions

In response to the gaps in the existing literature presented above, this research investigates three research questions and six sub-questions.

RQ1 How do family characteristics influence children's school enrollment and educational attainment in farming and non-farming households in Mozambique primary education?

> **RQ1.1** How does the household head's gender influence school enrollment in farming and non-farming households in Mozambique?
>
> **RQ1.2** How does the gender of the household head influence children's educational attainment in farming and non-farming households in Mozambique?

RQ2 How do family characteristics influence school attendance and educational attainment in primary education in smallholder households in Mozambique?

> **RQ2.1** How do family characteristics influence offspring's school attendance in smallholder households in Mozambique?
>
> **RQ2.2** What factors better explain the differences in offspring's education attainment in smallholder households in Mozambique?

RQ3 How does parental expectation influence children's school attendance and educational attainment in smallholder households in Mozambique primary education?

> **RQ3.1** How does considering agriculture a business or having an off-farm job, proxies for parental expectations, influence children's educational attainment in Mozambique?
>
> **RQ3.2** How does having an off-farm job or considering agriculture a business influence offspring's educational attainment?

1.4 Objective of the Study

The main objective of this study is to investigate the influence of family background characteristics on offspring's school enrollment and educational attainment in Mozambique, focusing on

smallholder households. To answer the research questions, first, the study examines the influence of family background characteristics on children's school enrollment and educational attainment among households that depend on agriculture and those dependent on other activities. Second, it investigates the specific determinants of school attendance and educational attainment among smallholder households. Third, by applying the expectancy-value method, the study analyzes the effect of parental expectations on children's school attendance and educational attainment in farming households.

1.5 Significance of the Study

In the economics of education and human capital formation theories, family characteristics have a first-order position in explaining educational outcomes. The family background drives investment decisions (Björklund & Salvanes, 2011; Rustichini et al., 2017), and it is more effective in affecting the final results of schooling children and tackling disadvantages in skill formation from childhood (see Gertler et al., 2014; Loughran et al., 2008; Heckman, 2006). Lifting people out of poverty in Africa means not leaving smallholders behind. They are the largest group, and also their daily fight is for the most basic needs. Understanding the family structure and economic livelihood of smallholders will affect interventions in producing successful outcomes. This study deepens the debate in the literature, firstly, by investigating family background characteristics among the smallholder farming households and the households that do not directly depend on agriculture and its significance in predicting children's enrollment and attainment in Mozambique. Results from this study may be generalized when studying countries with similar socioeconomic statuses.

Parental employment has been a proxy for family status. Although with mixed results, several studies apply parental employment status, or the type of occupation, for estimating educational outcomes (see Schildberg-Hoerisch, 2011; Ermisch & Francesconi, 2013), and parents who are low-income earners are prone to have many negative influences on their children (Heinrich, 2014). The employment status given to smallholder farmers can mislead the estimation of school outcomes. Heterogeneous characteristics that compose smallholder farming households and their relationship with household investment on the education of offspring remain not entirely

investigated or clarified. Although the smallholders are considered homogenous, differences in offspring educational outcomes and adulthood employment indicate differences in investment strategies, resource allocation, and future planning. Previous studies have analyzed the relationship between parental occupation and offspring's schooling by solely comparing a set of different jobs, or by indiscriminately analyzing the family background and children's schooling in rural areas (Shi et al., 2015; Smits and Hosgör, 2006), as well as the effectiveness of intervention programs (Galiani & McEwan, 2013; Shimamura and Lastarria-Cornhiel, 2010). As a second contribution, this study applies a unique dataset of smallholder farm households in the context of Mozambique. Therefore, it investigates the heterogeneous characteristics that compose smallholder farming households and their relationship with household investment on the education of offspring.

Parental education and income have been the two leading factors in explaining the demand for education (Chevalier, 2004; Dubow, Boxer, & Huesmann, 2010; Ermisch & Pronzato, 2010). On the one side, when income is the dominant effect, the demand for education in a given household is subject to changes in income, while on the other, parental education dominates the modeling of the household's aspirations. But in general, their effect on children's schooling has been mixed (Carneiro & Heckman, 2004; Chevalier et al., 2013; Bukodi & Goldthorpe, 2012; Erola et al., 2016). And the mechanisms through which they act are yet to be uncovered (Chevalier et al., 2013). For example, highly educated parents spend more time with their children (op. cit.). Complementarily, the research studied expectations in a vast range of different socioeconomic groups (Yamamoto & Holloway, 2010). The parental expectation is a signaling and directory mechanism, especially in the early years of schooling (Murayama et al., 2016; Froiland et al., 2012), and disadvantaged groups might have a higher expectation than better-off groups for their children's education (DeBacker & Routon, op. cit.). The nonuniform assumption among smallholder households only produces better estimations if parental expectations are heterogeneous. As the third and fourth significance of the study, this research furthers the literature by estimating the influence of parental expectation on schooling in smallholder agriculture households. It sheds light on the difference in school investment practices. Smallholder households expect the offspring, in adulthood, to either continue farming or to move to off-farm activities.

Therefore, the study i) estimates the influence of parental expectation through the dichotomy of parents considering farming a viable business or not, and how that impacts their education investment decision; and ii) applies the time the household head spends at home as a proxy mechanism through which parental expectation influences offspring's education attainment in smallholder farming households. Like most developing countries, where the majority of the population lives on non-income generating activities, this study uncovers the heterogeneous characteristics of the people directly relying on agriculture. The results can help design programs or policies to help smallholders step up the ladder out of poverty and maybe generalized for most African countries.

CHAPTER 2

EUCATION SECTOR AND CONTEXT OF SMALLHOLDER HOUSEHOLDS IN MOZAMBIQUE

2.1 Education Sector in Mozambique

Mozambique covers 801,590m^2 of land area and has a population of approximately 28 million people living in 11 provinces and 128 districts. Mozambique gained independence from Portugal in 1975, after a military struggle that lasted ten years (1964-1974). During the colonialism, Portugal designed an educational system that did not directly link with the economy of Mozambique but rather as a 'social control' instrument (Cross, 1987). As a result, by the end of the colonial era, at least 93% of the population was illiterate (Noa, 2019; Johnston, 1990). Frelimo (Liberation Front of Mozambique) is the political party in power since the independence. It began as a nationalist liberation movement in 1962, and changed to political party in 1977. Because most of the leaders inside Frelimo movement were literate (some had studied abroad), their revolution included literacy programs for soldiers and the population living in the 'liberated zones' (parts of the country overtaken by Frelimo). After the independence, the educational system was designed to create the environment that taught people – children and adults – to value traditional Mozambican/African culture, community participation and a sense of patriotism. Anyone with minimum qualifications (read, write and knowledge of basic arithmetic) was involved in the community, helping the general population learn to read and write. The governing and intellectual elite of the time believed that to be productive in the new modern economy, all citizens had to read and write, and the State had to follow the values of socialism. In fact, the ruling-class believed that the success of socialism depended on eradication of illiteracy (Johnston, *op cit*.), which would lead to the creation of socialist citizens (Müller, 2018).

The belief in socialist ideologies and the creation of a one-party-state Marxist country would bring disagreements among the elites, and in 1977, just after two years of independence, it would end up in a civil war. The war lasted for 16 years, and the opposing forces were Frelimo

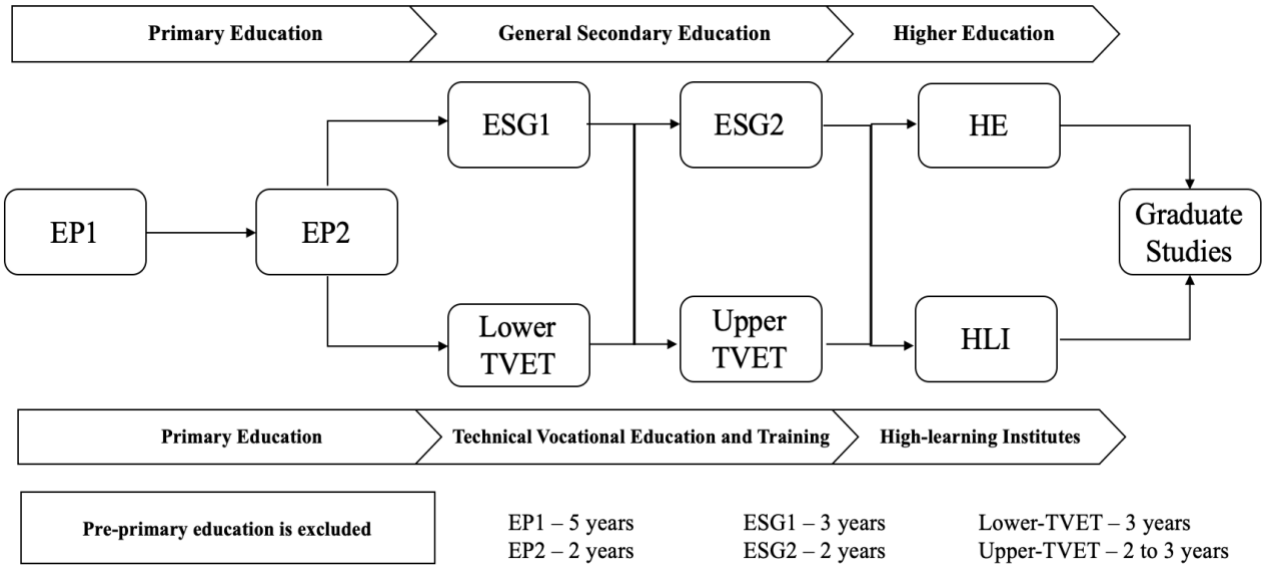
(turned into a central governing Marxist party) and Renamo (Mozambican National Resistance, the anti-communist party). By the end of the war, around one million people were killed or died because of food shortages and other causes linked to the war. Of the estimated 13-15 million total population, eight million were internally displaced or became refugees in neighboring countries. By 1994, most rural infrastructure was destroyed, including roads, hospitals, and schools. Directly related, absolute poverty stood high at 69% in 1997. Six years later, poverty went down to around 54% (MoEC, 2007). Before the international Millennial Development Goals (see World Bank, 2005) efforts of education massification, Mozambique had its education influenced by the history of colonialism, nationalism, and civil war. According to Mario (2002) apud Mario and Nandja (*op cit*.), Mozambique had three phases of education: the first phase, spanning from 1975 up to the mid-80s, the policies focused on adult education/literacy, because the newly-independent country believed it to be the key to development. By 1982, the literacy rate was 18%, from a low 5-7% in 1975. There was a promotion of nationalism, unity, and Mozambican identity.

The second phase goes up to 1995. Most of the educational efforts, especially in rural areas, were destabilized if not terminated by the civil war and the displacement of people. The adult literacy program was reduced, and the National Basic Education Department replaced the adult literacy committee. National and international policies and agendas characterized the third period. As the country became politically stable, the urge to invest in a robust education system and literacy programs drove the National System of Education. Various documents such as Education for All (EFA), Action Plan for the Reduction of Absolute Poverty (PARPA), the Constitution, and government programs were intended to improve educational outcomes (see Mario and Nandja, 2006; GoM, 2006; IMF, 2011).

The article 88 of the Mozambican Constitution states that "In the Republic of Mozambique, education shall be a right and a duty of all citizens. [And] the State shall promote the extension of education to professional and continuing vocational training, as well as equal access to the enjoyment of this right by all citizens" (Constitute Project, 2012:29). The PARPA guidelines indicate that education helps combat poverty, but it is also an instrument for allowing individuals to actively and fully participate in society. From the early 2000s, as the country's economy was

growing at 6% per annum, education had the role of helping it grow at an even faster pace, boosting women's productivity, educating people about the pandemic of HIV/AIDS that was decimating families in SSA (GoM, 2006). The general education in Mozambique, until the school year 2022, is characterized by a 5-2-3-2 system. The primary education has seven years, comprising five years of lower-primary, and two years of upper-primary (EP1 & EP2). The post-primary education has two tracks: general education and technical vocational education and training (TVET – in Mozambique also designated by technical and professional training). The five years of general secondary education comprise three years of lower-secondary, and two years of upper-secondary (ESG1 & ESG2). The technical and professional training stems from five to six years (lower and upper TVET), depending on the program. The lower-TVET programs include teacher training for primary education, and accounting, and the upper-TVET includes health sciences, public administration, and police force. The first ten years are designated basic education, and only primary education is free and compulsory. Higher education includes the general track (social sciences and hard sciences and engineering), as well as the professional/technical track (police sciences, maritime sciences).

Figure 2.1 Mozambique Education System



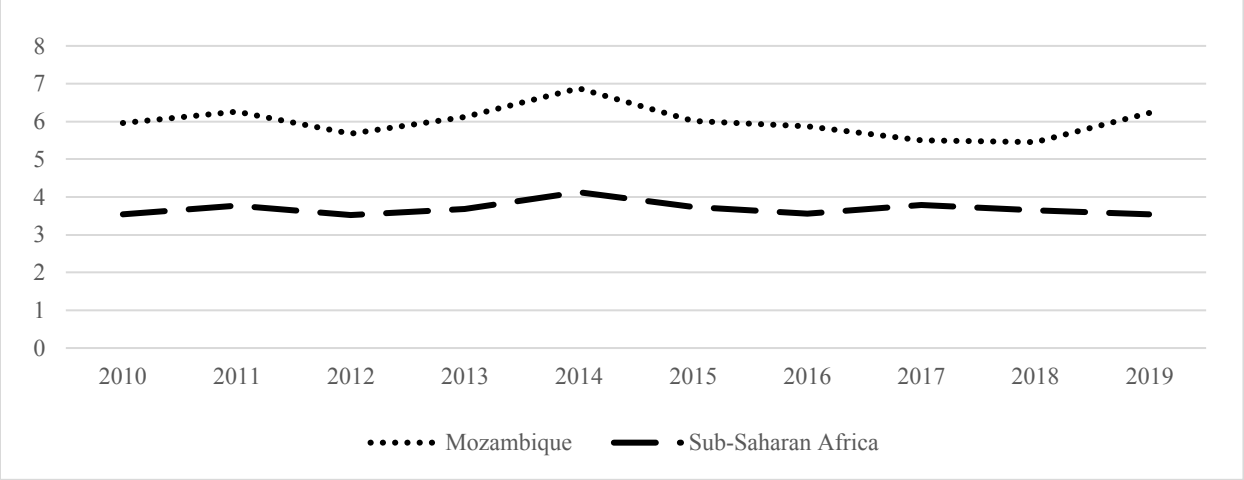
Source: Created by the author based on Brouwer et al. (2010)

The Ministry of Education and Human Development (MINEDH) administers pre-primary education, primary education, teacher training for primary education, secondary education, and all other managerial sectors related to the general education. Conversely, the Ministry of Science, Technology, Higher Education, and Technical Professional Training (MCTESP) is responsible for higher education (including high-learning institutes), and vocational and professional training. From 2023, the new education policy introduces the 6-3-3 system: six years of primary, three years of lower-secondary, and three years of upper-secondary; nine years of schooling become mandatory (MINEDH, 2020a).

Around 2000-2003, absolute poverty made it very costly to send children to school, even at the primary level for the majority of the population. The availability of schools, especially for post-primary and rural areas, was a massive challenge in itself, let alone ensuring quality (from teacher qualifications to school materials) and internal efficiency. The education policy in 2003/4 focused on lowering the cost for households by abolishing school fees, introducing automatic promotions at primary education, and increasing the number of schools and teachers. Consequently, lower-primary schools were increased at 9% per year to a total of 11,921 in 2014. Upper-primary schools grew from 1,203 in 2004 to 5,231 in 2014. The primary school population grew from 4.6 million in 2004 to 5.7 in 2014 and was projected to reach 10 million by 2020. The GoM has been increasing the education budget year after year. In 2003, only 3.3% of total GDP was allocated to education. Ten years later, 6.8% of GDP was being allocated to education. However, in 2016, it was found that the GoM, through semi-public enterprises (Tuna Mozambican Enterprise – EMATUM, Mozambique Asset Management – MAM, and ProIndicus) had contracted roughly $2 billion in loans, with no disclosure to either the National Parliament or IMF and the World Bank (see details in Africa Confidential, 2016; and Williams & Isaksen, 2016). As a result, the World Bank suspended direct financial aid to Mozambique, and the IMF cut off its budget assistance. All the Mozambican economy suffered. As figure 2.2 shows, the education budget started to decline sharply from 2015 until 2018 to below 5.5% of GDP. Even when the budget allocated to education declined largely, Mozambique still spent well above the average the what Sub-Saharan African

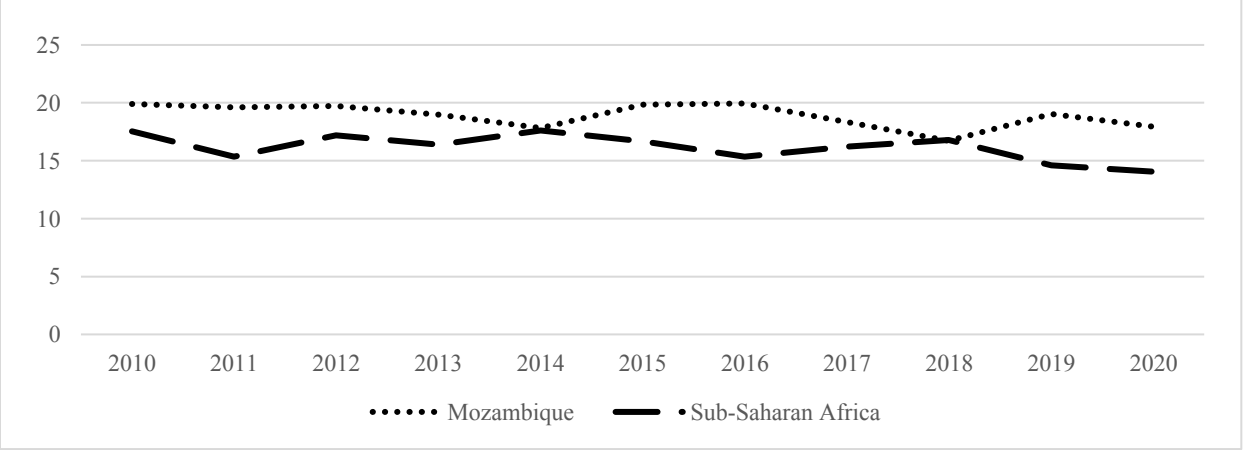
countries spend on education as share of the GDP. In fact, since 2010, Mozambique spend at least 1.5 times more than Sub-Saharan Africa average. Mozambique also spend more than the average when the budget is calculated as percentage of government expenditure (Figure 2.3). As the economy recovered in 2018, the budget allocated to education jumped 12% to over 6% of the entire country's output.

Figure 2.2 Government Expenditure on Education (As % of GDP)



Source: Created by the author based on WDI (2022)

Figure 2.3 Government Expenditure on Education (As % of Government Expenditure)

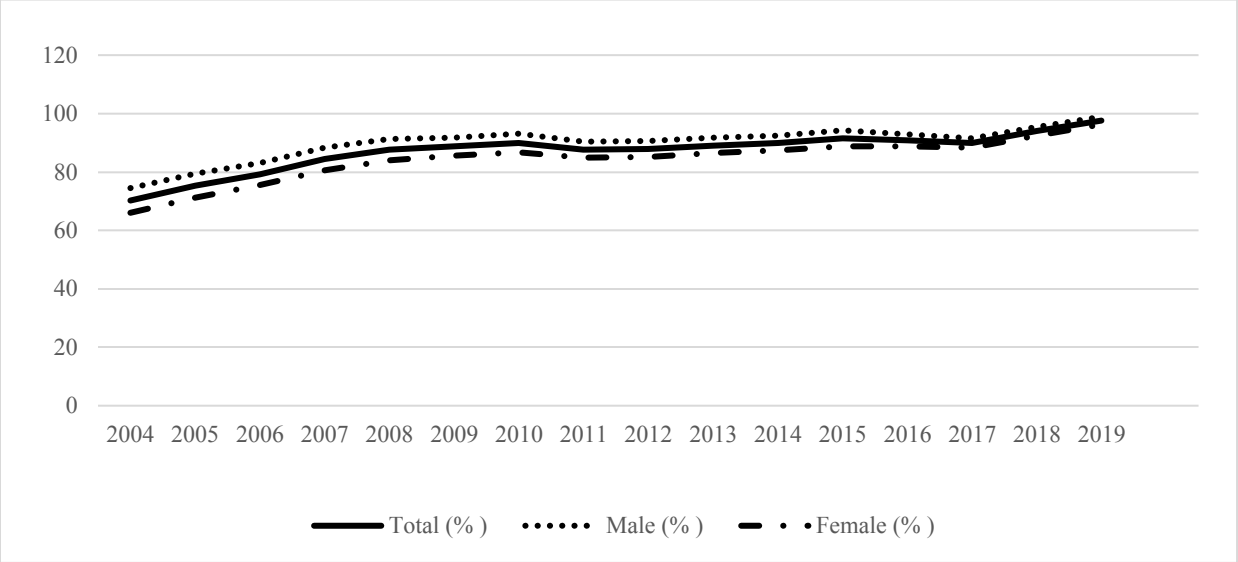


Source: Created by the author based on WDI (2022)

However, the issues in educating the Mozambican population start at early stage. Prior to required formal education, according to Bonilla et al. (2019) only 4% of children aged 3-5 enrolled in Early Childhood Education (ECE). The number of ECE schools is deficient and only offered by the private sector. The lower-primary level is characterized by low participation or late entrance, and dropouts before grade 5; high levels of absenteeism of both students and teachers, and unqualified teachers (Bassi et al., 2019; Bold et al., *op cit*.); and internal inefficiency. Thus, pupils take a double amount of time to complete a cycle (the data was compiled from JICA, 2015; Cho & Feda, 2015; MINEDH, 2020b; and UNICEF, 2011). Figure 2.4 shows that the education policy reforms in 2003 resulted in a steady upward growth of enrollment from 2004 to 2010; the net enrollment rate in primary education grew from 70% to 90%. In the same period, net enrollment rates in lower-secondary grew from 52% to 65%. From 26%, upper-secondary grew to 36%. When categorized by gender, the gains observed in primary education, girls' enrollment increased by 20 points, compared to 19 points for boys. In lower-secondary in 2010, although still lagging behind boys by at least 14 points, girls' enrollment increased from 43% to 58.5%. In Upper-secondary, girls' and boys' enrollment increased closely by 9 and 10 points, respectively.

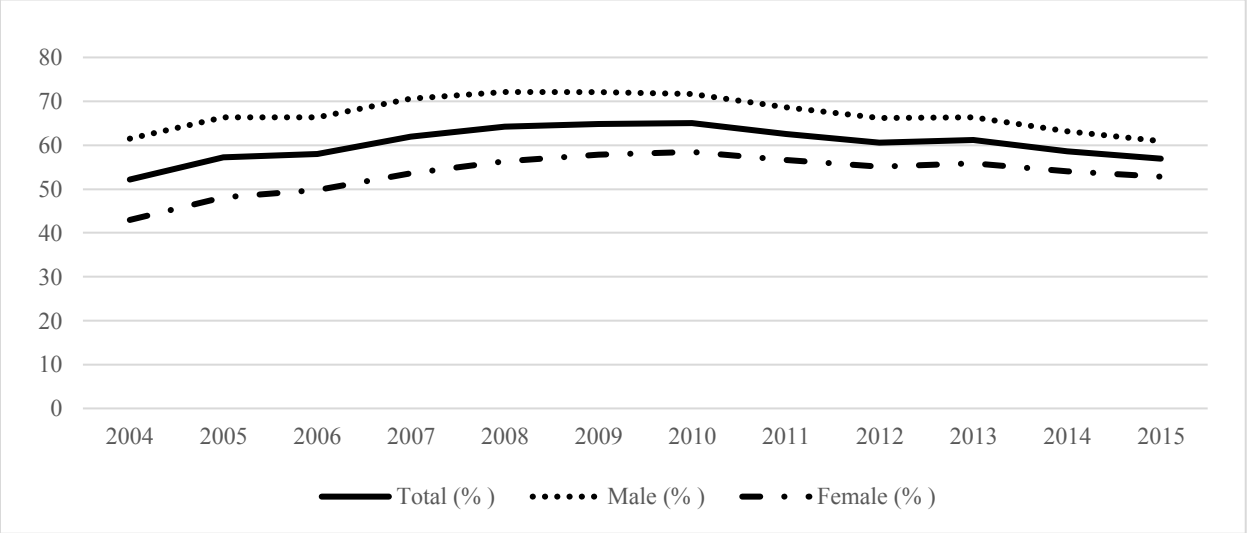
However, from 2011, the enrollment rate started to go up and down. One reason might be that the campaigns of massification and the importance of education stalled, and parents did not see any translation of that 'importance' into improving their lives, at least in the short run. In addition, although primary education is free and adopts automatic promotions, post-secondary education is neither. Despite the non-steady growth after 2010, net enrollments in primary education in 2019 were over 96%, with no significant difference between girls and boys. The same did not happen to post-primary education. Lower and upper-secondary only registered five points change, from 52% to 57%, and 26% to 31%, respectively. A significant positive gain was observed for girls. Boys' enrollment increased by two points in upper-secondary and slightly decreased in lower-secondary during 2004-2015.

Figure 2.4 Net Enrollment Rate, Primary Education



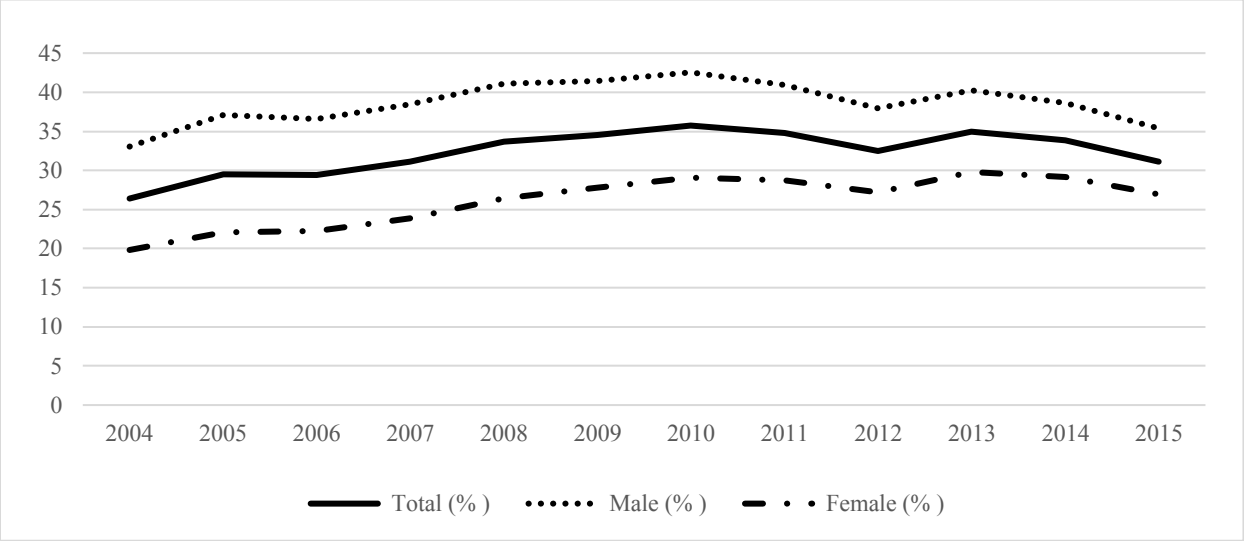
Source: Created by the author based on UIS (2022)

Figure 2.5 Net Enrollment Rate in Lower-Secondary Education



Source: Created by the author based on UIS (2022)

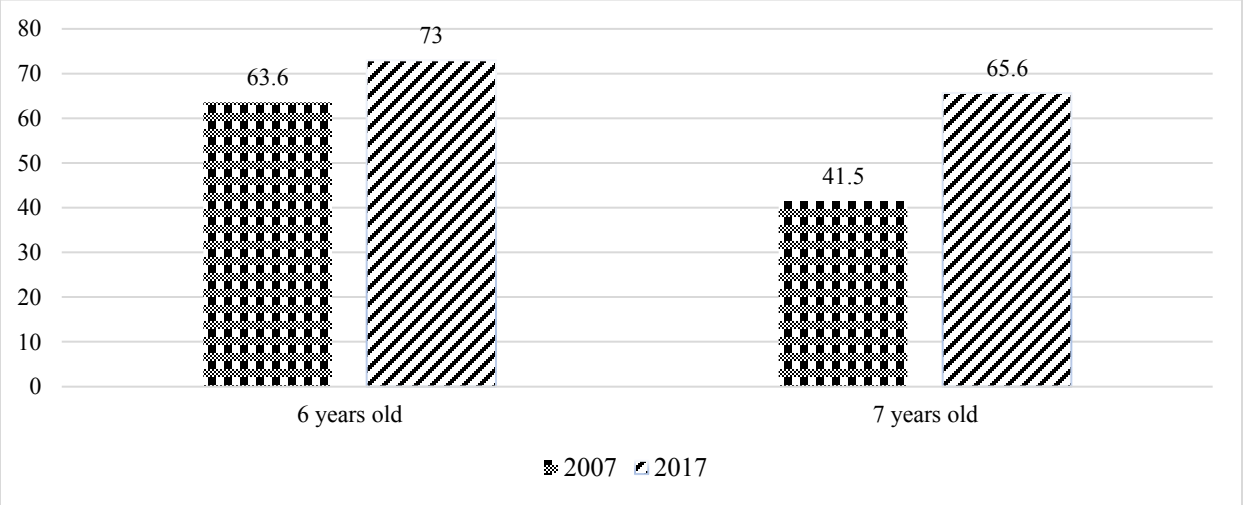
Figure 2.6 Net Enrollment Rate in Upper-Secondary Education



Source: Created by the author based on UIS (2021)

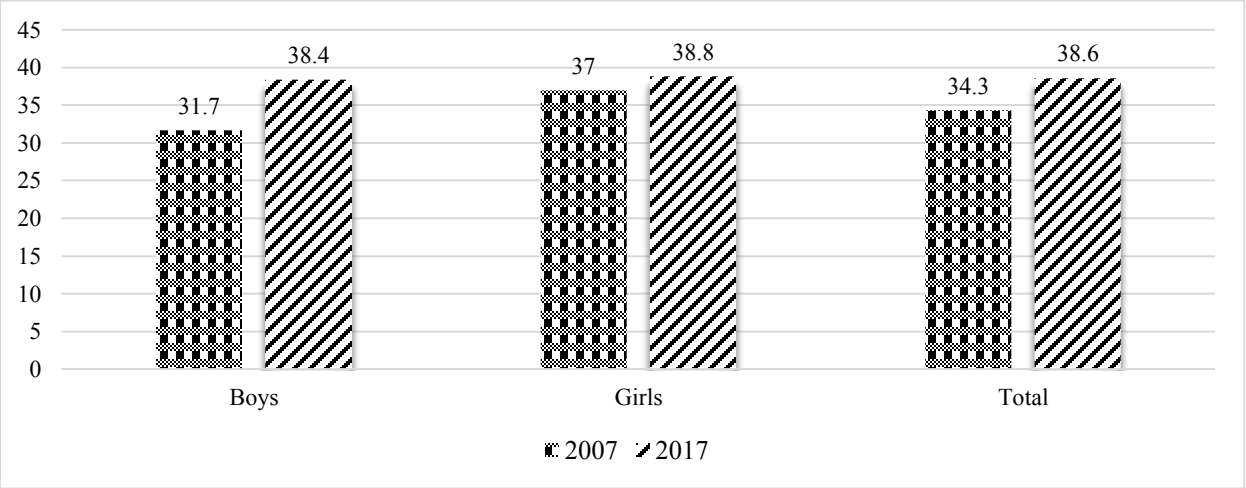
A combination of low/late enrollments and dropouts results in high rates of out-of-school children (OOSC). Figures 2.7 and 2.8 present OOSC data. For children aged 6-17, in 2017, 39% were out of school, a four-point increase from 2007. By gender, although there is no significant difference, in 2007, girls were already at a high of 37%, and therefore increased by one point during the ten years. Boys, however, grew four percent to 38% in the same period. More concerning, OOSC numbers are higher for the cohort aged 6 and 7. For the former, the data show a rate of 73%, an increment of 10 points from 2007 to 2017. For children aged 7, in the same period, a 14-point increase, to 66% in 2017. Some of the children in the older cohort, have been to school, and therefore have dropped out. Although there are still various issues in the supply side that negatively affect school enrollment, "the low levels of education appear to be strongly associated with high-dropouts and low retention rates, rather than limited accessibility" (Cho & Feda, 2015: 7). It also seems that as children get older, there is more pressure on the poorer households, and, therefore, high likelihood of abandoning school. The job market itself is a mixture of uneducated and unskilled self-employed or working unpaid family jobs, struggling to earn enough for living, and educated people who cannot find good jobs due to lack of better job opportunities (Lachler & Walker, 2018).

Figure 2.7 Out of School Children Aged 6 and 7



Source: Created by the author based on GPHC 2017 report (INE, 2019) and UIS (2021)

Figure 2.8 Out of School Children Aged 6 and 17

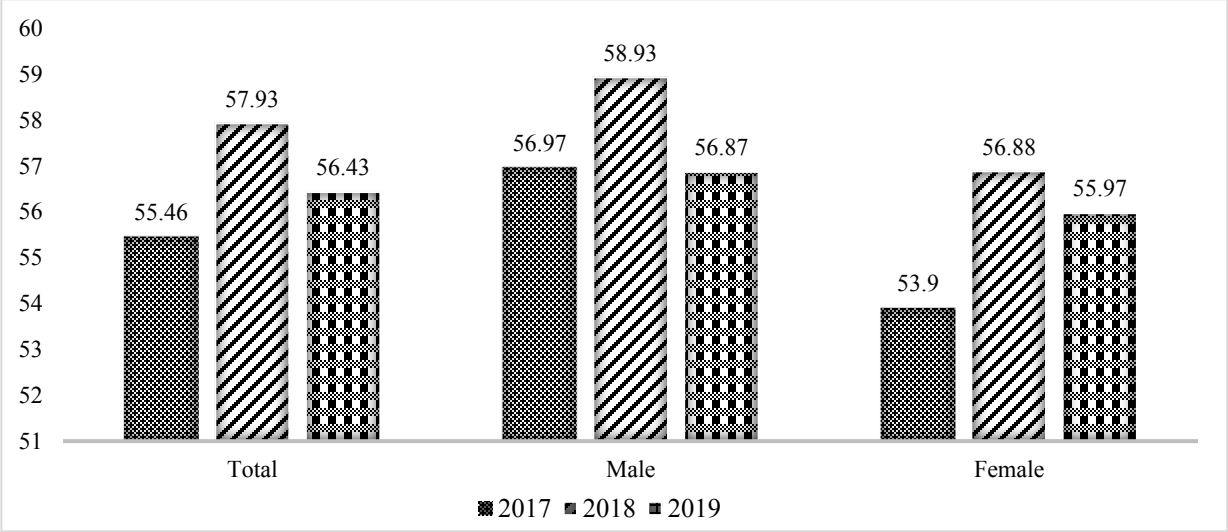


Source: Created by the author based on GPHC 2017 report (INE, 2019) and UIS (2021)

Figure 2.9 shows that survival rate data not only is low, but does not show any steady upward slope. The survival rate in primary education has been decreasing. In 2018, the survival rate to primary grade 5 was around 58%. In the following year, it decreased by two points. Boy's survival rate decreased from 60% to 57%, while girls' survival rate went down one point to 56%. The survival rate to the last grade of primary (grade 7) is much lower, but it is increasing, the same for boys and girls. From 39% in 2017, it went up to 43% in 2019 (Figure 2.10). During the same

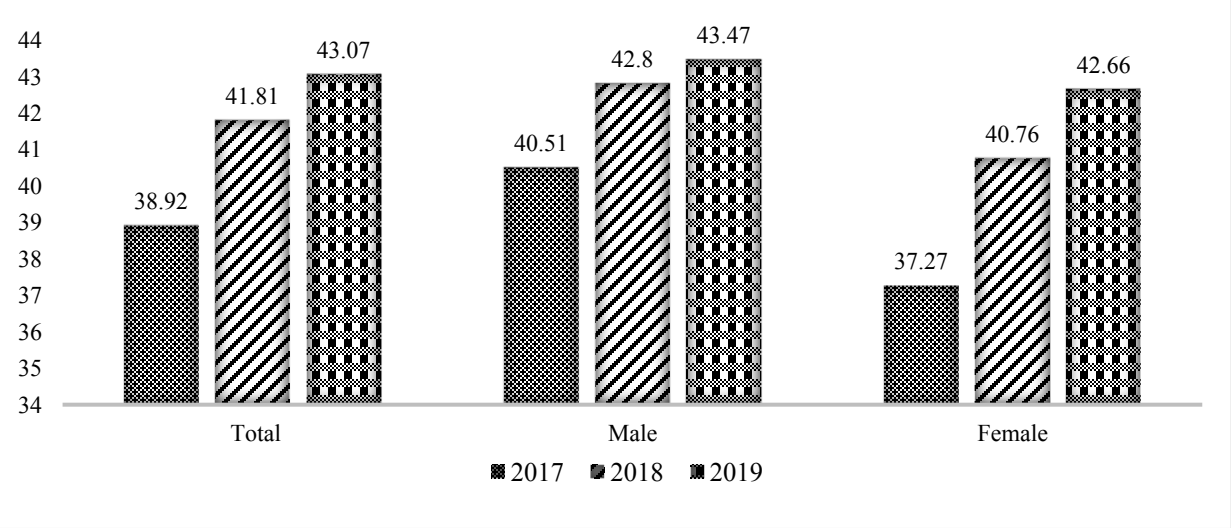
period, the survival rate for boys increased from 41% to 43%, and for girls, it went from 37% to 43%. This means that by the time pupils should be completing seven years of schooling, they are exiting school. Most of these children not only will never go back to school, but also are more likely to be living it with little literacy and numeracy skills, as the quality of education is low.

Figure 2.9 Survival Rate to Grade 5, Primary Education



Source: Created by the author based on UIS (2022)

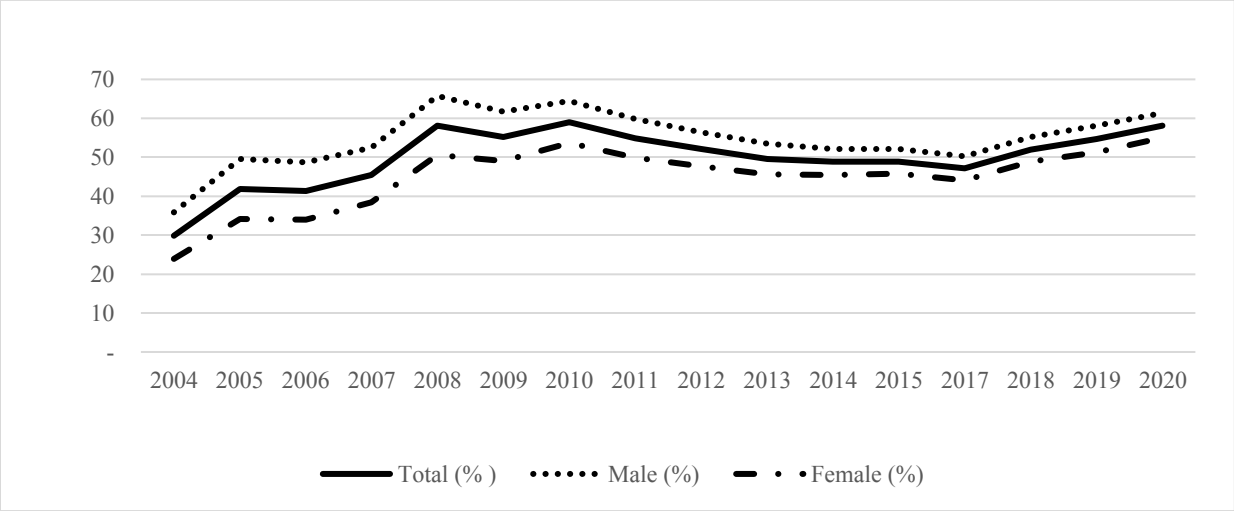
Figure 2.10 Survival Rate to the Last Grade of Primary Education



Source: Created by the author based on UIS (2022)

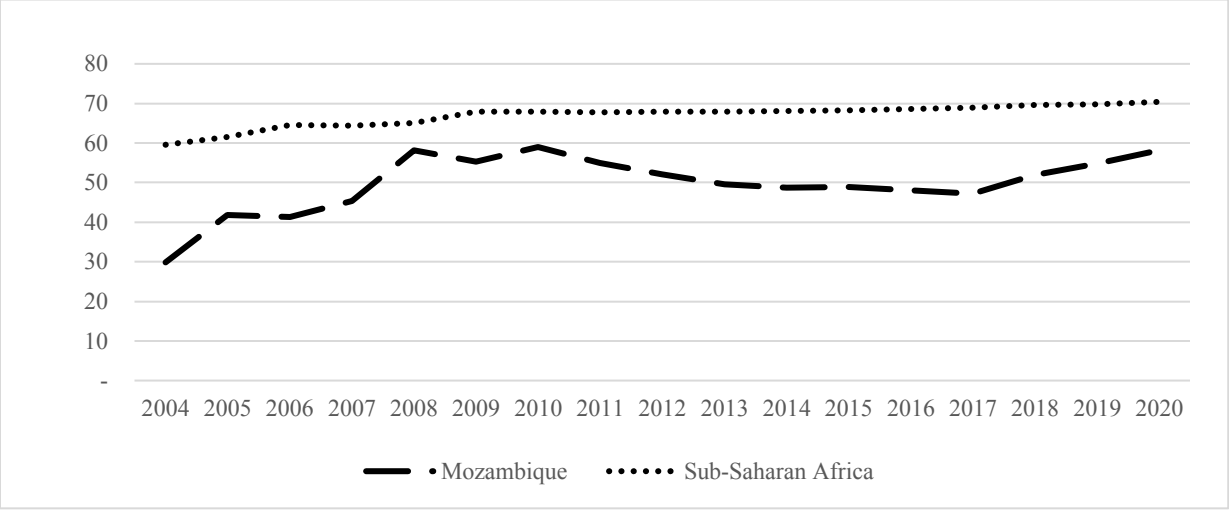
Figure 2.11 indicates that completion rates in primary education grew from 30% in 2004 to 58% four years later. Boys' completion rate increased by 30 points, while girls' increased by 27 points. Whether it is due to gender societal roles or parents' perceived endowments, the data show that, generally, boys enroll and complete school more often than girls. As showed above, Mozambique budget for education is well above the average of Sub-Saharan Africa, both as a share of the total GDP as well as a share of the government expenditure. However, the relationship between the inputs, at least solely measured by expenditure, and the output (educational success) does not seem to be linear. It is true that Mozambique has been closing the gap, for example in terms of primary education completion rate. In 2004, Mozambique primary education completion rate was 30% while the average of SSA countries was two times that (Figure 2.12). In 2020, the average of primary education completion rate in SSA was 70% whilst for Mozambique was 58%. If the number of people that complete primary is lower, the number of those who continue post-primary is even lower, let alone survive until the end of the secondary cycle. For example, completion rate in lower secondary stood below 25% (Figure 2.13), thus adding more OOSC.

Figure 2.11 Primary Education Completion Rate



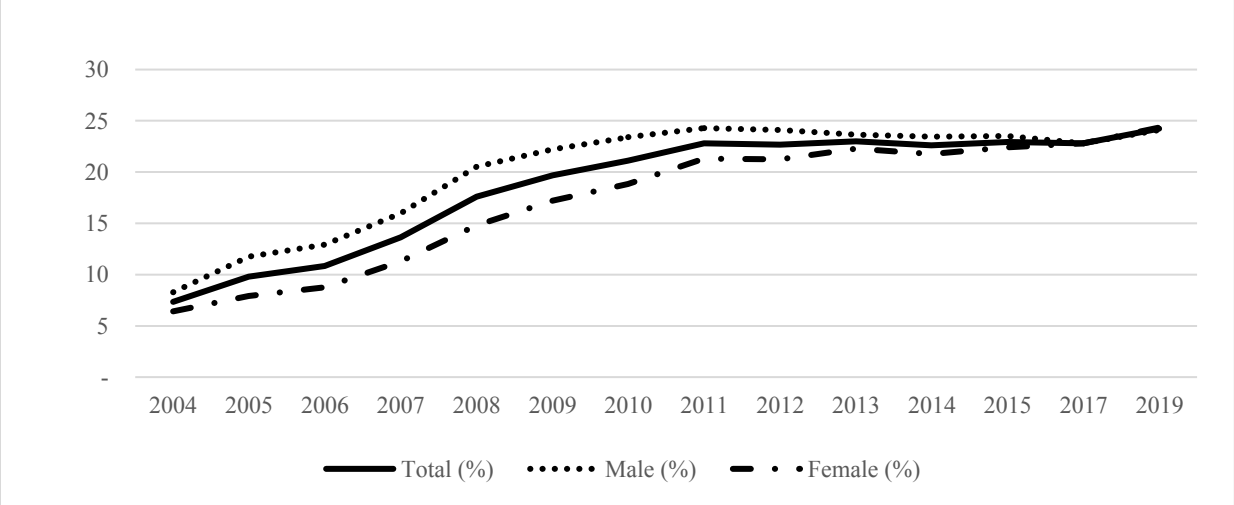
Source: Created by the author based on UIS (2022)

Figure 2.12 Comparison of Primary Education Completion Rate (Mozambique & SSA)



Source: Created by the author based on UIS (2022)

Figure 2.13 Lower Secondary Completion Rate



Source: Created by the author based on UIS (2021)

Some of the OOSC that did not enroll at entrance age six will eventually enroll. However, when looking at the rates OOSC aged 7, most of them will end up with at least a 2-years delay. As a consequence of late entrance, they will also have higher odds of dropping out early. Sabates et al. (2013) studied what causes dropouts in SSA countries after most of them had adopted the UPE programs. They find that both demand and supply-side issues contribute to dropouts. Individual and family factors include poor health and malnutrition, household chores and poverty, and

motivation to attend school. From the school side, teacher absence, distance to school, and poor quality are some of the factors that negatively correlate with attendance. In the case of Mozambique, Ferrone et al. (2019) find that, with the significant incidence in rural areas, child poverty hinders child development (in some areas, deprivation index reaches 95%). These children not only live in rural areas but also have less-educated parents, and depend on agriculture. They also find that a mix of nutrition, monetary, and non-monetary deprivations characterize the younger children, while education poverty is prevalent among the older groups. According to Ferrone et al. (*op cit*.), financial intervention alone cannot solve the whole issue of child poverty because of the complexity and interrelationship between the multiple types of deprivation (some children are deprived while not being poor), according to Ferrone et al. (*op cit*.), financial intervention alone cannot solve the whole issue of child poverty.

2.2 Land, Agriculture and Law

According to the Constitution, *agriculture* is a priority activity for Mozambique's development. Despite this, some research criticizes the government for not truly considering agriculture a priority. For example, Mosca (2014) claims that the agricultural sector, especially smallholders, has not been the top priority throughout the first four decades after independence. The author also argues that informal agriculture practices within the country reflect the post-independence status that has not translated into industrialization and job creation; as a result, a web of informal activities has started in urban areas and expanded to rural areas. Another issue is that the large farms created after independence in Mozambique have not been successful (Smart & Hanlon, 2014). The lack of direct government investment in agriculture, from small farms of subsistence to small commercial farms, might be causing long-lasting poverty among African countries (Mosca, *op cit.*). Mozambique has 36 million hectares of arable land, of which, agriculture uses 14%, and 2% of its irrigation resources are utilized (IFAD,[8] 2018).

[8] International Fund for Agricultural Development

Also, the Constitution states that "all ownership of land shall vest in the State" (Constitute Project: 34). The specific land law (Law #19/97) determines the conditions under which the ownership and the right of using or benefiting from land abides. The State recognizes that citizens have land ownership for housing economic activities. In principle, the land should not be sold because it is the State's property. Nevertheless, because of the various ways people acquire land, the State also guarantees the use of land given that an individual inherited it or occupied it legally, in which cases the local community can attest to the legality (customary practices). For the latter, for example, any national individual considered to be using the land in good faith for at least ten years can claim the right of use and benefit afterward. Due to flaws in the land law presented above, land disputes happen occasionally. For example, in the mid-90s, conflicts linked to tenure occurred as a response to internal migrations driven by the civil war, or immigrants coming back from neighboring countries who did not relocate back to their original locations, especially in peri-urban areas (see McGregor, 1997). Major disputes occur when public-private-partnership investments displace smallholders, grab their lands or privatize access to water resources (details in Veldwisch, 2015; Matavel et al., 2011).

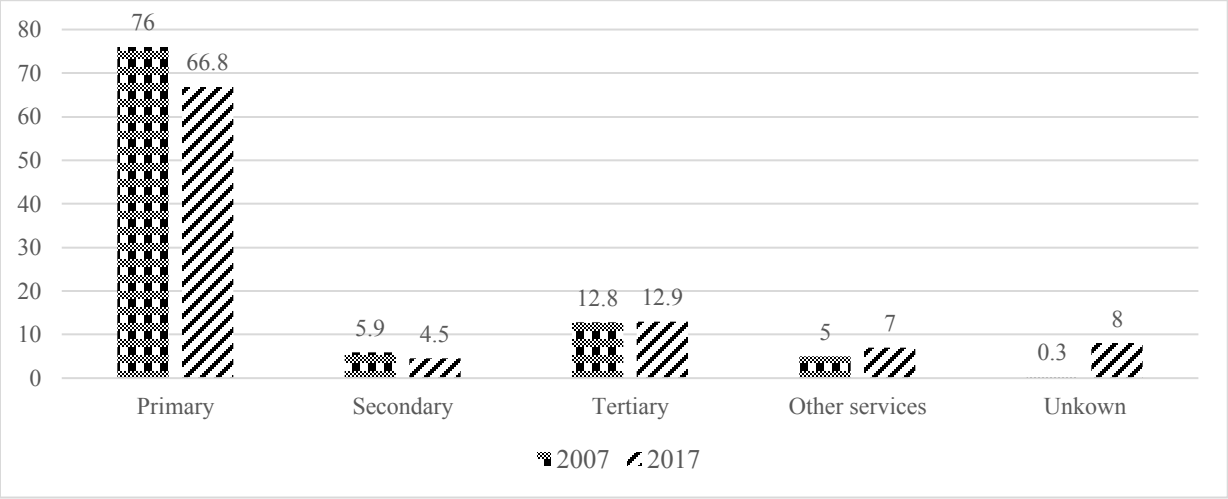
2.3 Smallholders in Mozambique

According to GPHC 2017, half of the population in Mozambique is less than 18 years old, and 67% live in rural areas (INE, 2019). Segmented by employment type, 67% of the population works in the primary sector. In comparison, the secondary sector only accounts for 5% of the working force (Figure 2.14). The primary sector comprises agriculture, forestry, fishery, and mining. Of these four activities, agriculture employs the most significant portion. Compared to 2007, the primary sector share decreased by 12%. However, the decrement in agriculture share did not translate into the growth of the manufacturing industry (secondary sector) or services (tertiary sector). Instead, the share of workers who quit agriculture was absorbed by "other services" and "unknown". In 2007-2017, the former grew from 5% to 7%, while the latter grew from 0.3% to 8%. The decline of agricultural workers is not a direct response to market expansion and better-paying job opportunities. Consequently, it translates into a high likelihood of workers moving to

informal jobs, where the income is still subsistence. Consequently, 82% of the population in 2019 worked in vulnerable employment (WDI, 2022).

Mozambique has a dual agriculture system of commercial and smallholder farmers (Makate et al., 2018). Data from the Ministry of Agriculture indicate that of the almost 4.3 million farms in Mozambique, 99% are small farms, while medium and large (626) farms compose 1%. Gender determines smallholder farmers' decisions (Murray et al., 2016). The share of women employed in agriculture is 80%, compared to 60% for men (WDI, 2022). Small farms produce food consumed by 80% of the population. Farmers have suffered from climate change depending on the area, including droughts and floods. Although the production conditions for smallholders are worsening year after year, characterized by low production (IFAD, *op cit*.), in the last two decades, agriculture still contributed at least 20% of the total GDP (Muianga, 2020).

Figure 2.14 Employment by Sector



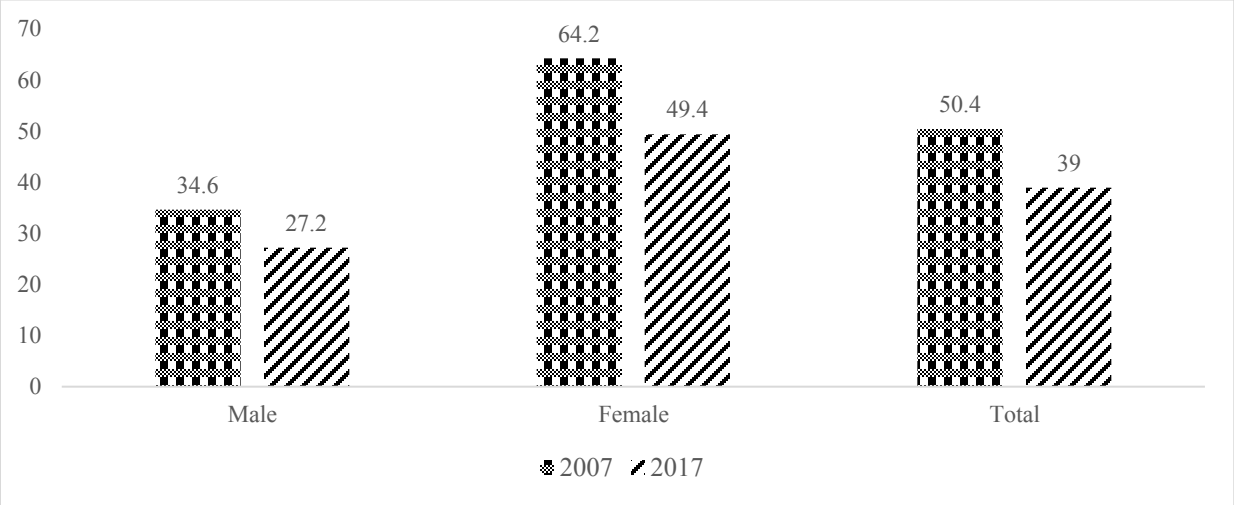
Source: Created by the author based on GPHC 2017 report (INE, 2019)

A wide range of issues directly related to the poverty level of smallholders constrains agricultural production. The IFAD's country report considers at least five of these aspects: lack of "water for irrigation, animal and human consumption; land with secure tenure; financial services; improved inputs and extension, veterinary and mechanization services; and infrastructure" (IFAD, 2018:2). The low output of agriculture and the productivity of smallholder farmers is also related

to their levels of education. It has been found that education enhances farmers' productivity (Luh, 2017). As argued above, the colonial occupation did not invest in the native population, and as a result, the country became independent with an uneducated population and inexistent school infrastructure, accentuated by the long civil war. Rural areas suffer from the inexistence of alternative jobs of agriculture to underemployment. Studies have argued that a focus on manufacturing is a bridge to lift most rural populations out of poverty. Besides agro-processing, which has been the only industry capturing investments, construction and forestry are the future areas of job creation in Mozambique (Balchin et al., *op cit*.).

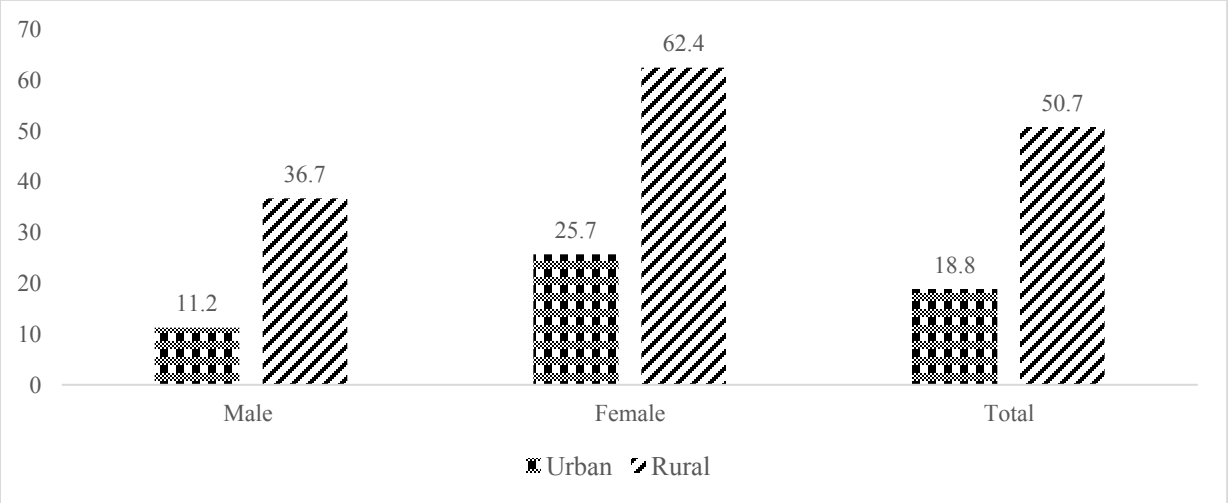
Although more people are becoming literate, the data still show a high illiteracy index. Data indicate that the illiteracy rate for people 15 years or older decreased from 50% in 2007 to 39% in 2017 (Figure 2.15). By gender, women are more likely to be illiterate. While 27% of men are illiterate, 49% of women are. The data also indicate that rural areas have a larger share of the illiterate population. More than half of the rural population is illiterate, compared to 19% in urban areas. Just a little over 1/3 of women in rural areas are literate, while 3/4 of women in urban areas are literate. For men, 11% in urban areas and 36% in rural areas are illiterate (Figure 2.16). Therefore, it shows that rural areas, women, and women in rural areas are more likely to be undereducated. However, the issue of low educational attainment among adults in the country is more complex than the data indicate. The adults' average years of schooling is a mere 3.2% (WDI), and 40% of young people employed in the private sector in urban areas do not attain beyond primary education (Lachler & Walker, *op cit.*).

Figure 2.15 Illiteracy Rate for People 15 Years or More



Source: Created by the author based on GPHC 2017 report (INE, 2019)

Figure 2.16 Illiteracy Rate for People 15 Years Old or More, by Location (2017)

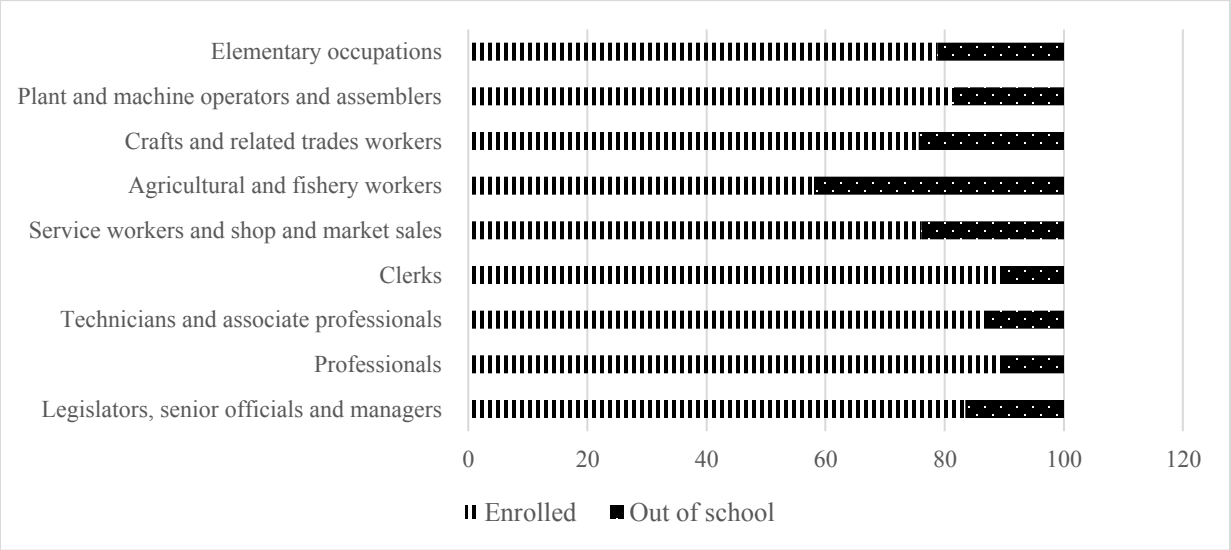


Source: Created by the author based on GPHC 2017 report (INE, 2019)

The census data of 2007 categorized households in terms of parental employment. The most compact categorization has nine types. The data indicate that agriculture has the highest number of out-of-school children and the lowest enrollment rate by household's head occupation. Over 2/5 of children in agricultural households are OOSC, and 58% are enrolled (Figure 2.17). The second-lowest performers are children living in households where the household head works in crafts and related trade jobs. However, children living in these households still enroll 18 points

higher and have 18 points less of being out of school compared to households dependent on agriculture. It seems like the more professional occupations have higher enrollments and lower numbers of OOSC. For example, the enrollment rate for children from households where the head works as a clerk or any other professional is 90%; the share of out-of-school is equal at 10%. Other professions correlated with higher school enrollments include technicians and associate professionals, legislators, senior officials and managers, and parents employed in industries. The takeaway is that the more children are out of school or less to enroll, the closer the sector is to be practiced in an informal setting. The reason might be that technical and professional occupations require some minimum formal education, which may influence children's schooling.

Figure 2.17 School Enrollment by Household Head's Occupation



Source: Created by the author based on GPHC 2007 data

In developing countries, due to low levels of education and lack of skills, most of the population ends up in farming activities, mainly subsistence agriculture. Of 3 billion people located in rural areas in developing countries, 2/3 reside in small farms, less than 2ha (Hazell et al., 2010). There are 570 million estimated farms in the World, of which 500 million are considered family, and 84% of these are less than 2ha (Lowder et al., 2016). Nine percent (9%) of family farms are located in sub-Saharan Africa (*op cit.*). The Food and Agriculture Organization defines a family

farm (smallholder farm) as an agricultural-based activity (agriculture, forestry, fisheries, pastoral, and aquaculture) operated and managed by a family unit, commonly dependent on family members' labor (FAO, 2013). According to Pingali (2010), a family farmer can be:

- ✓ a subsistence farmer dependent on a tiny plot of land;
- ✓ a post-Green Revolution farmer trying to sustain the productivity and gains from the Green Revolution; and
- ✓ a commercial farmer, connected to local, regional and even global markets trying to enlarge his production and value chain.

There is no an official definition of family farming across the African continent; "small-scale farming" and "smallholder farming" are used interchangeably; around 75% of the African population, direct or indirectly, is working in agriculture-related activities (Moyo, 2016). These people depend on agriculture to produce food and raise income to acquire education, critical to human capital accumulation and poverty alleviation. For sustainable production, households willing to continue in agriculture need, as a minimum, skilled labor, market and technical knowledge, finance and capital, and risk management (Poulton et al., 2005). In reality, most smallholders operate in a small niche of unskilled labor, local knowledge, and subsistence that does not give them sufficient output to sell locally. Low technology adoption is also one of Africa's characteristics (Muzari et al., 2012). The categorization of smallholders follows different patterns. For example, in the case of Ghana, Kuivanen et al. (2016) find five types, namely:

- ✓ Type 1: 22 people in one household, 50% of land for maize production, 96% of the on-farm labor, and an average of 10 cows/goats/sheep;
- ✓ Type 2: average of 6.3ha of land, 1/3 for maize, 3-7 cows, goats, or sheep;
- ✓ Type 3: 5.2ha of land, 2/3 for maize and legumes, no cows, and 9 goats or sheep;
- ✓ Type 4: 3ha, hired labor (14%), 50% of the crops marketed, 1 cow, and 6 goats or sheep; and
- ✓ Type 5: 2.5ha, resource constrained, 74% of land for maize, and mostly poultry farming.

In the case of Mozambique, Makate et al. (2018) examine a group of commercial smallholders in the northern Angonia District. They categorize these bean commercial smallholders by

"adoption of innovative practices" in their farming activities. Like Kuivanen et al. (*op cit.*), they find 5 types:

- ✓ Type 1: Land owners with small farm sizes – high basal fertilization, market participation;
- ✓ Type 2: educated farmer with access to credit – more years of schooling, formal training on beans production, access to credit;
- ✓ Type 3: rich male landowners with low education and large farm sizes – use of fertilizers;
- ✓ Type 4: young, inexperienced, poor male farmers – low years of schooling, no access to bean training and demonstration activities, least years of farming; and
- ✓ Type 5: experienced female farmers with high labor endowments – high female representation, more educated, highest number of available workers.

Generating income among these groups is challenging. The average income they make from selling beans is around 5,500 meticais.[9] Note that they produce only one harvest/year. Because of the drudgery and low productivity in farming activities, Smart and Hanlon (*op cit.*) consider four ways for poverty alleviation in Mozambique, namely i) continue with traditional practices (therefore low earnings and high chance of moving away to other activities), ii) migrate to urban areas (working in informal sector is the main path followed by the rural population who abandon farming), iii) rural jobs (processing food, trade, or farm worker are the most desired by people who remain in rural areas because they would have a stable income stream), and iv) expansion of the land owned (done by commercial smallholders who want to entirely invest in agriculture as business, but is still a small portion). The first two have proven unsuccessful so far, because low productivity in agriculture leads uneducated people to migrate to informal sector where they still earn an income for subsistence. Job creation and entrepreneurship, by engaging people in income generating farming, seem to be the paths for poverty alleviation in rural areas. Therefore, successful farming, even at small scale, requires access to markets, mechanization and technological adoption, access to credit, and risk reduction by not relying heavily on rain cycles (Smart Hanlon, *op cit.*).

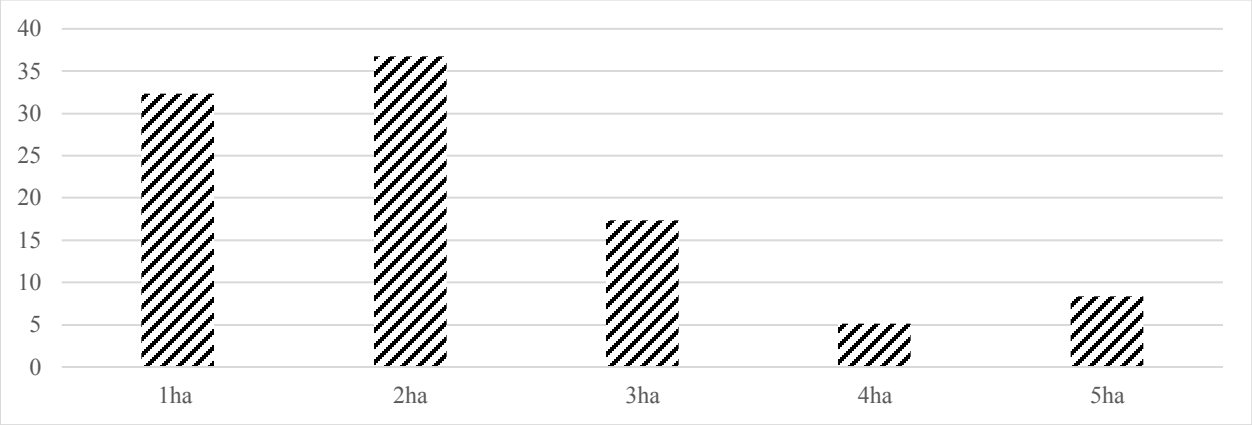
[9] By 2018 exchange rate, $1 was equivalent to 61 meticais.

In 2015, the Consultative Group to Assist the Poor (CGAP) conducted a survey in Mozambique involving more than 4,000 smallholder households to better understand their livelihoods, usage, and ways to improve the adoption of financial mechanisms. Classifying farms, particularly smallholder agriculture, does not follow the same pattern across the world. Lowder et al. (2016) argue that, commonly, the classification considers the "number of holdings, household size, and status […] as well as the agricultural land and farm labor themes" (p. 19). In Mozambique, there is no official definition of smallholders. The use of family farmers, smallholder farmers, and even peasants is interchangeable. The CGAP survey classifies smallholder farming households according to land size, livestock ownership, and the contribution of agriculture to household consumption. A household is considered a smallholder if it falls in one of the following classifications:

1. It owns up to 5ha of land;
2. It owns up to 50 heads of cattle;
3. The household has less than 100 goats, ships, or pigs; or
4. It has less than 1,000 chickens.

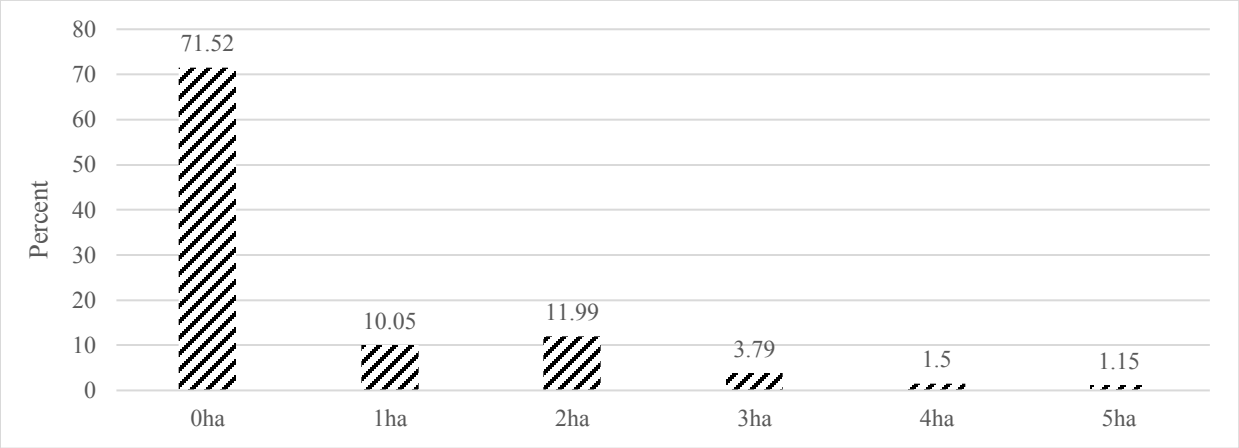
Also, agriculture must be the major contributor to household consumption, livelihood, or income. On average, smallholders control less than 2ha of land. Up to the threshold of 5ha (owned by 8% of smallholder farmers) defined by the CGAP survey, 32% of smallholders own up to 1ha of land, 37% own 2ha, 18% 3ha, and 5% own 4ha (Figure 2.18). Even though the amount of land controlled by smallholder is small, they mostly own the land. Only 29% reported to either have rented, borrowed, or "gained a right to use" the land. The distribution of rent or borrowed land is as follow: 10% for 1ha, 12% for 2ha, 4% for 3ha, and just over 1% for 4ha and 5ha each (Figure 2.19). In the survey no smallholder reported to have land constraints or lacking land. In the rural area, due to the community and family ties, land borrowing occurs often than land renting. Land renting is more prevalent in suburban areas, where some smallholders farm as business.

Figure 2.18 Distribution of Land Ownership in Smallholders (Up to 5ha)



Source: Created by the author based on CGAP (2015)

Figure 2.19 Land Rent or Borrowed by The Household



Source: Created by the author based on CGAP (2015)

The Family Budget Survey 2019/20 (IOF – Inquérito sobre Orçamento Familiar) categorized family members in four groups in Mozambique: 1-2 members accounting for 17%, 3-4 members (33%), 5-6 members (29%), and seven or more members at 21% (NIS, 2021). Family composition indicates that 22% of households are female headed (Table 2.1). The households have a maximum of 15 family members (female-headed). Female-headed families also have a minimum of 2 members, but one fewer member than male-headed households. That might indicate that female heads are single mothers (never married, divorced or widows), attested by the fact that these households have at least two members. According to the GPHC 2017, one-third of the

households in Mozambique are female headed. The fact that female heads have more family members might indicate a chain of daughters, being single-mothers, living together with their single mother. Another hypothesis specific to Mozambique, and some other African countries, is in the case of father's death, children born outside of the main household end up living with the widow. This is one gap so far ignored by research, which should deeply be investigated since it might cluster more poverty and disadvantages among children living in such environments. It is known that on average female participate less in the job market. In Mozambique, 75% of female heads wok in agriculture (NIS, *op cit.*), which makes them and their households economically vulnerable.

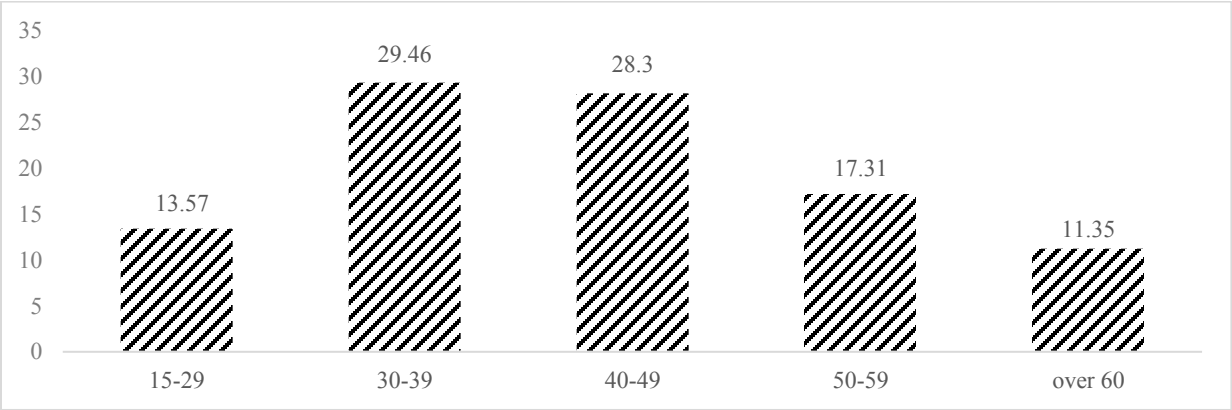
Mozambican population is young, and characterized by an expansive pyramid. Around 53% of the population is below 18 years old, and the average age is 16.6 years (GPHC, 2017). This is reflected in segmentation of the smallholder households by the heads' age. Seventy-one percent of the household heads are aged 15-49, of which, 14% are in the age group 15-29, 29% in the age group 30-39, and 28% are aged 40-49 (Figure 2.20). In Mozambique, people form families at young age, and while up to 49 years of age male headed household are the majority, and beyond that, female headed households tend to be the majority probably due to the excess male mortality in old age (NIS, 2021). Decomposing the family members, 21% are family heads, 15% are spouses, 45% are offspring, 19% are other household head related family members, and the rest are people with no familial relationship to the head (NIS, *op cit.*). Therefore, over 4/5 of the household members are parents and biologic children.

Table 2.1 Number of Household Members

Variable	Obs.	Mean	Min	Max
All sample	2,651	5.70	1	15
Male headed HH	2,064	5.90	1	14
Female headed HH	587	4.90	2	15

Source: Created by the author based on CGAP (2015)

Figure 2.20 Age Distribution of the Household Head



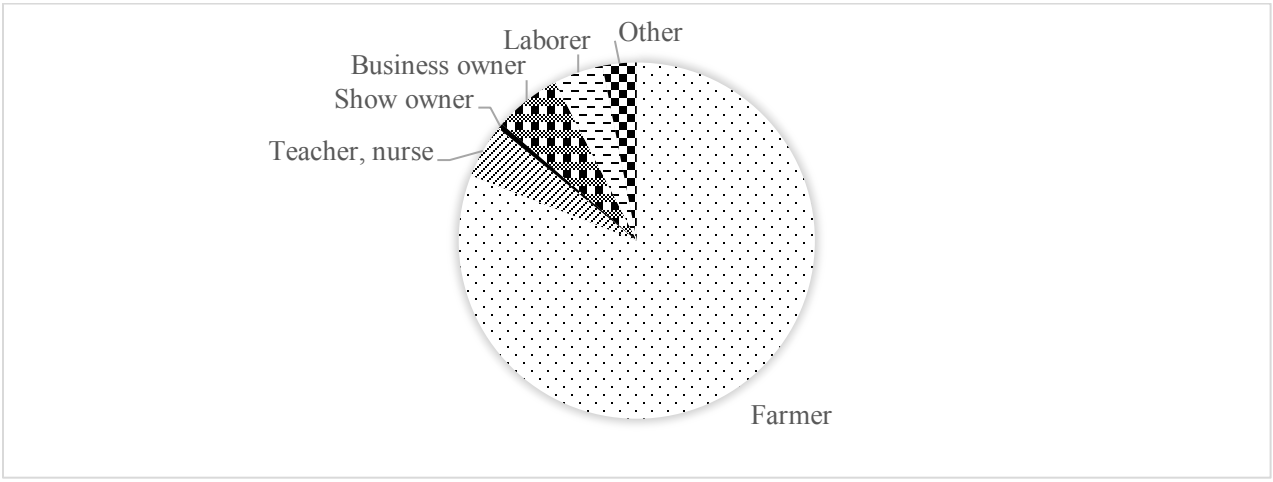
Source: Created by the author based on CGAP (2015)

Job types are never simple to define in developing countries. In Mozambique, whenever possible, the majority of the population does not rely on one activity only. In the CGAP survey, 81% of the household heads responded that their main activity is farming. The rest was composed of: 6% of business owners, 0.5% of shop owners, 5% of doctors, nurses, and teachers, 4.5 % of laborer, and 3% of others (Figure 2.21). Those who did not report agriculture as their main activity still have a large share of consumption dependent on farming output. Nurses or doctors work for community/local health center care with minimum qualifications, and most teachers are employed in primary education, thus, earning minimal salaries; and ii) the shop owners earn equivalent to minimum salary too by selling basic items needed in rural or suburban areas (ex., salt, sugar, rice, soap, etc.). That is why they still farm even though their main activity is not agriculture. Despite the majority report being farmers, when asked if they had any off-farm job/activity, only 19% said no. When asked if they got income in other ways, 36% of smallholders said “yes” (Figure 2.22) . However, only 15% report to have a regular wage/salary, and all household heads participate in agriculture, irrespective of their main activity.

Job opportunities of smallholder agriculture households are limited, but their economic activities are somehow dynamic. One hidden characteristic, is that not all activities smallholders engage in generate money, or if they do, that salary does not last long. That is because most of these off-farm activities are seasonal, or they do not get to be paid monetarily, as there are a lot of informal activities that mostly happen in a quasi-barter exchange in rural areas. In the case of rural

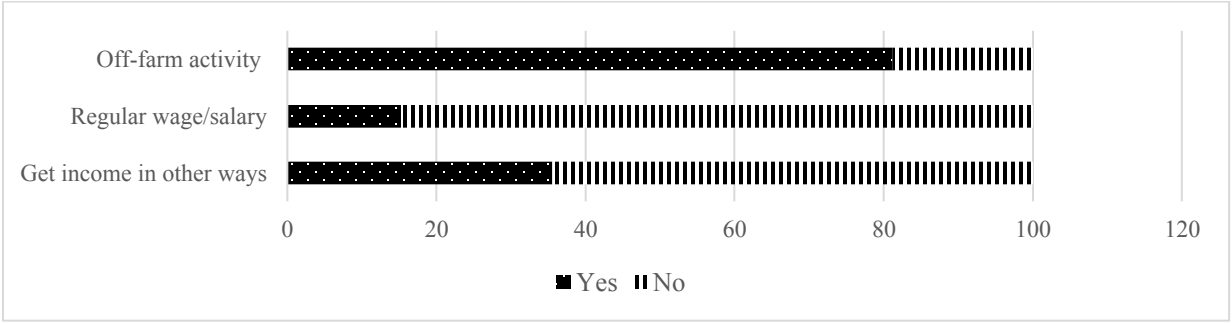
Mozambique, it is not uncommon for family members not residing in the same household or neighbors to help each other in building houses or small tanks to store water with no pay. Even in times of plowing or harvesting, it is common for them to work in groups in one plot then another to seep up the work. For example, of those who worked in agriculture as main activity, only a mere 1% reported the second job to be a professional-type. Over 23% responded that the second job was either business owning or shop owning. Although there is no a categorization of the business types, most of them are unarguably informal. Due this combination of lack of skills and job opportunities, and informal activities, the share of smallholders who receive income from the government is 2%, 1.5% from NGOs, and close to 7% receive pension.

Figure 2.21 Main Activity of the Household Head



Source: Created by the author based on CGAP (2015)

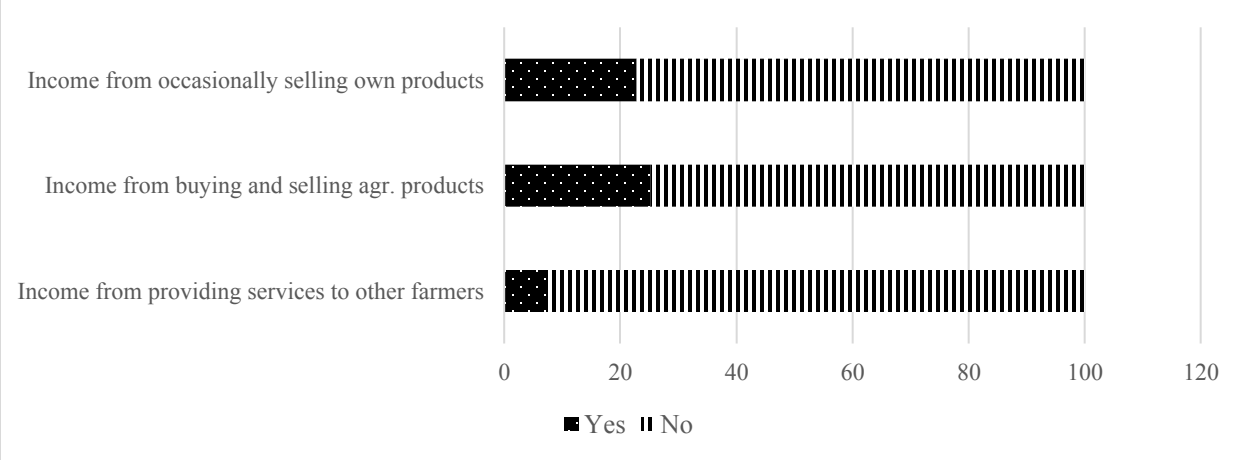
Figure 2.22 Off-Farm Activity and Other Ways of Getting Income



Source: Created by the author based on CGAP (2015)

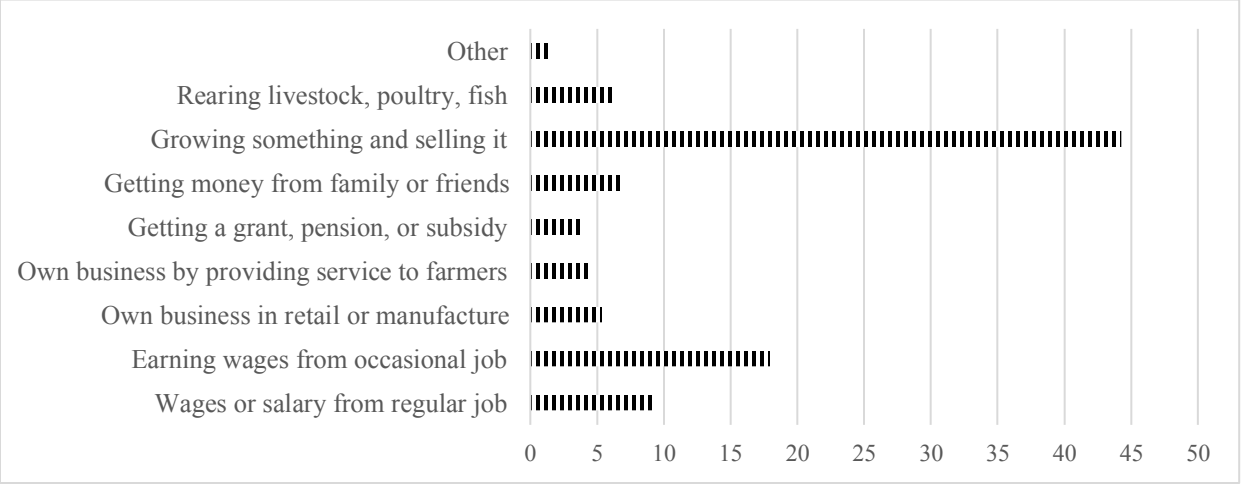
Most smallholders do not have regular wages/salaries because they do not have regular jobs. The majority work in a family-controlled environment, where family members produce for the household consumption. First, only 8% report to get income from provision of services to other farmer, or by processing their produce (Figure 2.23). After harvesting, it seems like output is not enough to sell. Over 77% of smallholder do not sell their products even occasionally. However, one-quarter report to buy or get products from other farmers to sell. When smallholders engage in an income generating activity, still agriculture related work is the most important. In figure 2.24, 44% of farmers indicate growing something and selling as the most important source of income, 18% earn income from occasional jobs, and only 9% cite a regular job as the most important source of income. Other important sources of income include livestock, remittances, and owning a business to some extent. This indicates on the one hand that there is a large portion of smallholders producing for subsistence, and on the other, that business opportunities linked to agriculture among smallholders are limited. The interpretation may be that first, money (including credit) is scarce among smallholders, which makes it challenging to operate a business, but also that most of them produce the same crops, which also limits possible transactions, especially in one-harvest agriculture type.

Figure 2.23 Income Related to Agricultural Services and Products



Source: Created by the author based on CGAP (2015)

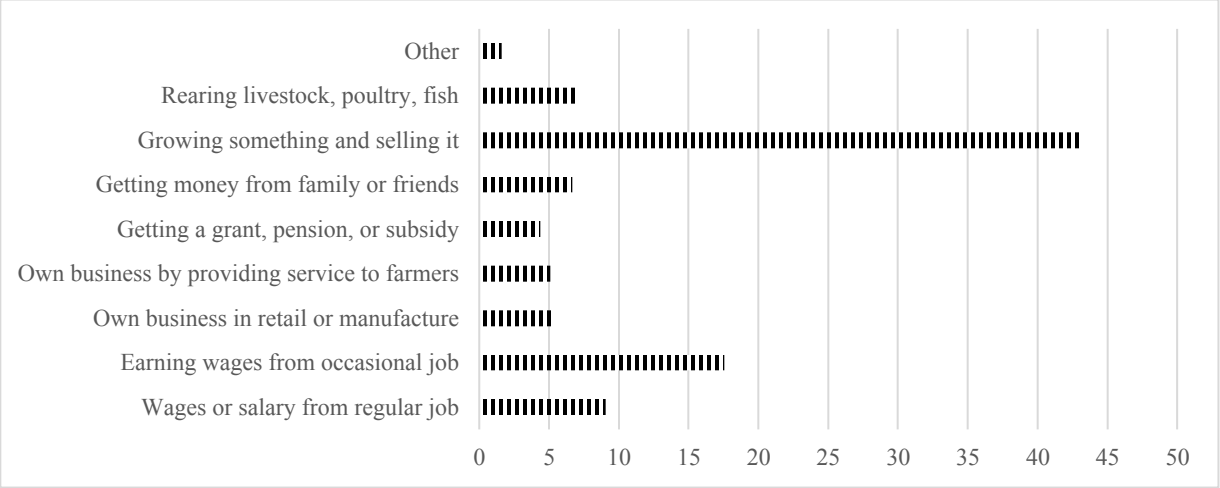
Figure 2.24 Household's Important Source of Income



Source: Created by the author based on CGAP (2015)

Research has shown that people's aspirations are influenced by those around their environment (Janzen et al., 2017). For example, when asked what source of income the household head liked the most (Figure 2.25), the rate of distribution of the answers was not far from "the important source of income" (Figure 2.24). For example, 43% of household heads responded that growing and selling crops was their favorite form of income generation, only 1% below the same response they gave to the question of the important source of income in the household. The other responses are distributed almost identically in the two figures. The results of these two graphs are puzzling, when considering that in Figure 2.23, only 23% of the respondents said they generate income from selling products they grow. Given this, it is tricky to know whether the answers are given after considering other possible activities they could do or aspire to do, or the responses are guided by choice constraints, and, thus, they simply choose the activity they have been practicing, whether it is optimal or not. One way of changing behaviors could be like the one in Ethiopia, where rural dwellers saw a video of populations living in similar conditions who apparently were successful in farming or business; at the end their aspirations increased significantly (Bernard et al., 2014).

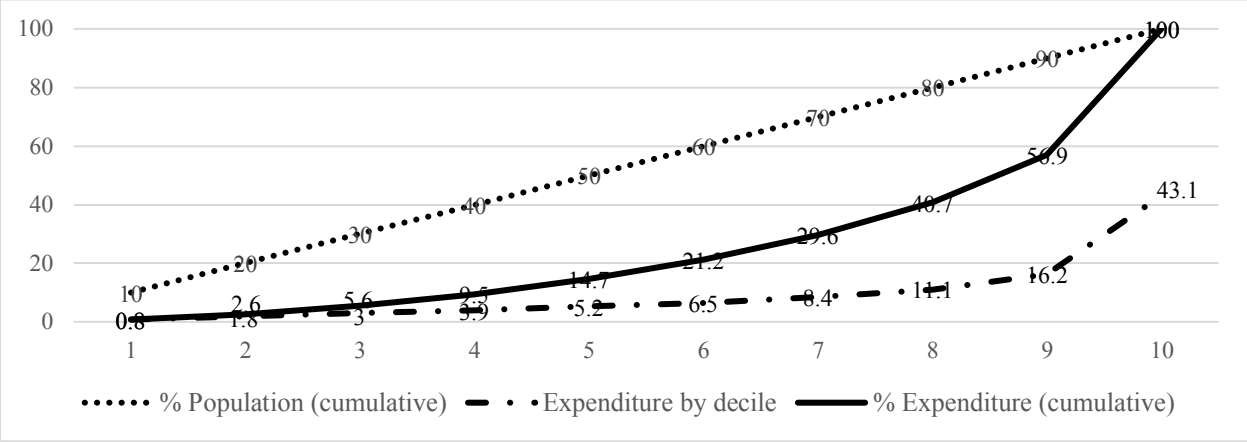
Figure 2.25 Income Source the Household Head Likes to Get the Most



Source: Created by the author based on CGAP (2015)

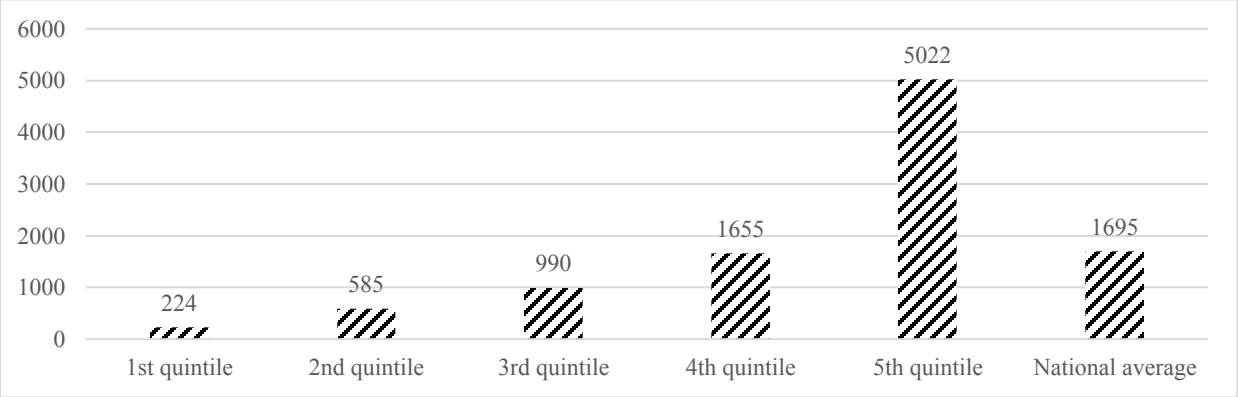
The fact that the Mozambican population is young brings some drawbacks. The 2017 census indicates that the general dependency ratio is high and increasing. From 94.8% in 2007, the dependency ratio grew to 99.5% (GPHC, 2017). In other words, for given 100 people, 99 depend on others in almost all of their consumption. Recent data of the National Institute of Statistics indicate that as of 2020, the dependency rate was 106%, meaning that there for each 100-active people, there are 106 inactive/dependent people (NIS, 2021). Additionally, there is a large share of inactive youth people (their dependency rate is 99.2%). The National Institute of Statistics also collected the expenditure behavior of the household in the same 2019-20 period (figure 2.26). Cumulatively, 50% of the population consumes 15%, while the top 10% consumes 43% (NIS, *op cit*.). The inequality goes even deeper at the bottom decile. Those at the first-decile spend less than 1%. The data also indicates that, monthly, the poorest households spend around $2 per capita, while the richest spend $112 per capita (by 2020 exchange rate). Figure 2.27 confirms inequalities among quintiles. Even among the bottom quintiles (smallholders), one person in the second quintile spends on average 2.6 times what a person in the first does. A person on the top quintile spends at least 22 times what an individual from the poorest quintile spends.

Figure 2.26 Cumulative Expenditure of Mozambique Population 2019-20



Source: Created by the author based on NIS (2021)

Figure 2.27 Monthly Per Capita Expenditure in Meticais (Exchange Rate 2020: $1 = 65MZN)



Source: Created by the author based on NIS (2021)

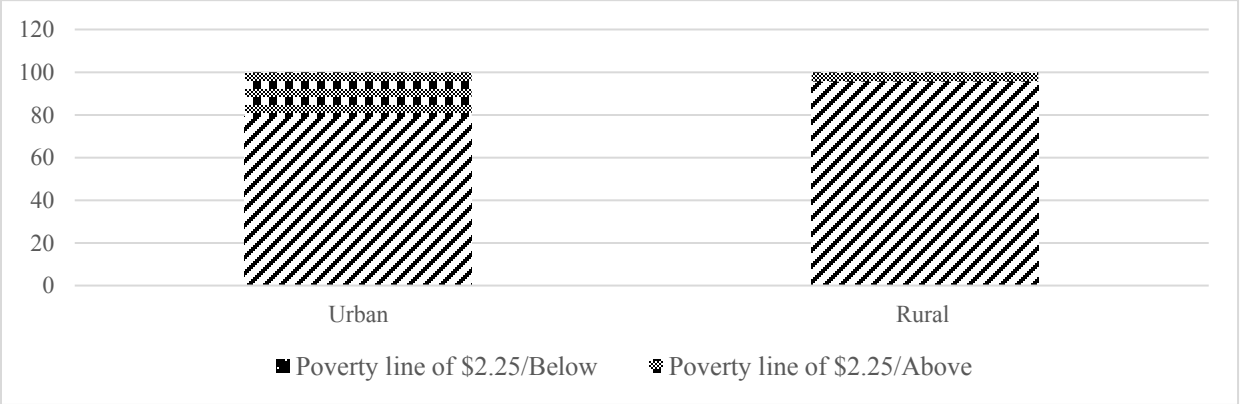
The expenditure characteristics of the smallholder somehow mirror those seen in the subgroups on the entire population. The CGAP data did not collect the exact amount each household spends per month. But, when applying consumption thresholds within the smallholder farmers, most of them are living under poverty. By the $1.25/day threshold, the data show that 73% of smallholders in rural areas live below the poverty line, while in urban areas the rate is 40% (Figure 2.28). If we apply the $2.25 threshold, the data goes even bleaker (figure 2.29). Roughly 96% of smallholders in rural areas, and 79% in urban areas live below the poverty line, respectively. Even if the threshold applied is $1.90 per day (see World Bank, 2020), still almost all smallholder

households in rural areas and majority in urban areas fall below the poverty line. Figure 2.30 is the depiction of how many times these households spend on groceries per year. Unsurprisingly, 52% responded to never spend any money, followed by "at least once a month" at 23%, and "at least once a week" at 11%. Those who seem to spend often, might be the ones located in urban areas (meaning suburban areas), who have a dual dependence on farming and regular or occasional jobs that generate income. The rest of smallholders spend on groceries only occasionally; 8% for "few times in a year", 3% for "once in a year", and a little over 3% for "according to harvest". As pointed out above, if agriculture production efficiently generated enough output to sell, the last group of respondents should have better share.

Figure 2.28 Poverty Line Threshold ($1.25/Day)

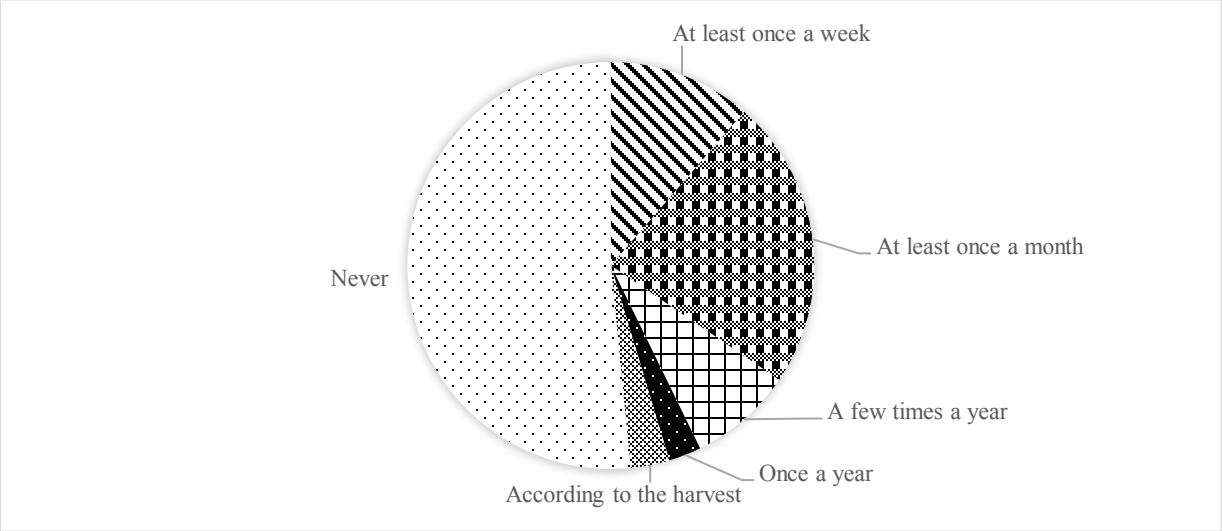
Source: Created by the author based on CGAP (2015)

Figure 2.29 Poverty Line Threshold ($2.25/Day)



Source: Created by the author based on CGAP (2015)

Figure 2.30 Household Spending on Groceries (Times in a Year)

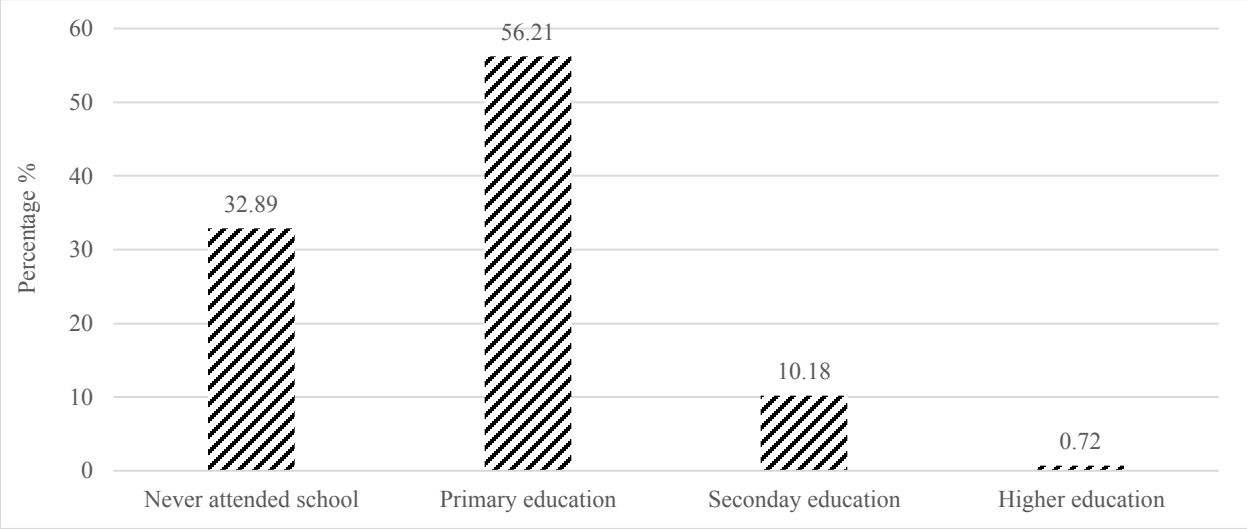


Source: Created by the author based on CGAP (2015)

Most household heads did not attend beyond primary education (figure 2.31). From a continuous variable on educational attainment, and sampling with no respect to the children characteristics, roughly 33% did not attend school, 56% have some primary education, and 10% have secondary education. However, when subject to children characteristics, and categorized by educational levels, the educational attainment of household heads changes significantly: 29% did not attend any school at all, 30% attended some years of primary, 17% report to have finished primary, and, unexpectedly, a large number, 24%, attended beyond primary (Figure 2.32). As mentioned earlier, female-headed household are not families with both parents where the woman is in charge (like the case of matrilineal societies). Out of all the households, only 2% have a male spouse which is not the head. Therefore, we only report mother's characteristics (male-headed households). Figure 2.33 indicates that 45% of mothers did not attend school, 26% have some years of primary education, 16% completed primary, and 13% attended post-primary. This indicates that 71% of women in smallhoder households have some to no formal education. In 2007, the share of educated mothers was much lower: 99% had either never attended school or had some few years of primary education, and only 1% reported to have completed the primary education (not reported here). At the end of the day, educational attainment in terms of years of education is

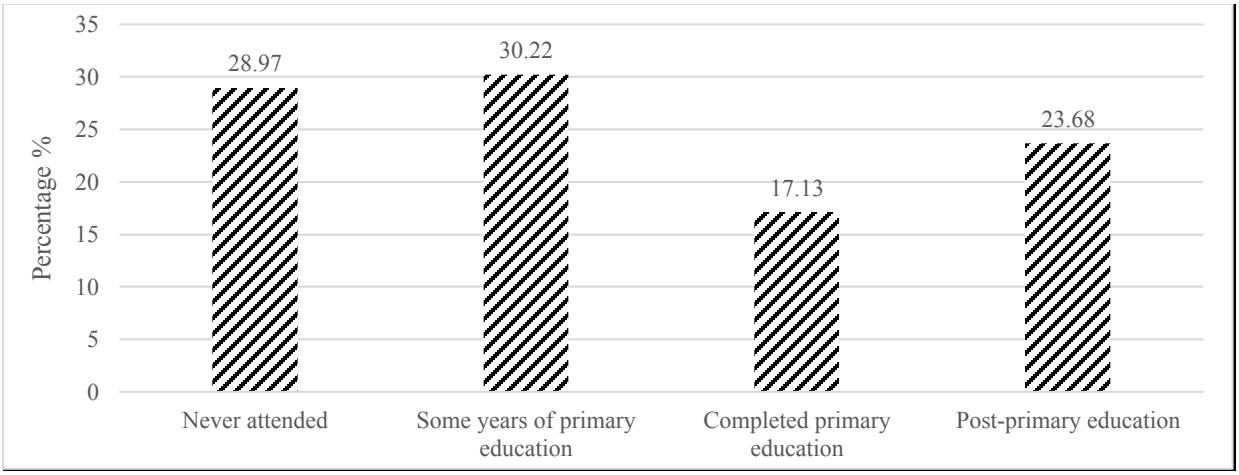
very low among the smallholders: an average of 4.5 years for male heads, 3.4 years for female heads, and 2 years for mothers (male-headed households).

Figure 2.31 Educational Attainment of the Household Head



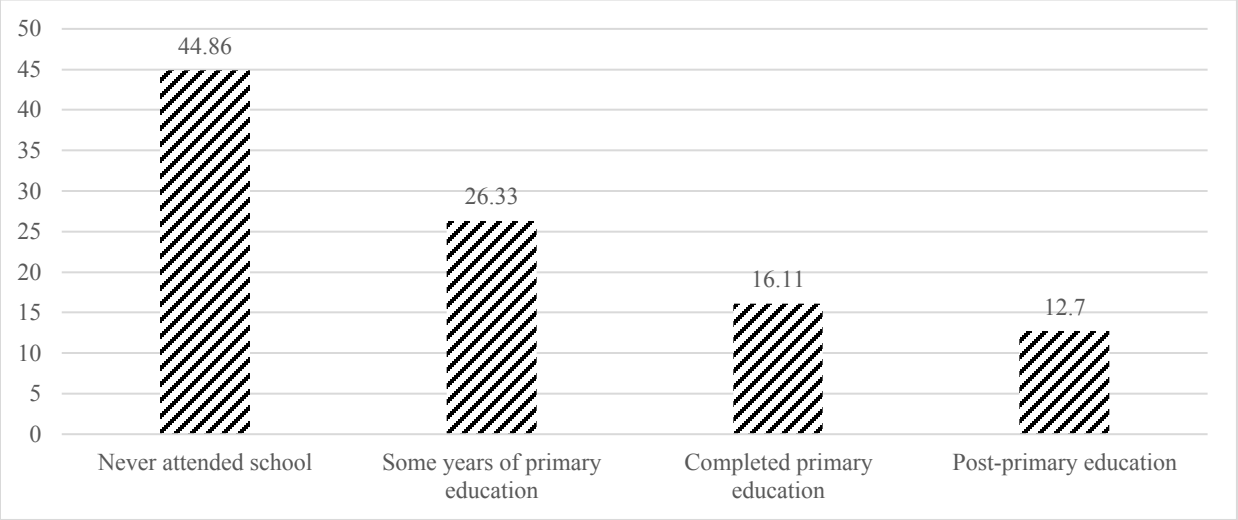
Source: Created by the author based on CGAP (2015)

Figure 2.32 Educational Attainment of the Household Head (Subject to Children's Characteristics)



Source: Created by the author based on CGAP (2015)

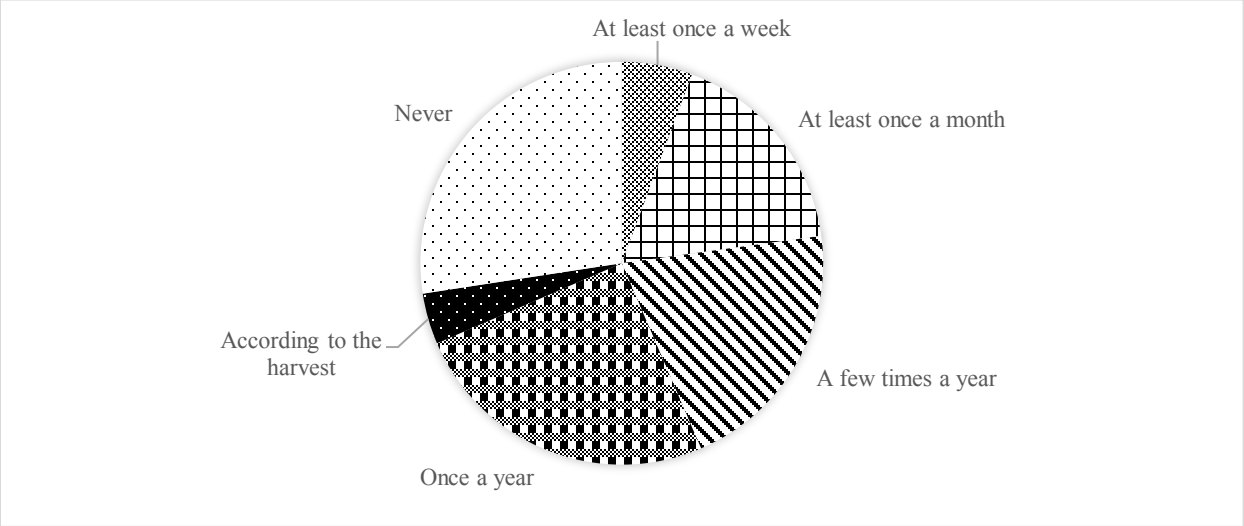
Figure 2.33 Mother's Educational Attainment (Male-Headed Households)



Source: Created by the author based on CGAP (2015)

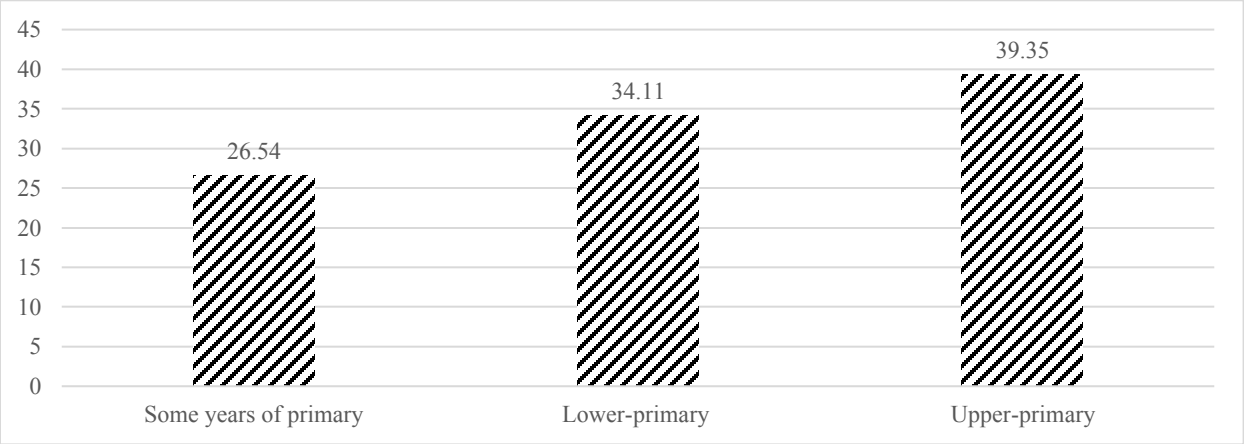
A combination of household consumption behaviors, investment, and heads occupation predicts offspring's education. Figure 2.34 indicates that 27% of households never spend on education, 25% spend at least once a year, 21% a few times a year, 17% spend at least once a month, 6% once a week, and the rest 4% according to the harvest. Over 80% of smallhoder household children report to attend school. However, their educational attainment does not seem to match attendance. Figure 2.35 reports educational attainment for pupils 13 years old or more. The official age to finish the seventh-grade of primary education is 12 years. The rate of those who finished primary education is 39%, which is ten points below the national average of 49% in 2015. Around 34% completed lower-primary, while over a quarter attended some years of primary. These last two groups either dropped out already or enrolled late and are still in primary level.

Figure 2.34 Household Spending on Education (Times in a Given Year)



Source: Created by the author based on CGAP (2015)

Figure 2.35 Children's Educational Attainment (13 Years Old or More)



Source: Created by the author based on CGAP (2015)

CHAPTER 3

LITERATURE REVIEW

3.1 Family Characteristics and Children's School Enrollment and Education Attainment

The prediction of education outcomes is complex due to the nature of the variables involved. The supply-side issues, in principle, should be of easy iteration and cross-country adaptability because basically, they are the same. However, in reality, because they intend to solve social problems, they have to abide by societal norms and environment. Additionally, educational systems themselves do not change as fast as they should, probably because they interact with society, which moves much more slowly. This is why even within a given country, recently, there is a continuous push towards the involvement of the local community, the parents, and raising decentralized management. When both the demand and supply-side issues are estimated, the former generally have a bigger influence on schooling than the latter. Even when researchers and educators talk about the importance of early childhood education, ultimately, the central driver for this is household level.

As an example, developing countries, where government investment on early childhood education and care is almost always nil, the demand side is the one leaning towards spending money by seeking private institutions. Therefore, recently, family characteristics have been argued the best predictors of children's schooling and educational outcomes. Björklund and Salvanes (2011), summarizing the state of the art of schooling prediction, found that even conservative estimates agree that around 40 to 60% variation of educational outcomes is predicted by the family background. They also find that unanimously, the research argues that the first way of family influence on educational outcomes is the transmission of genes from parents to kids, and the second one is home environment, practices and beliefs. Using an extensive dataset of around 70, 000 kids, Huisman et al. (2010) predict that in India, up to 70% of the explanatory variation of enrollments in primary education is explained by family characteristics. The result indicates that the combined power of these socioeconomic factors is highly significant in rural areas. Therefore, poorer

households and disadvantaged groups (e.g. girls, in more patriarchal areas) suffer the most from discrimination. This trend will be seen in the subsequent papers of this literature review.

Most of the assumptions and hypotheses presented in the science of estimating educational investments and schooling outcomes are well known and have been researched for decades. Yet, there is no consensus on how these factors, combined, predict schooling, and how governments and societies can be guided by them in their pursuit of more educated generations and richer nations. In fact, most research, in space and time, tends to find different if not opposing results, and because of that, some questions could be asked on the methodology and definition of the grouping 'society' variable. Trying to respond to this concern, Bukodi and Goldthorpe (2012) define three decomposing factors that influence offspring's educational attainment: parental class, status, and education. They find that the parental status and education have a strong relationship with education irrespective of children's gender. However, parental class has a significantly linear relationship with attainment only for girls. All three variables are found to exert independent influence on attainment, and therefore should not be taken as the same when estimating the 'social origins' of children. The second hypothesis explored by Bukodi and Goldthorpe (*op. cit*) is whether this effect is constant over time or not. The result indicates that parental class has constant effect for both sexes. As for parental status, it seems to be constant for sons, but there is a slightly decline over time for daughters. Finally, parents' education attainment has mixed effects for men, depending on the year-cohort (at some points weakening), while becoming stronger and stronger for women. Overall, the study finds that disadvantaged children are less likely to better their likelihood of underperforming.

Heckman (2006) concludes that the relationship between household investment and child development is dynamic. The disadvantage in skill formation is not a direct result of lack of financial resources, but due to the lack of cognitive and noncognitive stimulation given to young children (Cunha & Heckman, 2009; Gertler et al., 2014). In fact, income reportedly has only a modest effect. For example, Chevalier et al. (2013) study the effect of parental income and education on schooling in the U.K, more precisely on how these factors affect adolescents who leave school around the age of 16. Their results indicate that income predicts schooling less well,

while parental education, especially mothers' education has stronger effects for boys (see Lundborg et al., 2014). Even after controlling for income, the strong effect of parental education is not reduced. Pronzato (2012) examines the difference in the intergenerational transmission of educational success by paternal and maternal characteristics using twins in the case of Norway. Building on the previous research, she confirms that better-educated parents correlate with better offspring's educational outcomes. Sensitive to the sample, the results indicate that the fathers' education has a more significant effect among highly educated families. In contrast, mother's education seems to be the better predictor of schooling variations for the less educated families. Among siblings, father's and mother's education seem to not respond significantly to the pupil's abilities; thus, no significant bias is observed. However, for the lower educated parents, mother's education continues to have a significant effect on schooling.

Erola et al. (2016) also use a methodology similar to Bukodi and Goldthorpe (*op. cit.*). They estimate the offspring's achievement as influence of parental income, class and education, using a Finish sample data (0-29 years of age). Parental class also has a constant and insignificant influence over time. Compared to mothers' status, fathers' status is the predictor with stronger explanatory power (around 50%). Parental education is an independent and important factor, but its influence is subject to the children's age. Mothers' education is critical in the children's early years, but, from the early adulthood, fathers' education explains achievement better. Income has the most negligible results in the explanatory variation between siblings (especially during infancy). However, Dahl and Lochner (2012) found that family income positively affected academic achievement, and the biggest gains were observed among the poorer households. The dialogue of these findings may suggest that in developed countries, where the supply of schools is fairly equally distributed, thus lowering the direct cost of education for the household, the overall education level of parents is much more critical in raising children's educational attainment.

For the case of Madagascar, Glick et al. (2011) investigate the influence of the family and school factors on child achievement (using test scores for children aged 8 to 14). The study finds that the wealth status of the household has modest effect on schooling, and only stronger for the younger sample. According to the research, one possible explanation is that it might indicate that

wealth status of the household is mostly important as a school readiness indicator. Mothers' education is far more important in predicting children's schooling than fathers' education. The study notes that this might reflect difference in the amount of time parents spend with children, since fathers are more likely to be the bread-earners. However, the effect of parental education, even that of mothers, is significantly reduced when school factors are controlled for. The study cautions of the possibility of endogeneity of school factors. On the school side, teachers experience, shorter distance to school, and the presence of blackboards are found to be positively associated with attainment. Part-time schooling and the unavailability of toilet facilities are associated with negative test scores. The latter seem to even be more significant when girls do not have dedicated toilets.

Yamano et al. (2006) examine the factors that influence the schooling decisions of orphans in Uganda. Like in any developing country, the study notes that education is an important factor in entering non-farm activities in rural Uganda. Due to the AIDS pandemic in the early 2000s, most children lost at least one parent at an early age. The result indicates that for children aged 14 and below, being a single-orphan, does not significantly affect enrollment; however, for the older group, the effect is opposite. Even for non-orphans, a male not living with biological parents is less likely to not enroll. In terms of progression, orphans have higher odds of not continuing post-primary schooling. Wealth status is significantly and positively associated with enrollment, especially in secondary education. Overall, orphans have a slower school progression than their non-orphan counterparts. Some of the reasons, especially for girls, include school fees at the secondary level (which is not free), early marriage or pregnancy. With a similar background of the AIDS pandemic, Moyi (2010) found that, in Malawi, mothers' survival, female heads and more years of parental education lowered delayed enrollments.

Langsten and Hassan (2018) estimate children's educational attainment after Egypt adopted the universal primary education policy. They found that, although only wealthier families achieved UPE, enrollments and attainments have improved, especially for children living in rural areas. However, UPE policy does not increase enrollment rates for poor boys in urban areas. One reason might be that households living in suburban areas suffer the most from monetary pressure,

and, thus, children are more likely to look for informal jobs earlier than their peers from rural areas who, first, have to decide to migrate. For example, Abuya et al. (2013) found in Kenya that after the introduction of UPE programs, because of extreme poverty, children living in the poor suburbs of the capital Nairobi were dropping out early to work in dumpsites, and young girls (aged 14-16) were pushed to transactional sex. Thus, in a context of high rates of poverty, the elimination of school fee might not resolve the issues linked with low enrollments and high rated of dropouts (also see Lucas et al., 2012b).

In Turkey, Smits and Hosgör (2006) estimate the effect of family characteristics on children's primary and secondary school in Turkey, focusing on uneducated, low-earner, and rural populations. They find that enrollment is affected by parental education, income, father occupation, number of siblings, and mother's traditional beliefs. Girls enroll less than boys, and their odds of school participation are subject to having a mother who has at least finished primary education and can speak Turkish. Gender role affects the household's decision to enroll children in secondary education. The school enrollment of boys is significantly affected by the household wealth status. Shimamura and Lastarria-Cornhiel (2010) study agricultural credit provision to households and its influences on school participation in rural Malawi. The study finds that credit up-taking decreases the likelihood of attendance for girls. The data do not suggest that girls work more when the household enters into the credit program, but generally, all children tend to participate in household chores and attend school simultaneously, even without credit.

In India, Nakajima et al. (2018) find that literacy skills acquired in primary education have significant positive effects on children's progression and prevent dropouts. The availability of jobs locally also positively affects school progression. They also find a negative relationship between the time pupils spend on household chores and literacy skills acquisition during primary education. In rural areas, girls attain upper primary if they live with a father with better educational attainment. Surprisingly, the study also finds that when rural girls can read and write, they are more likely to participate as paid/unpaid labor in the informal markets. However, wealth had a weaker relationship with the likelihood of finishing upper primary. Jukes et al. (2014) estimate the factors that influence dropouts in Malawi. Age is the mediator of dropout, rather than orphanhood. One-

year increase in pupil's age was associated with over 50% increase in the odds of dropping out from school. The provision of a flexible learning schedule for children decreased dropouts by 45%. Because in grades 6 and 7 the age varied between 11 and 17 years, the program was more effective in reducing dropouts in the older cohort. Orphan children, who initially were perceived as "at risk", were less likely to dropout

The allocation of the available resources within the household follows a pattern: parents tend to expose the children perceived to have more abilities to more resources or to more opportunities. Datar et al. (2010) investigate if the household's early childhood intervention can be biased based on child endowments (they use birth weight difference between siblings) in the U.S. The common thinking would expect more resources to the disadvantaged siblings; however, the results show that children with a "normal birth-weight" significantly receive more investment. For example, the child with better endowments, in the presence of a sibling with 'less' endowments, is more likely to be taken to "well-baby visits", vaccination (for e.g. against polio) as well as attending kindergarten. Kids with low-birth weight are even less likely to be breast-fed than their siblings. The research, however, indicates that the interpretation of the results might not be as straight-forward. Firstly, investing more in the "normal" child might be driven by being born after a less-endowed child, thus reinforcing more awareness of taking care of the newborn. Secondly, it might be that parents prefer efficiency over equity, and therefore, respond to endowments that have higher likelihood of returns to investment in health care.

Adhvaryu and Nyshadham (2011) also examine parental early investment as response to child's endowments in Tanzania. The data applied uses two groups of children: those born during an iodine supplementation program and those born after the end of the program. Therefore, the study examines how child cognitive endowments and iodine supplementation influence the vaccination decision within the household. Kids who received iodine were more likely to also be taken for a polio vaccination. In terms of breast-feeding, the results do not show big differences, although the treatment group has a slightly higher probability of meeting at least 6 months of being fed. But children in treatment received more fluids like juice, water and milk. When the study investigates investments as results of information, it finds no differences between the two groups.

Therefore, it does not seem that the received visits from the iodine supplementation program before the baby was born reinforced to the parents the idea of higher endowments for the child who took the supplementation. As the children grow, investments do not seem to be influenced by having taken the iodine supplements or not. The study also finds that parents are more likely to treat children of the opposite sex more equally than children of the same sex. Overall, parents seem to invest more in children who received iodine. It might be because of expected higher-endowments or simply as compensation for perceived low-endowments than their siblings who were not treated.

Akresh et al. (2012) estimate the household's investment as response to the child's ability in Burkina Faso primary education. Parents' perceptions about the child's abilities positively correlate with enrollment. Compared to their siblings, children with one more standard deviation of parental perception of their abilities increases the probability of enrollment. When compared to the perceived "best" child, average pupils' abilities lower their chances of being enrolled. The research notes that one reason for investing more in the children with higher abilities is the parents' perception of higher chances of success for them. Therefore, while research has been critical to the underinvestment on the perceived lower-achievers, one should recognize that the households' allocation efficiency of constrained resources favors reduced investment risks. Meanwhile, the constraints of most developing countries do not end in the direct monetary cost. For example, even after enrolling, Dreibelbis et al. (2013) found that in Kenya, pupils, especially girls, barely attended school when they walked long distances to fetch water.

Aizer and Cunha (2012) examine how children's endowments relate to household's investment on human capital, starting from early childhood. One mediating variable applied to avoid endogeneity is the health status of the child at birth. The study also assesses how family size changes this relationship. The result indicates that between siblings, children born with higher weight receive better parenting investment. Prenatal investment also favors highly endowed children, although the explanatory power is not strong. Highly endowed children also strongly receive more investment as the family size of the household becomes larger, which means there is more allocation directed to fewer members. Thus, parents' allocation of resources creates a path of inequalities within the household by following the variation in endowments among siblings.

This reality reinforces the segregationist nature of education that feeds the social reproduction hypothesis, which many times is easily proven at the school level (Maloutas & Lobato, 2015).

Lyu et al. (2019) use cross-country data to examine how socioeconomic factors influence achievement (China, Germany and the USA). They find that while direct socioeconomic background of the child is important for performance in the USA and Germany, in China, location related factors (urban/rural) are much more important. Conley et al. (2015), however, examine if the effect of parental education on children' educational outcomes is due to its interaction with other socioeconomic factors (environment) or due to randomly underlying genes that children inherit from the parents (nature). The findings indicate that genes play a positive role in predicting educational attainment across the households and within the household. But genes do not seem to give an advantage beyond schooling. Aucejo and James (2017) found that early improvements in family background lessen inequalities within and between racial groups and between girls and boys. The gains subsist in equalizing college enrollment decisions. Brenøe and Lundberg (2018) estimate if the gaps resulting from childhood household background persist in adulthood, using a dataset from Denmark. They study differences in adolescence outcomes, educational attainment, and labor market outcomes (employment and earnings). In an advantaged household, they find that boys benefit the most compared to their sisters. However, as adults, the existent gender gap in attainment and employment benefit daughters, mediated by the influence of maternal education. Fathers decrease inequalities in terms of educational attainment in favor of boys while decreasing the labor market outcomes inequalities in favor of daughters.

Like most developing countries, rural China has a significant number of its youngsters quitting school before completing senior high school. Loyalka et al. (2013), by applying randomized control trial, estimate how counselling and information about the returns to schooling can raise the number of attendees at secondary education and improve academic achievement. They find that the availability of information does not increase performance and the likelihood of high school enrollment. Surprising, counselling seems to not only reduce achievement but also increase the probability of dropping out. The study concludes that the insignificant effect of information provision on academic performance may be outweighed by the low education quality

of rural schools and the family financial constraints. The negative effect of counselling could be the response to the growing demand and reasonable wages for unskilled labor; thus, the provision of information and counselling could have been a trigger to reassess the value of schooling vs the next alternative (work), in favor of the latter (also see Shi et al., 2015).

The inequalities in educational attainment become more devastating in the job market because schooling highly correlates with occupation. Parents' occupation is one of the leading variables in children's educational outcomes estimation. As with any other variable, results from the effect of parental occupation on school outcomes are mixed. Schildberg-Hoerisch (2009) exploit how parental employment (working hours), while addressing the selection bias issue, affects children attainment. The result finds that overall, there is no negative relationship between parental employment and secondary school attendance. When considering the negative effect of working mothers on schooling, the result still does not support that assumption. Even when estimating parental time spent with the children instead of working hours, the coefficient does not show significant positive effect. Conversely, income does not seem to be a significant factor either. However, it should be noted that this does not imply that under constraint or uncertainty these results still hold. For example, Coelli (2011) found that parental job loss significantly harms enrollment in college, because it signifies a loss of income.

Croll (2008) investigates the effect of socioeconomic factors on children's occupation choice in Britain. However, the findings indicate that pupils whose parents are in better occupations tend to be more ambitious, to have better educational attainment, and to choose better jobs than their peers from other backgrounds. Interestingly, it was also found that inequalities are reduced when the average ambition and educational success among pupils is the same, irrespective of the family background. But academically poor achievers, from disadvantaged households and below the ambition average, tend to do poorly in terms of occupation choice and job matching later on in their 20s. As the study implies, one educational policy recommendation is that non-ambitious children from disadvantaged households who academically perform well should be guided in order to raise their ambitions and therefore raise their life achievements.

Seshie-Nasser and Oduro (2016) examine if poverty status is responsible for delayed enrollments in the case of Ghana, and if it affects boys and girls differently. They find that income is not a significant predictor of the probability of delaying enrollments for girls or when pupils live in urban areas, however, it has a significant effect for boys and rural areas. Boys are older than girls at given grades, indicating that, on average, they delay even more. Boys are also more likely to repeat grades, dropout and re-enter at a later period. Urban pupils not living with their biological parents delay school entrance often. Even though poverty status does not impact significantly on the decision to enroll girls, it seems that the likelihood of finishing primary and progressing to secondary school is determined by the household's wealth status. Parental education is another important explanatory variable. More years of father's education are correlated with a lower probability of delaying enrollments, especially for girls, while mother's education increases the probability of enrolling at the official age for both boys and girls. Also, in Ghana, Nguyen and Wodon (2014) analyze the reasons for the gender gap in education attainment. They do the analysis of completing conditional to six items: enroll and complete primary, enroll and complete junior high school, and, lastly, enroll and complete senior high school. The data indicate that even though in the recent years there is progression in enrollments in primary and junior high school, gender gap still remains, especially as result of lower share of girls transitioning to senior high school. Disadvantaged households and those located in rural areas contribute significantly to the gender gap, starting from the completion of primary education.

Kuépié et al. (2015) investigate the factors that influence enrollment and educational attainment in a cross-study of 12 sub-Saharan Africa countries. The results find that girls, rural adolescents and poorer households have higher odds of having never attended school. Girls who seem to not perform well are more likely to drop out compared to boys with a similar performance. However, ceteris paribus, girls who perform relatively well are more likely to keep on attending than boys. A mixed-method study by Zuilkowski et al. (2016) find similar results in the case of Kenya. Age, being a girl, and poverty were associated with the risk of dropping out. Poor performance too was highly correlated with the likelihood of dropping out. From the qualitative method, the data reveals that pupils are the primary decision-makers when they feel the urge to

drop out. The researchers argue that most studies before focus on the financial decision of continuing to enroll pupils at school, thus, overestimating the power of parental decision in the same level as in the western reality. However, in the African context, adolescents have more "responsibilities and competencies" than their peers from richer countries. For example, at early age most Kenyan pupils participate in income generating activities, and participate financially into the livelihood of the household. In other study in rural Kenya, by King et al. (2015), it is found that financial constraints, malaria, and lack of sanitary pads negatively influenced attendance and positively influenced the probability of dropping out, especially for girls and orphans. One important factor to consider from the qualitative interviews, while girls reported menstruation as one of the reasons to not attend school, their parents or guardians did not report so. This indicates a lack of dialogue between parents and the offspring.

The constraints that undermine the schooling of the poor seem to be the same across all the developing countries. In Bangladesh, Sabates et al. (2013) find that age, pupil's gender, and non-regular income contribute significantly on the decision to keep pupils enrolled. Like in the cases presented above, pupils delay school enrollment. The probability of dropping out for boys was almost two times than that for girls. The lack of parental support and high rates of absenteeism were also found to positively influence the probability of dropping out, thus the importance of educated parents. Additionally, children who kept going to school reported to receive more support from their parents, and were less likely to engage in paid labor. In India, Gouda and Sekher (2014) found that 1/4 of pupils aged 6 to 16 were not attending school. Of those, around one-seventh had never attended school, and one-ninth had dropped out. Cultural background seems to matter in India, as a larger portion of dropouts were Muslims, or from some minority castes. Children living with illiterate parents were four times more likely to dropout than their peers living with literate parents. The financial status of the household was also a significant predictor of schooling. Pupils residing with unemployed parents were also more likely to drop out from school.

Hungi et al. (2014) examine the link between age and literacy at grade 6 (primary), and at what age poor children perform at their best in the case of Kenya. There is an incidence of over-age, either due to late enrollments or to grade repetition. Pupils seem to perform better when they

are in the age range 10 years and half, and 11 years and five months. The results are consistent irrespective of the pupil's gender, household wealth, school type, and location. Thus, younger pupils were more likely to achieve better performance compared to older pupils. Also, in Kenya, pupils' performance in primary education was related to adolescent girls' mobility in primary school. Omwami and Foulds (2015) examine the effect of age on schooling in Kenya. They find a persistence existence of under-age and over-age in primary education. It seems that as result, classes become over-crowded, which can reduce the quality of educational outcomes, especially in disadvantaged schools and regions. Maluccio et al. (2018) found that pupils who changed school in lower primary were more likely to be the worst performers, and they tended to change to poorer resourced schools (thus falling behind even more). Opposite to that, young girls who changed school in upper primary were among the best performers and were more likely to move to better school. Consequently, even in rural Kenya, parents respond to the quality of education. When they perceived that public schools were underdelivering, they were more likely to enroll children to private primary schools (Nishimura and Yamano, 2013). Gunnlaugsson et al. (2021) examine the determinants of school choice (private versus public) in Guine Bissau. They find that, like in most developing countries, overage school participation is common, especially in public schools and boys. The factors that explain the likelihood of enrolling in private school are parental education, household wealth status, and parental employment, rather than the pupil's gender.

Ganimian and Murnane (2016) review the literature in developing countries that applies impact-evaluations methods to study the best explanatory variables for school attendance, performance, and educational attainment. They conclude that: i) reducing the cost of education, by lowering or abolishing school fees and expanding school to remote areas increase enrollments and attendance, but it does not necessarily increase educational attainment; ii) the dissemination of information about the importance of school quality, better parenting and involvement in children's schooling, and the economic returns of better educated offspring affect parental behavior and improve children's performance; iii) the school resources only improve pupils' performance if it the changes are felt by the pupils in their daily interaction with school environment; and iv) programs that aim at improving teachers' effort do influence student's achievement, but low-

skilled teachers need more intervention, such as in-service training, to raise their performance to desirable standards (also see Jukes et al., 2014).

Senghor and Wolff (2017) study inequalities in educational attainment between siblings in six African countries, namely, Burkina Faso, Senegal, Nigeria, South Africa, Kenya, and Uganda. Although these six countries have different socioeconomic backgrounds, the study intended to estimate the effect of remittances on schooling. The data suggests that children from female-headed households in Senegal and Kenya are more likely to finish primary education. The spouse of head is more likely to migrate, thus the increase in schooling may be due to the positive effect of remittances received. Overall, offspring's schooling is correlated with the household socioeconomic status. Parents who complete primary education increase the likelihood of the children to also complete primary, even more so if the former have post-primary education. Children from the top two quintiles have advantages over the others, as well as living in urban areas. In Senegal and Uganda, girls attain less school years that boys. Having siblings is only weakly correlated with educational attainment.

In South Africa, Fleisch et al. (2012) estimate that out-of-school-children numbers are higher than the reported by the government. They find that "coloured boys", orphan of mothers, children born outside of the country, or who have migrated from one region to another in the last five years, and those living in recondite rural areas were more likely to not attend school. Household wealth does not seem to have a significant effect on attendance, however, children from families eligible for social grants who were not receiving them were less likely to attend too. Also, in South Africa, Branson et al. (2014) investigate the determinants of school progression and dropout. The research finds that the school system is characterized by high rates of repetition. As consequence of falling behind, pupils end up dropping out of school. Grade repetition seems to be the stronger explanatory variable of dropouts, even after controlling for school quality and socio-economic factors. However, pupils falling behind in better resourced schools are less likely to dropout. Household wealth status only has a moderate effect among male students. In the case of Bangladesh, Sabates et al. (2013) find that pupil's age and gender, poverty status (lack of income for household and school expenditure) are the variables that explain dropouts the best. In the case

of age, pupils enroll late on average. Children who report not having parental support are also more likely to dropout. In rural China, Li et al. (2013) find that peer effects within the household lead to school dropouts, especially for older children and females. Firstborn is less likely to drop out if a boy, due to son preference.

Due to poverty, especially in rural areas, populations migrate to urban areas seeking income that eventually they remit back to their locations of origin. Research has examined the relationship between migration, remittances, and children's schooling (whether the ones who are left behind, or those who migrate too, in the few cases where the whole family moves). Hu (2012) examines the influence of migration and remittances on high schooler's attendance in rural China. The assumption is that when parents migrate to the urban areas, they "leave behind" children, but do also send remittances. The partial effect of absence of an adult negatively affects attendance. The bigger negative effect is observed in poorer households, since they are the most financially constrained, and girls, who have disadvantage against boys in the case of China. The number of siblings also negatively affects attendance for girls. However, the reception of remittances seems to mitigate the "loss" of an adult for girls, while for boys the effect is insignificant. Wu and Zhang (2015) estimate the effect of migration on primary school enrollment in China. Children who migrate are less likely to be enrolled than those born in urban areas, especially if the child comes from rural areas. This last category enrolls less even compared to the children "left behind". Thus, irrespective of the location, children are more likely to be enrolled after staying longer in their destination. Also, in rural China, Zhao et al. (2014) estimate the effect of parental migration on pupils' school performance. Children who have migrant parents score less than their peers with parents present. The negative effect of migration on children's performance is higher if the parent who left is the mother.

Amuedo-Dorantes and Pozo (2010) investigate the impact of migration and remittances on educational success in Haiti. They find mixed results. In some communities, remittances increase attendance, whether they have out-of-the-country migrants or not; but in others, this relationship is negative if the parent is an out-migrant. The authors argue that out-migration sometimes put pressure on the household members left behind, and if they are financially constrained, it reduces

the probability of school attendance. In the case of Peru, Robles and Oropesa (2011) find that international migration harm the educational success of the children left behind. One issue is that migrant families can accentuate the willingness of those left behind to migrate too. The study finds that children aged 6-12 years who have a father or a sibling who works/worked in the US are less likely to aspire continuing their studies to college, because they too would like to work there. Using a dataset from Morocco, Bouoiyour and Miftah (2015) also investigate international migration and its impact on educational attainment. In the case of Morocco, rural children who live in households that receive remittances attain more years of schooling that their peers with no remittances, especially for male students. However, international migration is associated with lower probability of college completion.

Berker (2009) analyze the impact of internal migration on schooling in Turkey. They particularly investigate the effects of inter-provincial migration in the receiving province. The data show that native' educational attainment decreases when there are inflow migrants, especially among the poor households. The negative effect is higher for boys in middle school, while in high school is higher for girls. Antman (2012) examine within-household effects of parental migration to the US on children's educational attainment. The data suggest that when a parent migrate to the US, there is a positive effect on educational attainment, especially girls. However, a domestic paternal migration within Mexico does not significantly influence children's educational attainment, irrespective of their gender. The research concludes that father's absence itself does not seem to negatively affect schooling of the left-behind, however, the effect of remittances, dollars from the US, seem to be the positive drives of schooling more years for girls. Bouoiyour and Miftah (2017) intend to understand why do Moroccan migrants send money back home. The results suggest that altruism is the main reason. Migrants are more likely to remit to the economically disadvantaged households. Women tend to transfer less than men; this may be linked to women having more insecure jobs or being unemployed even after migrating. Additionally, higher educational attainment of the migrants has no effect on the remitting behavior.

3.2 Parental Expectations and Schooling

The overall expectation of the household is the key to the decision to invest or not invest in education. The study by Eccles et. al (1983) is one of the seminal papers on the expectancy-value theory. The initial assumption of the study is that expectation of parents and teachers does not directly influence children's performance; rather children's perception of parents or teachers' expectations is the main driver of their performance, the difficulty of the task, and endurance when difficulties arise. Parents influence children's expectancies twofold: as a role model and as their shown expectancies towards children's performance and achievement. The study found that parents' expectations have higher predictive power on children's expectations and performance than that of teachers. As role models, the influence of parents on schooling is non-significant.

Davis-Kean (2005), using the case of the U.S., studies the influence of parental education and income on pupils' achievement (aged 8-12) through the mediation of parental expectations. Two groups are equally represented in the dataset, non-Hispanic European American and African American. The assumption is that household socioeconomic variables influence schooling indirectly through parents' beliefs and behavior. The result indicates that socioeconomic factors influence achievement differently, conditional to both racial groups. The study found that indirectly, through expectations, parental education strongly explains schooling for African Americans, while for European Americans the indirect effect left some significant part unexplained. Income worked in the opposite direction. It had a much stronger effect on the European American group than it did on African Americans. However, the total (direct and indirect) effect of parental education on achievement was conservative for European Americans and much smaller for African Americans. The study concludes that SES (income and parental education) had a stronger indirect effect for the latter group, while for the former, the direct effect was much stronger, and, more importantly, household constraints did not strongly explain differences in children's achievement.

Fan et al. (2012) apply the structural equation model to study how parent involvement predicts children's school motivation among Caucasians, African Americans, Hispanic Americans, and Asian Americans. The research found that close communication between parents and the

school about the negative behavior of the students was negatively correlated with students' confidence and motivation across all ethnic groups. However, talking about positive issues did not show any significant positive relationship with motivation. Children whose parents showed high expectations for their post-secondary schooling consistently had higher confidence in their ability to cope with their tasks in both English and mathematics across all the ethnic groups. Differences show up in more specific household interventions. For example, Asian American children tended to be more confident about their mathematics capabilities, probably due to Asian households historically valuing mathematics and science education; Hispanic children tended to not have high confidence about their English skills.

Genicot and Ray (2017) examine how growth and inequalities can be explained by aspirations (aspirations are taken as the different levels of income or wealth that an individual can achieve). The paper argues that aspirations are a function of achievements and the surrounding environment (how robust is the economy as a whole), and since income is one of the important variables for growth, individual aspirations and income are jointly distributed. Although aspirations drive the way people invest and see the future and the prospect for their offspring if the individual aspirations surpass the overall possible outcomes it can lead to frustration. The bidirectional effect between aspirations and economic outcomes achieves an equilibrium if the effect of the society is not very large. Thus, society and individual aspirations have to be at a similar level.

Another study in the U.S. by Jacob and Wilder (2011) examines the relationship between expectations and attainment. One differentiating factor of this paper is that i) it estimates the direct influence of students' expectations on attainment, and ii) besides excluding parental expectations in the model, it does not consider children's expectations as a function of it. The first important finding is that expectations change as a function of information, and therefore, throughout the year, expectations may rise significantly depending on new information that children may acquire. Additionally, expectations seem to be much more influenced by external factors to school. Building on other studies, it can be hypothesized that the bulk of these external factors is determined by the home environment. The paper finds that although pupils' educational

expectations do not largely explain attainment, they still have stronger explanatory power even more so than other traditional variables. Overall, expectations have a stronger effect on endurance over time and on higher education enrollment, suggesting that as pupils become older, individual expectations become more and more relevant.

Loughlin-Presnal and Bierman (2017) examine the influence of parental expectations on elementary schoolers' achievement, living in low-income households. The three mediating variables of expectations are "parent involvement in child schooling, child learning behaviors, and child perceived academic competence" (p. 1694). It takes the traditional way of including parents' schooling expectations and pupils' self-perception of their abilities and performance. The research finds that parental expectations and children's performance are jointly determined, meaning that, simultaneously, the former influences the latter, and children's prior performance also explains part of parents' academic expectations (mainly in the early years of elementary). The study finds that the learning behavior of children is a predictor of achievement in early elementary years, while children's self-perception of their abilities predicted performance in later years of elementary school. Overall, the study finds that in the early years of elementary school, parental academic expectations increase children's academic performance, but, as they mature, the influence shifts to children's self-perception of their academic abilities.

Yamamoto and Holloway (2010) review the literature on parental expectations and schooling in the US by accounting for racial/ethnic differences. The reviewed literature suggests that parental expectations vary among racial or ethnic groups. Four mediating variables are used, namely: previous performance of the child, feedback from the school, parental perception of children's abilities, and parental support for children. They find that parental expectation varies by race, and, above all, previous children's performance does not have a bigger influence on the current parental expectations. Additionally, parental expectations seem to explain schooling performance only weakly among minorities than for European American ethnic groups. Because African Americans are more likely to live in economically disadvantaged households, Shanks and Destin (2009) estimate the influence of parental expectations on educational outcomes for this U.S. population segment. The three important variables included in the model are wealth status, income,

and parental education. The study found that when wealth is used as an expectations' proxy, within the same income level, families that fall above the median wealth line tend to have more expectations about their children's educational attainment than their peers (the results are the same across all income quintiles). The wealthier households observed a bigger advantage, and one of the explanations might lie in the fact that these households also enjoyed higher incomes, low unemployment, were more likely to be homeowners (all positively correlated with educational outcomes).

In the case of Mexico, Attanasio and Kaufmann (2009) estimate how both mothers' and youths' expectations influence the decision of attending high school and college while controlling for their perception of risk and unemployment after graduation. Further, the study analyses how unemployment risk and the expected returns to schooling also affect enrollment. It found that risk perception played a significant role in the decision of enrolling at high school, while the expected earnings were decisive in college attendance. The expectations of mothers and young adolescents mattered in high-school choice, but, for college enrollment, only youths' expectations mattered. One unexplored reason for these results could be that pupils are aware of the lower probability of finding a good-paying job with a high-school certificate but also of the high pay that a college certificate can bring in. Credit constraint is considered an important factor for poor adolescents not attending college. Additionally, as seen above in the paper by Jacob and Wilder (2011), when pupils become older, it seems that their self-motivation and perception of the importance of education for future career and earnings becomes increasingly much more relevant in the choice to attend.

Pesu et al. (2016) examined the influence of parents' and teachers' beliefs on "children's self-concept development" (ability in math and reading) in first-graders. First, according to the results, children's self-abilities development responds better to teachers than to parents. Thus, in the early years of elementary school, teacher' expectations are much more important. Second, and more importantly, the study found that low-performers did not respond to either parents' or teachers' beliefs, and higher-performers responded highly in both mathematics and reading. The paper argues that one reason for these surprising results might be that in the first years of schooling,

parents only have a formed idea of their children's abilities, but are not objectively informed (e.g. by grades in later years of schooling), while teachers enjoy the advantage of assessing and evaluating children frequently. If this holds, another reason not explored by the research is the reversal causation of children's self-abilities development on teachers' beliefs. Because direct children's evaluation occurs at school, it might be that teachers tended to give more positive feedback to high-performers, thus, boosting their self-confidence while indirectly demotivating the low-performing group.

As presented above, inequalities in children's schooling start from home, and different backgrounds dictate different schooling outcomes among pupils. DeBacker and Routon (2017) apply a panel dataset to study how education, expectations, and opportunities are related, using the U.S. National Longitudinal Survey of Youth 1997 (NLSY97). This paper finds that parents' experiences during their school days and the perceived value children give to education and performance influence parental expectations. Consequently, there are two pathways through which parents' expectations act: intrinsic and extrinsic factors. The former is defined by children's abilities and motivation, while the latter has to do primarily with the financial status of the household, whether it is enough to satisfy school necessities. One important finding is that parents from disadvantaged households (lower income or education attainment group) have higher optimism about the schooling outcomes of their offspring, even higher than the objective estimation of children's success. Even though this is surprising, the results strongly present that parents' positive expectations of success affect school outcomes positively and increase the odds of success of their children.

Froiland et al. (2012), using structural equation models, estimate the lasting effects of parental involvement and expectations on schooling. The research models expectations and involvement during kindergarten and how that affects expectations and school outcomes during the 8th grade. On the parent side, interestingly, the study finds that involvement and checking grades and homework in grade 8 slightly harm children's achievement (also see Murayama et al., 2016). However, early literacy at home positively predicts achievement in later grades. Early parental expectations for post-secondary positively correlate with achievement in 8th grade. The

study further recommends that because of the long-lasting effects of early parental expectations and parental intervention on schooling, it is critical to direct policies to raise parental awareness of their importance.

Gut et al. (2013) also use structural equation modeling to examine the long-term demand-side and supply-side variables that predict school performance. Overall results indicate that parents' and teachers' perceptions of children's abilities positively associate with performance 3 years later. Both teachers and parents responded positively to high-performing kids. Family tribulations (low-SES households and migration) negatively influenced both teachers' and parents' responses. And this behavior lasted and influenced children's school performance even after 3 years. This finding is alarming and should be addressed, especially on the supply side to reduce the high risk of low performance for the already lower-performers. The study suggests that schools should have some information on the family side; for example, the parents' perception of children's concurrent and future performances, and give them support so that 'troubled' households start sending positive signaling to their children. Equally, it is critical to ensure that teachers, the de facto evaluators, do not send negative signals to lower-performing and tribulated pupils.

Gniewosz et al. (2014) investigate the influence of parents' and teachers' feedback on reading and mathematics and how it affects "early adolescents' domain-specific academic self-concept and intrinsic task values" (p. 459) in Germany and the United States. The assumption is that teachers' and parents' beliefs influence pupils' intrinsic values directly, and indirectly through self-confidence, which in both cases leads to influence achievement. The study finds that the basis of the evaluation of competence for both parents and adolescents are school grades; thus, good grades are considered proof of competence. Early on, adolescents also seemed to incorporate their parents' feedback in their evaluation. Feedback at home also intermediates school feedback, which means that the power of school grades and evaluation predicts pupils' later behavior when parents do give it importance. Like Gut et al. (op. cit.), the study considers that a better way of increasing the odds of the positive impact of the feedback is the direct communication between households and schools, to ensure non-opposite messages and signals.

Briley et al. (2014) use proper experimental and longitudinal data, containing twins, to study the parental educational expectations considering the child characteristics. The result indicates that parental education expectation is associated with genetic endowments as early as four years old. It also shows that the relationship between child characteristics and parental expectations is dynamic and bi-directional; i.e., parents' expectations change over time, responding to changes in children's school outcomes. Initial differences in children's characteristics are better predictors of parental educational expectations than recent expectations. The notion that children's education is important from an early age is vindicated; children's behavior influences the environment in which they will receive the educational foundations.

Wigfield and Gladstone (2019) analyze how skills and achievement can be examined through the expectancy-value theory when pupils undergo a period of change or uncertainty, given that pupils' positive expectations positively predict performance. The study hypothesizes that high-positive children's expectations can make up for changes in learning. One example is when new subjects grow increasingly difficult. However, children's expectations need a certain lift, either from the school or from home. The research found a positive correlation between teachers' encouragement and students' positive response to changes; however, the result is weak when students are immigrants or minorities. This research finds that parents' encouragement and positive belief in children's abilities lessen the negative effect of uncertainty or shock on children's skills. In the case of minorities and migrants, parents can increase awareness by talking about the importance of their race or ethnicity to the child.

Ross (2019) examines the relationship between young adolescents' aspirations and their human capital as young adults in India. The research finds that household wealth weakly predicted adolescents' human capital at the age of 19. Ross calculates the aspirations gap as the difference between their aspired occupation's wage and the wage of their parents. The result indicates that children with the most considerable aspirations tend to score lower in human capital. Moderate aspirations lead to better human capital outcomes. Occupation aspirations and time invested studying at home at age 12 predict better future educational outcomes at age 19. This suggests that depending on the targeted occupation, children's aspirations can be raised, as long as they are not

far beyond the current status. Pupils can also be oriented to spend more time investing in school activities to attain their targeted job in the future. Graham and Pozuelo (2022) examine adolescents' aspirations and educational outcomes in poor urban households in Peru. They find similar results to those in other studies: even the poorest or adolescents who suffered some shocks in life have high aspirations. Adolescents aspire to have better occupations in the future and a willingness to migrate to better places. Those with higher life satisfaction and self-efficacy are more likely to have the same level of aspirations over time, which leads to investing more in education and avoiding conduct that may lead to risky outcomes. However, aspirations related to a job in the future are higher than those for education and migration. Adolescents who were already married or had a child showed lower educational expectations than their peers. Moreover, adolescents orphaned by a father had lower aspirations to migrate.

Janzen et al. (2017) examine aspirations and the human capital formation in Nepal. Like previous studies, they find that aspirations result from future-oriented behavior. They found that aspirations are influenced by people's outcomes around adolescents' networks or higher, but never in a lower position. There is a threshold in which aspirations do not positively affect educational outcomes. When there is a large gap between the current status and aspirations, the investment in the future becomes negative. At the same time, aspirations can help people attain more years of schooling and have better jobs; they can also reinforce poverty or widen the poverty gap. In Peru, Pasquier-Doumer and Brandon (2015) found that indigenous children have the same aspirations as non-indigenous children when external constraints are controlled for. However, indigenous children aspire to lower socioeconomic occupations compared to non-indigenous. Unlike other studies that show that aspirations far beyond the current status harm attainment, the results from Peru indicate that the higher the gap between the current children's status and the aspired occupation, the more significant is the progress in language acquisition. Some indigenous children might be aware of their racial condition by aspiring to lower occupations than their non-indigenous peers even when they are in the same socioeconomic status. It might also be due to the influence of people around them. The economic situation of the household can also condition the quality of expectations.

Chiapa et al. (2012) examine the exposure to professionals and its effect on educational aspirations among the poor in Mexico. The assumption is that due to their socio-economic conditions, the poor might lack an aspirational environment, resulting in underinvestment in the offspring's education. The research examines the direct link between parental aspirations and educational outcomes. After the experiment, six months later, the results indicate that the exposed households increased their aspirations by half. They also find a positive influence of parental aspirations on children's educational attainment, probably because aspirations indicate hope (Graham and Ponzuelo, 2021). When analyzing from the children's perspective, Graham and Ponzuelo (*op cit*.) find that adolescents have higher expectations for their educational outcomes, including the poorest or those who went through adverse shocks. Self-efficacy and satisfaction explained the persistence of aspirations over time. Adolescents within this group were found to invest in their future through education and avoid risky behaviors (see Roy et al., 2018).

Bernard et al. (2014) designed a program to study aspirations among rural populations in Ethiopia. The program first randomly selects a group of people and shows them a documentary of people from other regions in similar conditions who succeed in agriculture or business ownership with no external financial help. The control group watched an entertainment video. Six months after the two groups watched the videos, the results show that the group that watched the successful agriculture/business had higher aspirations than the baseline, especially those who already had high aspirations before the documentary. There was also a stream of peer effects on work versus leisure, savings and investment, and on investment behavior in education. The treatment group worked and saved more, increased children's enrollment to school, and generally invested more in schooling.

3.3 Parental Time and Schooling

The time spent between parents and children predicts schooling, health, and psychological development. It is a common thought that child care quality is a function of the home environment. In the USA, Guryan et al. (2008) estimate the influence of parental education and parental time on children's schooling. The study found that more educated parents spend more time with their

children. The findings hold for all categories decomposed for the estimation (care, education-related interactions, playing, and traveling opportunities). The reasons may either be that highly educated parents are efficient in the interaction with their children, or they give more care and attention to their children in the first place. The classical hypothesis posits a substitution relationship between the time left for leisure and higher wages. Even if not all of the axioms hold, expectedly, highly educated parents are also more likely to spend more time at their workplaces.

Using a dataset from the British Household Panel Survey, Ermisch and Francesconi (2013) estimate the long-term effects of parental time on educational attainment. They apply the maternal employment status when the children are aged 0 to 5 years. Overall, results reveal that mothers' full-time employment harms young adults' educational attainment. Mothers' part-time employment is also negatively associated with school achievement; however, it has a small and insignificant effect. Although a clear-cut explanation is non-existent, these results indicate that income does not dominate the substitution for parental interaction with children, at least not strongly. Maternal education and presence are critical in the early childhood interventions for child development (e.g. Erola et al., 2016).

In a cross-country study (Canada, the UK, and the USA), Baker and Milligan (2013) estimate the parental time investment difference between boys and girls. Compared to mothers, fathers, in the early years of the child, spend less time in parenting. However, as the child grows, the result indicates that fathers invest more time in boys. The overall results find that parents spend more time engaging in teaching activities with girls from as early as nine months. They also find that the evidence of the preference of boys over girls is non-existent in the very young age of children in these three countries. The extra time that fathers spend with boys as kids grow up might be responsible for inequalities observed later in society. If we link this to parental expectation as seen in the literature above, the extra parental time invested in boys might indicate the societal betting nature of increasing the odds of success in life (in case boys are perceived to be the natural better performers). The research has also shown that parents tend to invest more in the child perceived as more skilled.

In most countries, mothers are more likely to stay at home and spend more time with children than fathers. Maternal employment reduces the time mothers should spend with children. Del Boca et al. (2014) study the decision to participate in the labor market (especially mothers) and the opportunity cost of the time spent at home. They find that parental time improves cognitive development. The larger positive effects are observed in the early years of the child. Monetary spending is less deterministic of child development. Even cash transfers do not seem to directly raise the quality of outcomes of the child, because money might be used for other consumption items within the household or to increase the parental free time (leisure). Kalil et al. (2012) estimate the relationship between maternal education and the curve of the time spent with offspring. Compared to less educated mothers, highly educated mothers spend more time with children, and, more importantly, the type of activity in which they engage during these interactions evolves with the child's age. For example, during toddlerhood and infancy, mothers spend more time in care and play-related activities. However, from 6 to 13 years old, mothers engage in more managerial activities.

Del Bono et al. (2016) analyze the effect of early maternal time and early child performance in the UK. Compared to mothers who fall below the average educational attainment, maternal time of more educated mothers has a higher positive effect on child cognitive development. The study advances that the reasons for this performance difference might be that highly educated mothers are more efficient, or that their children end up more educated (but also it could be any combination of both). Much more importantly, the study finds that early-time investments have higher outcomes than late-time make-ups (see Caucutt & Lochner, 2012; another discussion in the case of the UK see Meroni et al., 2021). For non-cognitive outcomes, in the long run, the child's ability offsets the positive effect of maternal early-time investment. One linkage to not neglect is that the skills production is also a function of the household investment (of which parental time is one of the variables).

Holmes et al. (2018) also examine how maternal employment can disrupt children's school outcomes. They apply mediating variables that can lessen the negative effect of time disruption created by the mothers' employment. The method tests the differences of the impact if mothers

have a college degree or not and if they work full or part-time. Independent of the category in the four combinations, maternal work is negatively associated with school involvement, while school involvement is positively associated with school outcomes. However, the direct influence of maternal employment on academic success is not significantly negative, which shows that it has an indirect influence. Part-time jobs have the most negative impact on maternal school involvement, and as an explanation, the study advances that mothers in this category might underestimate the time they spend in the working-place. Thus, they fail to prepare compensatory mechanisms. The study concludes that the mother's employment substitution effect is stronger than the income effect.

Carneiro et al. (2015) examine the long-term benefits of maternal leave on children outcomes in Norway. For the children whose mothers were eligible for maternal leave after birth, the increased time they spent with the newborn, later on, decreased dropouts by 2% and increased their wages by 5% at the age of 30. The results are more significant and have a larger magnitude for less-educated mothers: dropouts decline 5%, and the odds of better wages increase by 8%. Therefore, the study of parental time may reveal parenting differences and inform policymakers and households of the optimal time investments and tools young children need. According to Yum (2016), parental time investment accounts for 40% of the variation of intergenerational income persistence.

Wang and Sheikh-Khalil (2014) estimate the effect of parental involvement on adolescents' schooling. They decompose parental involvement into three categories: i) school-based involvement, ii) home-based, and iii) academic socialization. Their findings suggest that involvement improves academic outcomes and adolescents' mental wellbeing. The data indicate that out of the three categories, direct school involvement receives less parental time. Parental involvement at home and academic socialization were found to positively influence pupils' behavior, while school-based involvement helped them emotionally. These two served as mediators for educational achievement. One interesting finding in this study is that parents' direct involvement in school issues might not help achievement; however, it does help students in their

emotional development. But it might also indicate that parents do not invest enough time in contact with the school.

Gayle et al. (2018) predict how intergenerational mobility is affected by parental education, time, and income in the US, using educational attainment as the outcome variable. To solve endogeneity problems, they apply instrumental variable methods on time investment. During the child's first five years, household income positively influences schooling outcomes. However, the effect becomes statistically insignificant after controlling for parental time investment. Parental education has a positive and significant impact on performance. The study concludes that, during infancy, parental time can make up for household income constraints.

Hsin and Felfe (2014) examine the impact of maternal employment on child development. Like previous studies, the research finds that maternal employment reduces the interaction time between the mother and the child. There is no significant negative impact of work on activities that improve child development. But because of the reduced interaction time, it might ultimately harm the child indirectly. One important finding is that working mothers seem to translate the time spent with their children into more "quality time". The findings also show that parents can put their children into different activities positive to child development as a compensatory mechanism for the time lost. A similar paper by Baker and Milligan (2015) studies how maternity leave influences cognitive and behavioral development in Canada. Their result indicates no significant gains on cognitive and behavior scores from the increased mothers' time. The result shows a negative effect on cognitive development, which, according to the study, might indicate the influence of time as mothers got back to work.

Dercon and Singh (2013) conduct a comparative study of parental gender bias on nutrition, aspirations and self-efficacy in Ethiopia, India, Peru, and Vietnam when pupils are aged, 8, 12, and 15. They find heterogenous results across the four countries, age, and the direction of the bias. India seems to show a systemic gender bias against girls, followed inconsistently by Ethiopia. As the children get to the age of 12, gender bias against girls in terms of cognitive achievement is more pronounced. However, in Vietnam, parents are pro-girl in terms of achievement. At early years, boys are favored in Peru, but this trend disappears as children become older. As for

aspirations, from early age to when children are 12, parents have higher aspirations for boys in India and Ethiopia, while in Vietnam parents have higher aspirations for boys. In Peru results are somewhat mixed. Across all countries, girls are favored when it comes to nutrition. In Ethiopia, poor boys are less likely to enroll compared to poor girls. Same result is seen in India as pupils grow older. In the four countries, there is a strong relationship between parental aspirations at age 8, and children's aspirations at age 12, as bias in aspirations are closely related to educational achievement. Maternal education reduces gender bias among children. Interestingly, because in Vietnam girls are favored, the study finds that mother's education reduces the bias against boys. Rural children's education most of the times is hindered by simultaneously working and attending school.

Orkin (2012) analyze rural children who work and attend school in Ethiopia. At early age, both boys and girls engage in household chores equally, but, starting from 13 years old, boys are more likely to engage in paid or subsistence work, while girls do chores and take care of other children more often. Results indicate that children enroll to school equally, irrespective of gender. Children who engaged in commercial farms, fishing, or herding far from home, are more likely to miss school. Children living in households with long-sick people were more likely to early on be in paid-work. Children from households with monetary constraints work more often, more likely to have never enrolled or have dropped out from school. Although there are no school fees, buying uniforms and textbooks seem to harm school attendance, except for the wealthier households. To help disadvantaged children, the study denotes that flexible school calendars and timetables might increase enrollments and attendance in rural Ethiopia.

CHAPTER 4

METHODS

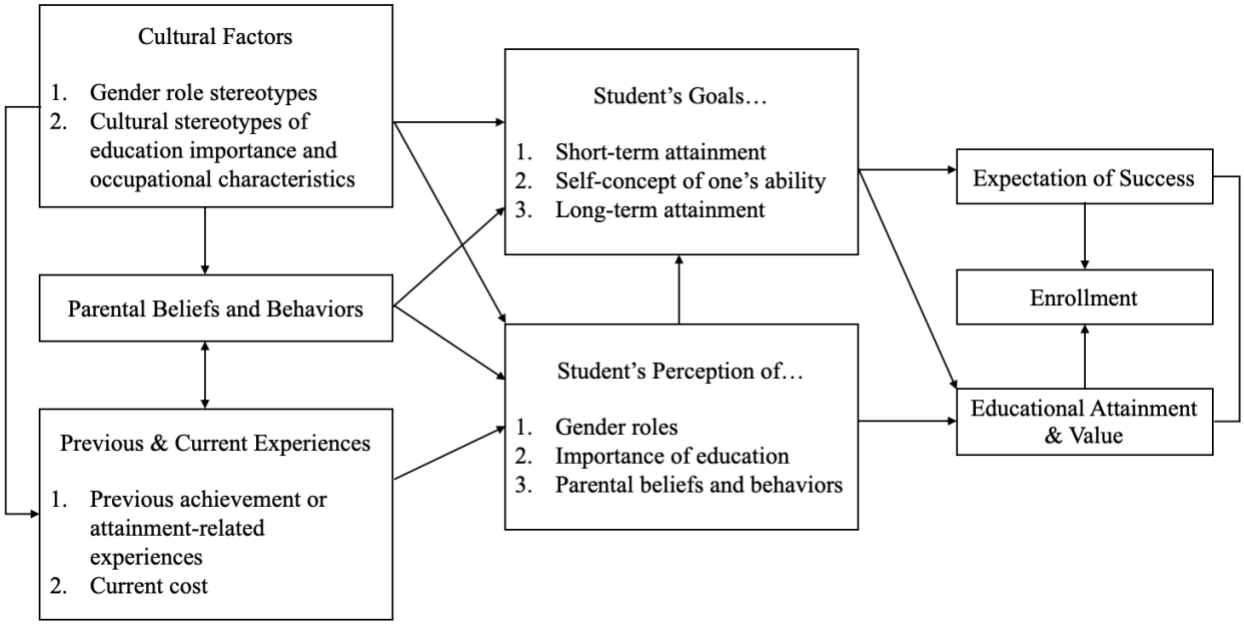
4.1 Analytical Framework

Published in 1983, the paper "Expectancy, values, and academic behaviors" by Eccles et al. defines the expectancy-value theory. They analyze tasks and goals through an "individual's expectancies or subjective probabilities of success" (pp. 78). As for performance in school, because self-perception values are related to achievement, they are themselves influenced by the children's perception of what parents and teachers expect from them and children's perception of past performance and other social and cultural elements. All combined impact children's perception of the degrees of difficulty of 'present' tasks. The central assumption of Eccles's model is that children's interpretation of reality influences their expectancies and not the reality itself. Expectancy influences all the subfields of an individual's beliefs: "choice of the activity, intensity of the effort expended, and actual performance" (pp. 81). The expectancy-value model estimates values and expectations and their influence on the choice of the task, endurance, how well children believe they will perform the task, and the actual outcome (Wigfield & Eccles, 2000, 20002). The negative features are the costs of doing the task. The three most important are: an alternative task, the effort required to perform the task, and the negative emotion that occurs while performing the task (Eccles et al., *op cit*.).

For an individual-centered analysis, the task and the goal do not solely explain motivation (Conley, 2012). Research has started to separate cost and expectancy as standalone variables because the negative emotions of doing a task negatively determine the outcome (Conley, *op cit*.; Barron & Hulleman, 2015; Rosenzweig et al., 2019). The literature on expectancy-value theory (EVT) has focused on explaining performance so far. However, a long-term analysis should look into attainment because parents invest in education so children can complete 'more' years of schooling. After reviewing research on expectations, values, and performance, Hulleman et al. (2016) conclude that children's expectations and beliefs predict schooling and educational attainment. Figure 4.1 presents a simpler EVT model adapted from Rosenzweig et al. (*op cit.)*.

Cultural environment (gender roles and the importance of education) influence parental beliefs and behavior and children's goals (in the short and long run). Likewise, previous experiences affect both children and parents (simultaneous effect). The self-perception ability of the child also influences its goals and the value given to schooling. Conversely, perceptions, short and long-term goals, with the mediation of expectations and values, influence schooling. The takeaway is that the expectancy-value theory considers that socioeconomic factors influence schooling indirectly through expectations, and, in this relationship, even in the simplified model, there are "complex interactions" (Conley, *op. cit.).*

Figure 4.1 Simplified EVT Model for School Enrollment and Educational Attainment



Source: Created by the author based on Rosenzweig et al. (2019)

The complexity of the model makes it challenging to collect all the variables and isolate the partial effect of each. It also creates various scenarios of simultaneity bias. For example, there is simultaneous causality between parental expectation and children's expectation and between parental beliefs or behavior and previous experience (a child's performance/attainment and cost). Past decisions might also undermine the parental attitudes toward schooling (Kazeem, 2010). In addition, the estimated cost in the expectancy-value model is the cost that the pupils undergo

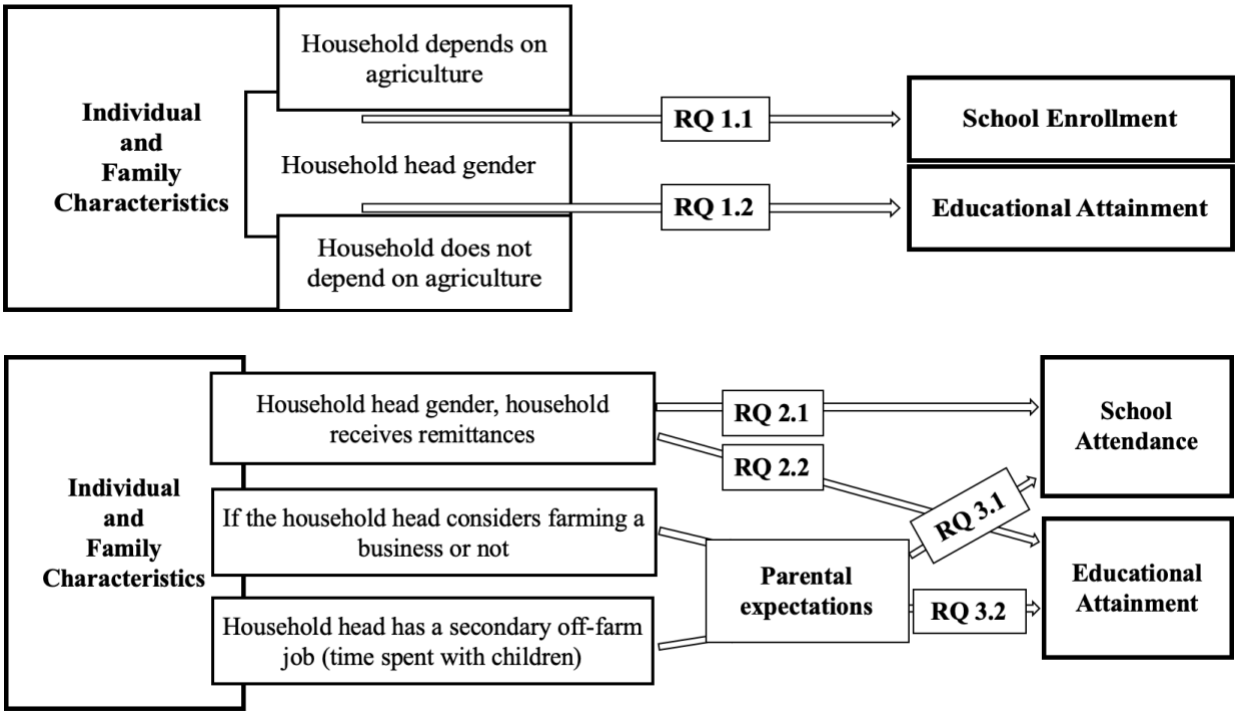
(dissatisfaction in doing the task, the opportunity cost of doing it, and the effort required for completing it). When assessing educational success on a longer timeline, it is possible to directly estimate the effect of parental expectations and beliefs on children's schooling. Beliefs influence the decision to send children to school. The expectation of success (educational success and better job opportunities) affects the persistence of keeping the children in school longer (attainment). Suppose the model can capture the household's expectations and values without relating them to the children's perceptions. In that case, it can also capture the non-monetary cost the household incurs in keeping the children in school. One valid assumption is that the household suffers monetary and non-monetary constraints by sending children to school. Therefore, by estimating school enrollment and educational attainment, the model is more likely to calculate the incentives households have in investing in education and if the children genuinely mirror those incentives and expectations. The short-term goal of mastering a particular subject indeed drives the inputs and motivations a child may be willing to invest. However, in most developing countries, where parents are uneducated, the value to the household might lie in the bigger goal of leveraging the overall educational attainment of the family members, especially the offspring.

We construct an analytical framework for the study based on the literature review, problem statement, and research questions (Figure 4.2). The framework has two parts. The first part, corresponding to research questions 1.1 and 1.2, uses nationally representative data from the General Population and Housing Census (2007). The rationale behind this is first to estimate children's school enrollment and educational attainment among Mozambican households. As presented above, 82% of women in Mozambique work in agriculture, making them more likely to be poor and vulnerable. As a result, gender role is a variable that should be closely assessed at both parents' and children's levels to check its effect on schooling. The occupation of the household head also dictates the household's spending behavior and investment decision. Therefore, the households are grouped around the household head gender. Then the households are decomposed into those dependent on agriculture and those off-farm (detailed categorization will be explained in the data section). Because at least 99% of farming households are smallholders, the assumption is that any household that reports being in agriculture is likely to be a smallholder-type. Through

these two research questions, the study predicts schooling in smallholders compared to the other household backgrounds in Mozambique.

After that, in the second part of the analytical framework, RQ2 and 3, we apply a nationally representative data of smallholder households to deepen the current understanding of farmers' investment in their offspring's education. The justification in RQ1 is that differences in schooling of smallholders, if well modeled and estimated, can reveal differences in investment strategies and plans from house to house. In this part, first, a general model (RQ 2.1 and 2.2) estimates the likelihood of children's enrollment and educational attainment, controlling for individual and family factors. Research questions 3.1 and 3.2 apply the expectancy-value model to predict schooling and education success. Two variables are applied separately: if the household head considers agriculture a business and if the household head has an off-farm job. These variables are modeled to proxy parental expectations and how they affect children's education.

Figure 4.2 Analytical Framework



Source: Created by the author based on Abuya et al. (2013), Jukes et al. (2014), Erola et al. (2016), Wigfield & Gladstone, 2019

4.2 Hypotheses

We develop six hypotheses based on the six research questions presented above and on the previous literature. In the case of research question 3, because the previous studies mainly focused on students' subject matter and performance, a similar approach to the one presented in Figure 4.1, of modifying the EVT model to hypothesize for school enrollment and educational attainment is adopted.

Hypothesis 1.1: Household head gender has an insignificant influence on children's school enrollment in farming and non-farming households in Mozambique. Boys are more likely to enroll than girls, but they drop out at proportional rates (mediated by age). Coming from farming households or living in rural areas does not significantly harm enrollment.

Hypothesis 1.1 is based on previous research and the socio-economic situation of Mozambique. Because primary education in Mozambique has no enrollment fee, and schools in primary education are relatively available throughout the country (Cho & Feda, 2015), the decision to enroll children, initially, is not subject to the gender of the household. This hypothesis is contrary to what has been found elsewhere. For example, Moyi (2010) found that mothers' survival and female heads significantly decreased the probability of delaying enrollment in Malawi. In Turkey, Smits & Hosgör (*op cit*.) found that mothers' traditional beliefs and primary education completion are significant factors in enrolling girls. Relating to Mozambique, the hypothesis is that boys will drop out more often than girls. However, rather than the gender of the child, the more significant mediator of dropouts is age (Jukes et al., 2014; Tamusuza, 2011; Sabates et al., 2013). In an African cross-country study, Kuépié et al. (2015) found that school participation is lower for girls, rural pupils, and children from poorer households.

Hypothesis 1.2: Household head's gender significantly influences school attainment. Being a female head is positively associated with children's school attainment, but a female head in a farming household negatively influences educational attainment. Boys are more likely to finish primary education in both male and female headed-households.

Research has looked at the parental influence on offspring education, focusing on variables that define parental background: education and status. In Madagascar, for example, Glick et al. (2011) found that mothers' education is a better predictor of children's schooling than fathers' education. Therefore, education is the mediator of the positive influence of mothers on offspring schooling. In the Finish case, Bukodi and Goldthorpe (2012) found that mothers' education is a better predictor of attainment in the children's early years, while fathers' education is significant as the children become older. They also found that the father's status explains half of the educational success, while the mother's status explains less (also check Erola et al., 2016). It might indicate that in developed countries, where parental status is less ambiguous, fathers' status is a better proxy of the variables that define fathers, and education is the better representation of mothers. Undoubtedly, this also is related to the fact that fathers are more likely to participate in the labor market while mothers spend more time at home. In the case of the developing countries, however, parental status, primarily if defined by occupation, is more trivial, and the overall educational status of parents is deficient. If the same argument of mothers spending more time at home holds, then female-headed households should enjoy better educational outcomes in the case of Mozambique.

Hypothesis 2.1: There is no significant difference in attendance by the gender of the household head. Overall, there is no significant difference in boys' and girls' attendance, but in households where the head is female or below the poverty threshold, boys attend school more than girls. Children living in households that report to receive remittances are more likely to attend school.

Hypothesis 2.1 considered that as children become older are likely to drop out irrespective of gender. Because of that, under the same constraints, boys and girls do not equally attend because socioeconomic factors and the age at first-grade enrollment determine attendance (Tamusuza, *op cit*.). Interestingly, Tamusuza also found that working children in urban areas are more likely to attend, while in rural areas, they attend less. However, households that received agricultural credit in Malawi decreased girls' school attendance (Shimamura & Lastarria-Cornhiel, 2010). Boys' attendance is subject to the wealth of the household. In Kenya, Dreibelbis et al. (2013) found that

the likelihood of pupils not attending school was 18.5%, 17% for boys and 20% for girls. Poorer children were more likely to be absent too. Hu (2012) finds a negative effect of father's absence on schooling, but remittances increase attendance. As the pupils become older, the likelihood of not attending increases, especially for girls. However, boys' attendance increases as they become older. They also find that when living in female-headed households, pupils report not attending school 10.1% for boys and 8.3% for girls. In South Africa, Fleisch et al. (2012) found that children whose mothers died are less likely to continue attending school, irrespective of gender. Other disadvantaged demographics include living in recondite rural areas and non-white boys.

Hypothesis 2.2: Female-headed households or above the poverty line positively correlate with educational attainment. Boys are more likely to attain more years of schooling. Receiving remittances also is positively correlated with educational attainment.

Although scarce, some quantitative studies examine rural areas or poorer households. The universal primary education in Egypt significantly raised educational attainment, especially in rural areas (Langsten & Hassan, 2018). They found that children living in wealthier households are more likely to finish primary education. In India, Beaman et al. (2012) found that a female household head increased attainment for girls. Decomposing the senior-high-school completion as a function of the success rate in the previous educational levels (primary and junior-high-school), Ngueyen and Wodon (2014) found that girls start lagging behind boys in Ghana from the completion primary school, 86.5% against 92.7%. However, when they start high school, girls' probability of completing the cycle is 89.4%, compared to 88% for boys. Overall, girls living in rural areas or the poorest quintiles enroll less and attain fewer years of schooling than all the other subgroups. Bouoiyour and Miftah (2015) found that rural children in Morocco attained more years of schooling if the household received remittances (also see Antman, 2012).). In Nigeria, Kazeem et al. (2010) found that girls are less likely to attend school even after controlling for socioeconomic factors such as parental education and attitudes toward education, location, and child's age.

Hypothesis 3.1: Parental expectation negatively influences educational attainment if parents consider agriculture a business because the offspring will be more likely to continue on-farming in the future.

Hypothesis 3.1 builds on the expectancy-value theory and previous literature on aspirations and investment in the future. High parental expectations and aspirations predict children's schooling and school outcomes (Jacob & Wilder, 2011; Chiapa, 2012; Loughlin-Presnal & Bierman, 2017). The assumption is that parental expectations have to surpass the cost of sending children to school. In the case of smallholders, their aspirations weigh education versus agriculture and which one will contribute more to the offspring's future. One interesting fact to explore is that parents might choose the path of agriculture because they understand that investing in education takes a long time and will not pay back the investment. However, they also might have low expectations of their offspring's educational success. Alternatively, it could be that as poor children grow up, they need to participate economically in the household (Dercon & Singh, 2013). Due to this dilemma, low aspirations can trap families into generational poverty (Dalton et al., 2014). Graham and Pozuelo (2022) found that even adolescents who suffered shock or lived in poorer households in Peru demonstrated high educational aspirations and willingness to invest in the future. Bernard et al. (2014) designed a program to raise aspirations in rural agricultural Ethiopia by showing a documentary of people in similar conditions who succeeded in agriculture or small business owners. After the evaluation, aspirations and expectations rise in the treatment group regarding money management, behavior towards school enrollment, and spending on children's schooling.

Hypothesis 3.2: Parental expectation positively influences educational attainment if the head has an additional off-farm job. Although parents staying at home should have higher expectations for their children's schooling, the income effect is dominant. The off-farm job of the parent might also influence the employment aspirations of the offspring and, therefore, the educational outcomes.

In consonance with hypothesis 3.1, socioeconomic status determines the level of aspirations (Pasquier-Doumer & Brandon, 2015; Roy et al., 2018). Dercon and Singh (*op cit*.)

study parental aspirations and gender bias among children. The mixed results find that in India and Ethiopia, parents favor boys, while in Vietnam, parents favor girls. In Peru, the initial bias in favor of boys disappears as children grow pass 12 years old. However, the result also indicates a failure in transmission of low aspirations from parents, as girls succeed in schooling (girls' high aspirations offset parents' low aspirations). In Nepal, Janzen et al. (2017) find that aspirations are influenced by the outcomes of people around adolescents' environments or higher, but never below their current status. The investment for the future declines when the aspirations become larger than the current status. In India, Ross (2019) found that, rather than household wealth status, aspirations (occupation) and the time invested in education at age 12 predict pupils' human capital at age 19.

4.3 Models

The study applies the ordinal logistic method to respond to research questions 1.1, 1.2, 2.2, and 3.2; for research question 2.1 3.1 the study applies the probit model.

4.3.1 Probit Model

Research question 2.1, which examines whether pupils attend school or not, appropriately can only be estimated by a *qualitative response regression model* (Gujarat, 2012). The binary dependent variable, attendance, takes a value of 1 if the pupil attends school and 0 otherwise. If the ordinary least-square (OLS) model is applied, then the model can be represented as:

$$Y_i = x\beta + u_i \tag{4.1}$$

where the response variable Y_i has a conditional expectation subject to the values of the control variables, $x\beta$. Equation 4.1 is equivalent to $\Pr(y = 1 \mid X) = F(x\beta) \equiv p(x)$, for all real numbers $z: 0 < F(z) < 1$, and $z \in R$. When a dichotomous dependent variable is estimated applying OLS assumptions is designed as a *linear probability model* (LPM). The issue is that the assumptions of the OLS model are not always assured when estimating the linear probability model:

1. the linear probability model always assumes a linear relationship between the probability of the outcome variable and explanatory variable, irrespective of its value;

2. the probability of an event should lie between 0 and 1; however, LPM does not guarantee that the estimated probability is situated between those boundaries; and,
3. in LPM, the error term is not normally distributed and has heteroskedastic behavior (Gujarat, *op cit*.).

From indexing $x\beta = \beta_0 + \beta x_1 + \cdots + \beta x_K$, we can rewrite equation 4.1:

$$y^* = x\beta + e, \qquad y = 1[y^* > 0] \tag{4.2}$$

e is continuous, normally distributed (around zero), and independent of x (Wooldridge, 2002). If the normality of the error term is assumed, then the equation is estimated by the *probit model*. By guaranteeing the normality assumption, the probability of y^* to be less or equal to y is calculated from the *standard normal cumulative distribution function* (CDF):

$$P_i = \Pr(y = 1|X) = \Pr(y_i^* \leq y_i) = F(\beta x_1 + \cdots + \beta x_K) = F(X\beta) \tag{4.3}$$

In equation 4.3, the slope coefficient β_K measures the probability of occurrence of an event for a change in β_K. Now, the probability lies between 0 and 1. The CDF of F can be rewritten in equation 4.4 as:

$$F(z) = \Phi(z) \equiv \int_{-\infty}^{z} \phi(v)dv \tag{4.4}$$

The standard normal density, $\Phi(z)$, can be expressed by equation 4.5:

$$\Phi(z) = (2\pi)^{-1/2}\exp\left(\frac{-z^2}{2}\right) \tag{4.5}$$

The probit model solves the imperfections of estimating dichotomous outcomes with a linear probability model. However, we should be cautious about the interpretation of the results. Since x_K is discrete, the predicted probability changes from c_K to $c_K + 1$, and can be calculated as:

$$\begin{aligned}\hat{\delta}_K = F[\hat{\beta}_1 + \hat{\beta}_2\bar{x}_2 + \cdots + \hat{\beta}_{K-1}\bar{x}_{K-1} + \hat{\beta}_K(c_K + 1)] \\ - F(\hat{\beta}_1 + \hat{\beta}_2\bar{x}_2 + \cdots + \hat{\beta}_{K-1}\bar{x}_{K-1} + \hat{\beta}_K c_K)\end{aligned} \tag{4.6}$$

If x_K is a binary variable, then $c_K = 0$. This method calculates the values of x_j with sample averages. Then, the summary of the estimated marginal effects can be obtained by calculating the average of $\beta_K f(x\beta)$, given the population, or by estimating $\beta_K E[f(x\beta)]$. Thus,

$$\hat{\beta}_K\left[N^{-1}\sum_{i=1}^{N} g(x_i\hat{\beta})\right] \tag{4.7}$$

in the cases x_K is continuous, or

$$N^{-1}\sum_{i=1}^{N}[F(\hat{\beta}_1 + \hat{\beta}_2 x_{i2} + \cdots + \hat{\beta}_{K-1}x_{i,K-1} + \hat{\beta}_K) - F(\hat{\beta}_1 + \hat{\beta}_2 x_{i2} + \cdots + \hat{\beta}_{K-1}x_{i,K-1})] \tag{4.8}$$

when x_K is binary. The standard errors (asymptotic) are derived from the last two equations (see details in Wooldridge, *op cit.*).

Equations 4.7 and 4.8 calculate the average marginal effect (AME) to better interpret the Probit model results. In a nutshell, the model for research question 2.1 can be written as:

$$\Pr(y = 1|x) = F(x\beta) \tag{4.9}$$

where $y = 1$ is if the pupil attends school, $y = 0$ if the pupil does not attend; $x\beta$ is a vector of individual and household factors of the children.

4.3.2 Ordinal Logit Model

When the response variable *Y* takes multiple ordered values *J,* {0, 1, 2, …, *J*}, the cumulative probability of *Y* falling at or below a certain cutoff is

$$\Pr(Y \leq j) = \pi_1 + \cdots + \pi_j, j = 1, \ldots, J \tag{4.10}$$

and by having a model

$$Y_i^* = \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_K X_{iK} + u_i \tag{4.11}$$

$$= \sum_{m=1}^{K} \beta_m X_{im} + u_i \tag{4.12}$$

The latent Y_i^* variable is unobserved, *X* is a vector of explanatory variables, and u_i is the error term. Given the *J-ordered* options, the dependent variable behaves as:

$$Y_i = 1 \text{ if } Y_i^* \leq \pi_1 \tag{4.13}$$

$$Y_i = 2 \text{ if } \pi_1 \leq Y_i^* \leq \pi_2 \tag{4.14}$$

$$Y_i = 3 \text{ if } \pi_2 \leq Y_i^* \leq \pi_3 \tag{4.15}$$

$$\vdots$$

$$Y_i = J \text{ if } \pi_j \leq Y_i^* \tag{4.16}$$

where $\pi_1 \leq \pi_2 \leq \pi_3 \ldots \leq \pi_{J-1}$, and the πs define the cutoffs (threshold parameters) that the ordered J categories represent when observing Y_i. The ordinal logit model (OLM) is also called the *proportional odds model* because the coefficients of the X regressors are the same in each J category, only differing in the *threshold-intercepts* (see Gujarati, *op cit.*). The OLM applies the maximum likelihood principles so that:

$$Pr(Y_i \leq j) = \Pr\left(\beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_K X_{Ki} + u_i \leq \pi_j\right) \tag{4.17}$$

$$= \Pr\left(u_i \leq \pi_j - \beta_1 X_{i1} - \beta_2 X_{i2} - \cdots - \beta_K X_{Ki}\right) \tag{4.18}$$

The cumulative probability of equation 4.17 is that Y_i is equal to j-category and less than 1, 2, …, or j. From the probit model explained above, the probability of an outcome to succeed or not is found by calculating the cumulative distribution function (CDF) of probability distribution (Gujarat, *op cit.*). If the error term u_i has been logistically distributed, then we have an ordered logistic model, and its probabilities are:

$$\frac{\exp\left(\pi_i - \beta X\right)}{1 + \exp\left(\pi_i - \beta X\right)} \tag{4.19}$$

where βX is equivalent to $\sum_1^K \beta_K X_K$. Because the OLM is not linear, the interpretation of the model using the tool so far developed is complex. However, the complexity of reporting the results can be simplified by using the odds ratio:

$$\frac{\Pr(Y_i \leq j \mid X)}{\Pr(Y_i > j \mid X)} = \frac{\Pr(Y_i \leq j \mid X)}{\Pr\left[1 - \Pr(Y_i \leq j \mid X)\right]} \tag{4.20}$$

where

$$\Pr\left(Y_i \leq j \mid X\right) = \sum_{m=1}^{j} \Pr\left[Y_i = m \mid X\right] \tag{4.21}$$

is the probability that the outcome is less than or equal to *j*. By applying the CDF in the equation (the one with exponentiation) to calculate the odds ratio in the equation (the one after exponentiation), and take the log of the odds ratio, we get:

$$\text{logit}[\Pr(Y_i \leq j)] = \ln \frac{\Pr_i(Y_i \leq j \mid X)}{\Pr(Y_i > j)} = \ln \frac{\Pr(Y_i \leq j)}{[1 - \Pr(Y_i \leq j)]} \quad (4.22)$$

$$= \pi_j - \sum_{m=1}^{K} \beta_m X_{im} \qquad j = 1,2, \ldots, (J-1) \quad (4.23)$$

The model assumes that the *X* variables have the same effect across all *J* – 1 cumulative logits. Given then research question 1.1, the estimated model is,

$$Pr(Enrolment = j \mid X_K) = F(\pi_j - X\beta) - F(\pi_{j-1} - X\beta), j = 1, 2, \text{and } 3 \quad (4.24)$$

The J-categories are $j = 1$ if the child has never enrolled, $j = 2$ if the child is a school dropout, and $j = 3$ if enrolled. The vector $X\beta$ is a set of children's individual and family characteristics, including regional differences (rural vs. urban). The J-categories for research questions 1.2, 2.2, 3.2, and 3.2 are $j = 1$ if the pupil has some years of education, $j = 2$ if the pupil has completed lower-primary school, and $j = 3$ if the pupil completed upper-primary education. In the younger sample, some pupils (ages 12 and 13 years) have never enrolled, therefore, the categories change to $j = 1$ if the pupil has no formal education $j = 2$ if the pupil has some years of primary school, and $j = 3$ if the pupil completed lower-primary education.

4.4 Data Description

The study applies two datasets, namely the Mozambique General Population and Housing Census (GPHC) 2007 data and CGAP Smallholder Household Survey 2015: Building the Evidence Base on the Agricultural and Financial Lives of Smallholder Households data. The first one is available on the IPUMS International website, while the second is available on the World Bank's microdata website.

4.4.1 Mozambique General Population and Housing Census 2007 Data (RQ1)

The data were collected in 2007 by the National Institute of Statistics (NIS). The optimal results would also include the estimated change among all households by using the last census data collected in 2017; however, as of 2022, there are still not available. From the GPHC 2007 data, IPUMS International hosts 10%. For this study, roughly 200,000 observation points were bootstrapped. Because the study revolves around the head of the household, only households with one head were kept. The households are also grouped into three categories depending on where the household head works. In the original dataset, the occupation of the household head had nine different categories. Identical categories are grouped into three groups used in the research: 1) agricultural workers; 2) elementary occupations, crafts, trade, and machine operators; and 3) senior officials, professionals, clerks, and managers. Because 99% of the households dependent on agriculture in Mozambique are smallholder farmers, agricultural workers are categorized as smallholders. Then the data are also grouped into female-headed and male-headed households.

The debate on the importance of the language of instruction at school is present in the context of Mozambique. Even though Portuguese is the official language, most children do not speak Portuguese as their first language. Almost all children living in rural areas come into contact with Portuguese for the first time at school. In the GPHC 2007 dataset, only 1% reported using Portuguese as their first language. Mozambique officially has 42 languages (Ngunga, 2011). Grouping the children by their language at home would be of no use for the study because the educational system is not bilingual. A better approach was to apply the binary variable taking 1 if the children speak Portuguese at home and 0 otherwise. This variable captures all children who speak Portuguese at home daily, those who use it occasionally, and those who do not use it. Another complex variable is education and literacy. Parental education is categorized as “less than primary”, “primary completed”, and “secondary completed”. The share of less than primary category includes parents with no education and others with some years of education. Concerning that, in Mozambique, the definition of literacy is if someone can write and read simple words. Some people have no formal education, but they can read/write, most of the times in native Mozambican languages. Therefore, the binary variable “illiterate”, 1 if illiterate and 0 if not, is

included in the model. The two independent variables are school enrollment and educational attainment. School enrollment has three categories: never enrolled, enrolled (currently), and dropped out. Educational attainment also has three categories: no education, some primary education completed, and primary education completed. The age group of children ranges from 6 to 18 years. As a result of late enrollments, although the official age to complete primary education is 13, the data contain a large number of 18 years old adolescents still in primary.

Table 4.1 Description of Variables (RQ1)

VARIABLES	DESCRIPTION
Dependent variables	
School enrollment	
Never enrolled	Dummy variable taking the value 1 if the pupil has never enrolled in school, otherwise 0
Enrolled	Dummy variable taking the value 1 if the pupil is currently enrolled in school, otherwise 0
Dropped out	Dummy variable taking the value 1 if the pupil has dropped out of school, otherwise 0
Educational attainment	
No education	Dummy variable taking the value 1 if the pupil has never attended school, otherwise 0
Some primary completed	Dummy variable taking the value 1 if the pupil has some years of primary education (below 5 years), otherwise 0
Lower primary completed	Dummy variable taking the value 1 if the pupil has completed lower primary education (5 years), otherwise 0
Upper primary completed	Dummy variable taking the value 1 if the pupil has completed upper primary education (7 years), otherwise 0
Dependent variables	
Pupil's age	Specific age variable of the pupil
Female	Gender of the pupil taking 1 for girl and 0 for boy
Do not speak Portuguese at home	Dummy variable taking 1 if the child speaks Portuguese at home, and 0 otherwise
Female head	Gender of the HH head taking 1 for female and 0 for male
Household head's age	Specific age variable for the household head

Illiterate head	Dummy variable taking the value 1 if the household head is illiterate, otherwise 0
Household head's educational attainment	
Less than primary	Dummy variable taking the value 1 if the household head has no education or never completed primary education, otherwise 0
Primary completed	Dummy variable taking the value 1 if the household head has completed primary education, otherwise 0
Secondary completed	Dummy variable taking the value 1 if the household head has completed secondary education, otherwise 0
Mother's educational attainment (male-headed household)	
Less than primary	Dummy variable taking the value 1 if the mother has no education or never completed primary education, otherwise 0
Primary completed	Dummy variable taking the value 1 if the mother has completed primary education, otherwise 0
Secondary completed	Dummy variable taking the value 1 if the mother has completed secondary education, otherwise 0
Head's occupation	
Senior officials, professionals, clerks & managers	Dummy variable taking the value 1 if the household works as senior officials/professionals/clerks/managers, otherwise 0
Agriculture workers	Dummy variable taking the value 1 if the household is agriculture worker, otherwise 0
Elementary occupations, crafts, trade and machine operators	Dummy variable taking the value 1 if the household works in elementary occupations/crafts/trade/machine operators, otherwise 0
Number of children less than 6 years	Specific number of children aged under 6
Family size	Specific number of family members
Rural	Dummy variable taking 1 if the household is located in rural area, and 0 if is located in urban area

Source: Created by the author based on Census data 2007 (IPUMS, 2010)

4.4.2 Summary Statistics for RQ1

This section summarizes the characteristics of the main variables used in the study. The summary statistics are grouped into a full sample and subsamples according to children's age (for example for educational attainment, the cutoff is 12), the enrollment status (enrolled, dropped out or never enrolled), and the headship of the household. Table 4.2 presents the summary statistics of the key variables (full sample). Even though the official age for primary school is 6 to 12 years, the study sets the target at children aged 6-18. The reason is that until 18 years old, a large number of children reported having never been to school or only having primary education. Therefore, the cut off is children who never attended school, were enrolled or have dropped out but reported not having completed more than primary education. The children's age mean is 11, and they are equally represented by gender. Twenty seven percent of children have never been to school, 64% are enrolled, and 9% dropped out. The family size is around 6 members.

The household head's age ranges from 17 to 78 years old. The average is around 42 years old. Female headed households account for 27%. Interestingly, 53% of households report speaking Portuguese[10] even though a staggering 85% of the heads have less than primary education, and 47% reported being illiterate. The fact is that only a minority use Portuguese daily, let alone being their first language. As for household educational attainment, 13% completed primary education, 2% completed secondary, and the rest is composed of parents who have fewer years of education or have never been to any formal education at all. The head's occupation is categorized into three groups. The categorization follows a pattern of close work-types: i) agriculture: includes agriculture and fishery, which employs 70% of the workers; ii) elementary: composed by elementary occupations, crafts, trade, etc., accounting for 24%; and iii) officials, comprising senior officials, professionals, clerks and managers (accounting for 6%). By location, 71% of the households are located in rural areas.

Tables 4.3 and 4.4 report the individual and household characteristics in male and female-headed households respectively. The data indicate that children living in female-headed

[10] Portuguese is the official language and lingua franca, but it is not used by the majority of the population, especially in rural areas.

households enroll more often than their counterparts from male-headed households, but they also dropout more. While in male-headed households, 28% of children have never enrolled, 8% dropped out, and the remaining 63% are enrolled, in female-headed households 25% have never enrolled, 9% dropped out and 66% are enrolled. The average age of the children is 11 years, and the girls and boys sampled are equal at 50%. Male heads have an average age of 42 years, while female heads have one year less. Among male-headed households, 49% reported not being able to speak Portuguese, compared to 45% in female-headed households. This is also puzzling because 93% of female heads either have some years of primary education or never went to school, while 82% of male heads schooled below primary (or never participated at school). While 15% of male heads completed primary education, only 6% of female heads did complete primary.

The schooling of mothers (in male-headed households) is similar to that of female heads: 92% have none to few years of education, 7% report having primary education completed, and only a mere 1% have post-primary education. In female-headed households, their spouses' educational attainment is not included (or estimated) because only a minority have a husband. As pointed out above, even though the data do not differentiate, the majority are widows or single mothers never married. Additionally, while 37% of male heads are illiterate, the number for illiterate female heads is almost double that (72%). The occupation of the household heads also reveals disparities: 83% of female heads work in agriculture, compared to 65% of male heads. Around 28% of male parents work in elementary occupations, crafts, trade and machine operators, while the number for female heads is only 13%. The location of the households is more evenly distributed: 70% of male-headed households are located in rural areas, compared to 74% of female-headed households. The comparison of these two tables is somewhat interesting. Even though female heads tend to be in a disadvantage in terms of school attainment and occupation and literacy, they initially are more likely to send children to school. Additionally, the educational attainment of female heads is similar to that of mothers in male-headed households. Children living in female-headed households probably drop out more because they are also likely to be poorer, and the difference is a mere one point. The estimation results reveal the importance of mothers'

educational attainment as a proxy to decision making in male-headed households compared to women who are household heads.

Table 4.2 Summary Statistics for Enrollment Status (Aged 6-18)

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
School enrollment					
Never enrolled	48822	0.27	0.45	0	1
Dropped out	48822	0.09	0.28	0	1
Enrolled	48822	0.64	0.48	0	1
Independent variables					
Pupil's age	48822	11.12	3.73	6	18
Female	48822	0.50	0.50	0	1
Does not speak Portuguese at home	48822	0.47	0.50	0	1
Family size	48822	6.18	2.37	1	15
Household head's age	48822	41.89	12.29	17	78
Household head's educational attainment					
Less than primary	48822	0.85	0.36	0	1
Primary completed	48822	0.13	0.33	0	1
Secondary completed	48822	0.02	0.15	0	1
Female head	48822	0.27	0.44	0	1
Illiterate head	48822	0.47	0.50	0	1
Head's occupation					
Senior officials, professionals, clerks & managers	48822	0.06	0.23	0	1
Agriculture workers	48822	0.70	0.46	0	1
Elementary occupations, crafts, trade and machine operators	48822	0.24	0.43	0	1
Rural	48822	0.71	0.45	0	1

Source: Created by the author based on Census data 2007 (IPUMS, 2010)

Table 4.3 Summary Statistics of Children in Male-Headed Households

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
School enrollment					
Never enrolled	33127	0.28	0.45	0	1
Dropped out	33127	0.08	0.27	0	1
Enrolled	33127	0.63	0.48	0	1
Independent variables					
Pupil's age	33127	11.05	3.75	6	18
Female	33127	0.51	0.50	0	1
Does not speak Portuguese at home	33127	0.49	0.50	0	1
Family size	33127	6.50	2.26	1	15
Household head's age	33127	42.24	12.20	17	78
Household head's educational attainment					
Less than primary	33127	0.82	0.38	0	1
Primary completed	33127	0.15	0.36	0	1
Secondary completed	33127	0.03	0.17	0	1
Illiterate head	33127	0.37	0.48	0	1
Mother's educational attainment					
Less than primary	33127	0.92	0.27	0	1
Primary completed	33127	0.07	0.25	0	1
Secondary completed	33127	0.01	0.08	0	1
Head's occupation					
Senior officials, professionals, clerks & managers	33127	0.07	0.25	0	1
Agriculture workers	33127	0.65	0.48	0	1
Elementary occupations, crafts, trade and machine operators	33127	0.28	0.45	0	1
Rural	33127	0.70	0.46	0	1

Source: Created by the author based on Census data 2007 (IPUMS, 2010)

Table 4.4 Summary Statistics of Children in Female-Headed Households

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
School enrollment					
Never enrolled	13211	0.25	0.44	0	1
Dropped out	13211	0.09	0.28	0	1
Enrolled	13211	0.66	0.47	0	1
Independent variables					
Pupil's age	13211	11.16	3.67	6	18
Female	13211	0.50	0.50	0	1
Does not speak Portuguese at home	13211	0.45	0.50	0	1
Family size	13211	5.50	2.43	1	15
Household head's age	13211	41.22	12.19	17	78
Household head's educational attainment					
Less than primary	13211	0.93	0.25	0	1
Primary completed	13211	0.06	0.23	0	1
Secondary completed	13211	0.01	0.10	0	1
Illiterate head	13211	0.72	0.45	0	1
Head's occupation					
Senior officials, professionals, clerks & managers	13211	0.03	0.18	0	1
Agriculture workers	13211	0.83	0.37	0	1
Elementary occupations, crafts, trade and machine operators	13211	0.13	0.34	0	1
Rural	13211	0.74	0.44	0	1

Source: Created by the author based on Census data 2007 (IPUMS, 2010)

When looking into the detailed characteristics of each group by enrollment status, there are interesting deviations from the full sample's averages; special attention should be given to pupils' gender, is Portuguese spoken at home, is the household's head literate, and household's location. Official primary education ranges from 6 through 12 years old. Specific characteristics of pupils

who have never been to school (Table 4.5) indicate that their mean age is 8 years old, and 52% are girls. This means that pupils are at least two years late for enrollment, and girls are more likely to stay out of school. The household's composition reports that 93% percent of the households do not use Portuguese, and the household's head averages 41 years old. Of the total number of households, 25% is headed by women; 64% of the heads reported being illiterate. Ninety five percent of the heads have zero to few years of primary; 86% of them are employed in agriculture, 13% in elementary occupations, crafts, trade, or machine operators, and 86% live in rural areas. Form the data, it seems like the most disadvantaged groups, i.e., illiterate parents or less educated parents, working in agriculture, and rural areas affect pupils' enrollment negatively.

Table 4.5 Summary Statistics of Children who Have Never Enrolled

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Pupil's age	10158	7.81	1.89	6	12
Female	10158	0.52	0.50	0	1
Does not speak Portuguese at home	10158	0.93	0.25	0	1
Family size	10158	5.94	1.99	1	15
Household head's age	10158	40.65	12.01	17	78
Household head's educational attainment					
Less than primary	10158	0.95	0.23	0	1
Primary completed	10158	0.05	0.22	0	1
Female head	10158	0.25	0.43	0	1
Illiterate head	10158	0.64	0.48	0	1
Head's occupation					
Senior officials, professionals, clerks & managers	10158	0.01	0.12	0	1
Agriculture workers	10158	0.86	0.35	0	1
Elementary occupations, crafts, trade and machine operators	10158	0.13	0.34	0	1
Rural	10158	0.86	0.34	0	1

Source: Created by the author based on Census data 2007 (IPUMS, 2010)

The composition of the characteristics of children who dropped out from school is somehow similar to the ones who have never enrolled. Starting with the individual level, for pupils aged 12 to 18, the mean age is 16, and 57% are girls (Table 4.6). In Mozambique, lower primary is considered one level on its own, and it lasts for 5 years. Thus, the study defines the ages 12 through 18 for educational attainment estimation. Over two-thirds of them did not finish lower primary, 27% finished lower primary, and the remaining 11% finished upper primary education. At the household level, one-third does not use Portuguese daily; 87% of the heads did not finish primary. Female heads compose 27% of the total number of the households. Like in the previous group, the average age of the household's head is 40. Forty five percent report being illiterate; 69% of the household's heads work in agricultural related activities, 26% in elementary occupations, crafts, trade, or machine operators, and 72% of the households are located in rural areas. Dropouts seem to have the same patterns of disadvantages as those who have never enrolled. However, the most significant variable that contributes to drop outs seems to be age. As pupils become older, their probability of dropping out increases. In fact, pupils who start school late are found to not stay long in school.

The official age to complete lower-primary (grade 5) is 11. Table 4.7 presents the characteristics of children aged 12 and 13 to assess their school performance. The data indicate that the gender categorization is not far from the full sample mean (48% of pupils are girls). Although 70% of the households are located in rural areas and 84% of the household heads did not even finish primary education, only 36% report to not use Portuguese at home. Fourteen percent of the heads finished primary education. Regarding the head's occupation, 69% work in agriculture, 25% in elementary occupations, crafts, trade and machine operators, and 6% as senior officials and clerks. The family size is a little over six members. By the official completion age, only 21% completed lower-primary education, while over two-thirds only have some years of primary (below 5), and 16% have no formal education. By age 12, those who did not enroll yet are more likely to never enroll; and as seen in table 4.6, only 27% of dropout children aged 12 to 18 complete the first cycle of primary education.

To capture the children's enrollment delay, table 4.8 defines a threshold of educational attainment of age 14. In the range 14-18, the average age is 16. By gender, pupils are distributed evenly. One-third report not using Portuguese at home. The household head's age is averaged around 42, and 27% are female-headed households. While 13% of the heads finished primary education, 84% have some years of primary or have never attended school. Rural areas constitute 67% of the total households, and, equally, 67% of household heads work in agriculture. Elementary occupations, crafts, trade and machine operators compose 27% of the working force. This is interesting because it has a direct relationship with the reduction of people living in rural areas in the sample. According to the subsample of out of school children, 16 is the age in which most children tend to dropout. Therefore, it is expected that this subsample has a significant number of out of school pupils, especially when looking at their educational attainment. Only 16% completed the entire cycle of primary education (grade 7), while 28% completed lower-primary. Pupils who attained some few years of primary account for 36%, and those who have never enrolled account for 20%. These last two groups combine into 56% of children over the primary education official age who did not complete even the first five years of schooling.

Table 4.6 Summary Statistics of Educational Attainment for Dropout Children

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
Education attainment					
Some primary completed	3459	0.62	0.49	0	1
Lower primary completed	3459	0.27	0.44	0	1
Upper primary completed	3459	0.11	0.31	0	1
Independent variables					
Pupil's age	3459	16.08	1.86	12	18
Female	3459	0.57	0.50	0	1
Does not speak Portuguese at home	3459	0.30	0.46	0	1
Family size	3459	5.34	2.81	1	15
Household head's age	3459	39.58	15.03	17	78
Household head's educational attainment					
Less than primary	3459	0.87	0.34	0	1
Primary completed	3459	0.12	0.33	0	1
Secondary completed	3459	0.01	0.11	0	1
Female head	3459	0.27	0.44	0	1
Illiterate head	3459	0.45	0.50	0	1
Head's occupation					
Senior officials, professionals, clerks & managers	3459	0.05	0.21	0	1
Agriculture workers	3459	0.69	0.46	0	1
Elementary occupations, crafts, trade and machine operators	3459	0.26	0.44	0	1
Rural	3459	0.72	0.45	0	1

Source: Created by the author based on Census data 2007 (IPUMS, 2010)

Table 4.7 Summary Statistics of Educational Attainment (Aged 12 & 13)

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
Education attainment					
No education	7074	0.16	0.37	0	1
Some primary completed	7074	0.63	0.48	0	1
Lower primary completed	7074	0.21	0.40	0	1
Independent variables					
Pupil's age	7074	0.16	0.37	0	1
Female	7074	0.63	0.48	0	1
Does not speak Portuguese at home	7074	0.21	0.40	0	1
Family size	7074	6.35	2.35	1	15
Household head's age	7074	43.65	11.72	17	78
Household head's educational attainment					
Less than primary	7074	0.84	0.37	0	1
Primary completed	7074	0.14	0.34	0	1
Secondary completed	7074	0.03	0.16	0	1
Female head	7074	0.28	0.45	0	1
Illiterate head	7074	0.44	0.50	0	1
Head's occupation					
Senior officials, professionals, clerks & managers	7074	0.06	0.24	0	1
Agriculture workers	7074	0.69	0.46	0	1
Elementary occupations, crafts, trade and machine operators	7074	0.25	0.43	0	1
Rural	7074	0.70	0.46	0	1

Source: Created by the author based on Census data 2007 (IPUMS, 2010)

Table 4.8 Summary Statistics of Educational Attainment (Aged 14 or More)

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
Education attainment					
No education	14278	0.20	0.40	0	1
Some primary completed	14278	0.36	0.48	0	1
Lower primary completed	14278	0.28	0.45	0	1
Upper primary completed	14278	0.16	0.37	0	1
Independent variables					
Pupil's age	14278	15.93	1.44	14	18
Female	14278	0.50	0.50	0	1
Does not speak Portuguese at home	14278	0.31	0.46	0	1
Family size	14278	6.01	2.69	1	15
Household head's age	14278	42.31	13.60	17	78
Household head's educational attainment					
Less than primary	14278	0.84	0.37	0	1
Primary completed	14278	0.13	0.34	0	1
Secondary completed	14278	0.03	0.17	0	1
Female head	14278	0.27	0.44	0	1
Illiterate head	14278	0.44	0.50	0	1
Head's occupation					
Senior officials, professionals, clerks & managers	14278	0.07	0.25	0	1
Agriculture workers	14278	0.67	0.47	0	1
Elementary occupations, crafts, trade and machine operators	14278	0.27	0.44	0	1
Rural	14278	0.67	0.47	0	1

Source: Created by the author based on Census data 2007 (IPUMS, 2010)

4.4.3 CGAP Smallholder Household Survey 2015 (RQ2 & RQ3)

The CGAP data were collected in 2015, with a framework based on the 2009-2010 Census of Agriculture and Livestock (designed from the GPHC 2007). The smallholder sample is representative at the national level (all provinces), involving 3,000 smallholder households. Because of non-responses, 3,158 households were sampled, expecting a non-response rate of 5%. Mozambique has three regions: North, Center, and South. The regional distribution of the samples followed the number of agricultural households in each region. Then in each region, the samples were equally distributed across urban and rural areas. The sampling successfully interviewed 2,574 households. The collected information includes agricultural practices (land size, crops, livestock, farm management, and markets), socioeconomic (employment status, income, expenditure, and investment), and basic information of each individual, including educational attainment and schooling status. Instead of enrollment, like in research question 1, research question 2 uses a binary variable "attendance". While children can be enrolled without attending, this variable assesses if children truly go to school. The data were collected in the second semester of the year. By this time, children at risk of dropping out are more likely to have already done so. Educational attainment has three outcomes: some years of primary (meaning below grade 5), lower primary completed, and upper primary completed. Research question 3 applies two variables that proxy parental expectations: 1) if the household head has one off-farm activity, and 2) if the household head considers agriculture a business.

4.4.4 Principal Component Analysis for the Household Wealth Index

For the calculation of the household wealth index, we use nine variables. Because principal component analysis works better with binary variables, all variables were transformed to have only two outcomes. Most of them were already coded as such, except for the case of toilet (no toilet, traditional toilet with a hole only, toilet with running water), and lightning source (uses wood/batteries, using petroleum or solar, having electrical grid). Because of sample, all those who reported to have a latrine or a toilet connected to septic tank were considered as "having toilet", and those who used either electricity or solar and oil for lighting were considered as "having

lighting". This is because in the case of Mozambique, the coverage of electrical power is only 32%, so many households do not have electricity due to supply constraints. The Kaiser-Meyer-Olkin test (KMO) test indicates that values between 0.80 and 0.89 are meritorious when calculating PCA. As seen in the table 4.10, KMO test indicates an overall value of 0.81. As it will be seen in the results section, the household wealth index is a variable that helps understanding deeper differences among the smallholder households. The sampling by location only included representative samples that were above 5%.

Table 4.9 Description of Variables (RQ2 & 3)

VARIABLES	DESCRIPTION
Dependent variables	
School attendance	Dummy variable taking the value 1 if the pupil is currently attending school, otherwise 0
Education attainment	
Some years of primary (below 5)	Ordinal variable taking the value 1 if the pupil has some years of primary education
Lower primary completed	Ordinal variable taking the value 2 if the pupil has completed lower-primary education (5 years
Upper primary completed	Ordinal variable taking the value 3 if the pupil has completed primary education (7 years)
Independent variables	
Pupil's age	Specific age variable of the pupil
Female	Gender of the pupil taking 1 for girl and 0 for boy
Contribute to agriculture	Dummy variable taking 1 if the pupil contributes into agriculture, otherwise 0
Household head's age	Specific age variable for the household head
Female head	Gender of the HH head taking 1 for female and 0 for male
Household head's educational attainment	
Head has no education	Categorical variable taking the value 1 if the head has no formal education, otherwise 0
Head has some years of primary education	Categorical variable taking the value 1 if the head has some years of education, otherwise 0

Head completed primary education	Categorical variable taking the value 1 if the head completed primary education, otherwise 0
Head has post-primary education	Categorical variable taking the value 1 if the head has post-primary education, otherwise 0
Poverty line	Poverty line cut-off variable of $1.25/day taking 1 if the household is above the line, otherwise 0
Mother's educational attainment	
Mother has no education	Categorical variable taking the value 1 if the mother has no formal education, otherwise 0
Mother has some years of primary education	Categorical variable taking the value 1 if the mother has some years of education, otherwise 0
Mother completed primary education	Categorical variable taking the value 1 if the mother completed primary education, otherwise 0
Mother has post-primary education	Categorical variable taking the value 1 if the mother has post-primary education, otherwise 0
Location	Dummy variable taking 1 if the household is located in urban area, and 0 if is located in rural area
Receives remittance	Dummy variable taking 1 if the household receives remittances, otherwise 0
Land size	Specific land size ranging from 1 to 5ha
Head has a secondary job	Dummy variable taking 1 if the household head has an off-farm job, otherwise 0
Farm is business	Dummy variable taking 1 if the household head considers farming a business, otherwise 0
Household wealth index	
First quintile	Categorical variable taking the value 1 if the household is in the first quintile, otherwise 0
Second quintile	Categorical variable taking the value 1 if the household is in the second quintile, otherwise 0
Third quintile	Categorical variable taking the value 1 if the household is in the third quintile, otherwise 0
Fourth quintile	Categorical variable taking the value 1 if the household is in the fourth quintile, otherwise 0
Fifth quintile	Categorical variable taking the value 1 if the household is in the fifth quintile, otherwise 0

Source: Created by the author based on CGAP data (2015)

Table 4.10 KMO Test Results

Variable	KMO
Number of rooms	0.79
Number of HH members with a cellphone	0.84
Material of the floor	0.83
Material of the walls	0.77
Lightning source	0.78
Household has a toilet	0.81
Household has an electric iron	0.83
Household has a clock or watch	0.81
Household has a radio	0.83
Overall	0.81

Source: Created by the author based on CGAP data (2015)

4.4.5 Summary Statistics for RQ2 and RQ3

The following section describes children's individual and household characteristics among the smallholder farmers. The data used is the Consultative Group to Assist the Poor survey data, conducted in 2015 in smallholder households, representative at the national level. The main objective of the survey was to collect the smallholder farmers' demand for agricultural financing mechanisms, and use of digital technologies in their transactions. Table 4.11 summarizes the school attendance of children aged 6 to 18, for the whole sample, with focus on the variables specified for research question 2.1. The data indicate that 83% of children were attending school when the survey was conducted. One important note is that the data were collected in the second semester. As result, the research assumes that most of the children who would dropout have had done so. This is because children who are likely to stop attending school do so by the middle of the year, or right at the beginning of the second semester (being July in the case of Mozambique). If this assumption holds, the data show that there is fairly high attendance among the surveyed smallholder households. Pupils' average age is around 12 years, and 46% are girls. Based on the older cohorts, 15% of the total sample participate in agriculture, and 16% participate in income

generating activities. Differently from the census dataset presented above, only 6% of smallholders report to use Portuguese at home.

The household heads' average age is the same as reported in the census data, around 42 years, and 22% of the households are female-headed. It is relevant to note that because the average age is 42, as of 2015, most parents were born in 1973 (two years before the independence of Mozambique). Therefore, they attended school in the 1980s before the national system of education introduced in the mid-1990s serving their offspring. The full sample data indicate that 29% of parents have no formal education, 30% have some years of primary, 17% completed primary, and 24% attended post-primary education. Because the existence of children under 6 (official school entrance age) might negatively affect the schooling of older siblings (caregiving), we included a variable to capture this relationship. Although the maximum is 5, the average, when including households with no children below the age 6 is 0.5 (approximately 1). In the estimation results, models will be built that restrict the sample to households that have at least one child, to capture a unit change and its influence on the schooling of siblings. Because most of the households did not report their monthly income or consumption level monetarily, the study uses the poverty line threshold to estimate the wealth status of the household. Only one-third of the households live above the cutoff of $1.25/month. If the bar is raised to $2.25, almost all the smallholders fall below the poverty line. By location, 19% live in urban areas. The definition of urban areas should be understood in the context of developing countries. Apart from the big capital cities (province level, which is the highest in the Mozambique administration system), smaller cities (district level) often with living conditions not far from rural areas are categorized as 'urban'. In Mozambique, they include administrative posts (towns) and municipal councils (city councils).

Table 4.14 reports the summary statistics for school attendance of the official school age of primary education (6-13). This cohort attend seven points higher than the full sample, at 91%. Girls' participation is slightly less than the full sample, representing 45%. The average pupils' age is ten years. The average age of the household head is 41 years (one year less than that of the full sample), and, like the previous table, 22% of the households are female-headed. The educational attainment of the household head is distributed as follows: equally at 29% for parents with no

formal education, and for those with some years of primary, 17% completed primary, and 29% have post-primary education. Children under six years old average close to one (including the sample with no children in these age cohort). One point above the full sample, 34% of the households are above the poverty line, and 21% of the households are located in urban areas. The higher school attendance, when compared to the full sample, seems to be linked to favoring factors such as the younger age of pupils, slightly richer and urban dwelling households.

Table 4.11 Summary Statistics of School Attendance (Aged 6 to 18)

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
School attendance (yes = 1)	2651	0.83	0.37	0	1
Independent variables					
Pupil's age	2651	12.08	3.32	6	18
Female	2651	0.46	0.50	0	1
Contribute to agriculture (yes = 1)	2651	0.15	0.36	0	1
Contribute to income (yes = 1)	2651	0.16	0.37	0	1
Speaks Portuguese (yes = 1)	2651	0.06	0.24	0	1
Household head's age	2651	41.55	10.48	16	70
Female head	2651	0.22	0.42	0	1
Household head's educational attainment					
No formal education	2651	0.29	0.45	0	1
Some years of primary education	2651	0.30	0.46	0	1
Primary education completed	2651	0.17	0.38	0	1
Post-primary education	2651	0.24	0.43	0	1
Number of kids aged below 6 years	2651	0.58	0.85	0	5
Poverty line (above = 1)	2651	0.33	0.47	0	1
Household wealth index					
First quintile	2651	0.24	0.43	0	1
Second quintile	2651	0.17	0.38	0	1
Third quintile	2651	0.19	0.39	0	1
Fourth quintile	2651	0.21	0.41	0	1
Fifth quintile	2651	0.19			
Location (urban = 1)	2651	0.19	0.39	0	1

Source: Created by the author based on CGAP data (2015)

Table 4.12 Summary Statistics of School Attendance in Female-Headed Households

Variable	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
School attendance (yes = 1)	587	0.82	0.39	0	1
Independent variables					
Pupil's age	587	12.10	3.34	6	18
Female	587	0.45	0.50	0	1
Contribute to agriculture (yes = 1)	587	0.15	0.36	0	1
Contribute to income (yes = 1)	587	0.16	0.37	0	1
Speaks Portuguese (yes = 1)	587	0.04	0.20	0	1
Household head's age	587	40.84	11.37	16	70
Household head's educational attainment					
No formal education	587	0.40	0.49	0	1
Some years of primary education	587	0.29	0.45	0	1
Primary education completed	587	0.16	0.37	0	1
Post-primary education	587	0.15	0.35	0	1
Poverty line (above = 1)	587	0.36	0.48	0	1
Household wealth index					
First quintile	587	0.27	0.45	0	1
Second quintile	587	0.17	0.38	0	1
Third quintile	587	0.16	0.36	0	1
Fourth quintile	587	0.20	0.40	0	1
Fifth quintile	587	0.20	0.40	0	1
Location (urban = 1)	587	0.25	0.43	0	1

Source: Created by the author based on CGAP data (2015)

Table 4.13 Summary Statistics of School Attendance in Male-Headed Households

Variable	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
School attendance (yes = 1)	2055	0.84	0.37	0	1
Independent variables					
Pupil's age	2055	12.08	3.31	6	18
Female	2055	0.46	0.50	0	1
Contribute to agriculture (yes = 1)	2055	0.15	0.36	0	1
Contribute to income (yes = 1)	2055	0.16	0.37	0	1
Speaks Portuguese (yes = 1)	2055	0.07	0.25	0	1
Household head's age	2055	41.75	10.20	16	70
Household head's educational attainment					
No formal education	2055	0.26	0.44	0	1
Some years of primary education	2055	0.31	0.46	0	1
Primary education completed	2055	0.17	0.38	0	1
Post-primary education	2055	0.26	0.44	0	1
Mother's educational attainment					
No formal education	2055	0.45	0.50	0	1
Some years of primary education	2055	0.26	0.44	0	1
Primary education completed	2055	0.16	0.37	0	1
Post-primary education	2055	0.13	0.33	0	1
Number of kids aged below 6 years	2055	0.61	0.83	0	5
Poverty line (above = 1)	2055	0.32	0.47	0	1
Household wealth index					
First quintile	2055	0.23	0.42	0	1
Second quintile	2055	0.18	0.38	0	1
Third quintile	2055	0.20	0.40	0	1
Fourth quintile	2055	0.22	0.41	0	1
Fifth quintile	2055	0.18	0.39	0	1
Location (urban = 1)	2055	0.17	0.37	0	1

Source: Created by the author based on CGAP data (2015)

Table 4.14 Summary Statistics of School Attendance (Aged 6 to 13)

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
School attendance (yes = 1)	1660	0.91	0.29	0	1
Independent variables					
Pupil's age	1660	9.97	2.11	6	13
Female	1660	0.45	0.50	0	1
Household head's age	1660	41.36	10.42	17	70
Female head	1660	0.22	0.41	0	1
Household head's educational attainment					
No formal education	1660	0.29	0.45	0	1
Some years of primary education	1660	0.29	0.45	0	1
Primary education completed	1660	0.17	0.38	0	1
Post-primary education	1660	0.25	0.43	0	1
Poverty line (above = 1)	1660	0.34	0.48	0	1
Location (urban = 1)	1660	0.21	0.40	0	1

Source: Created by the author based on CGAP data (2015)

Table 4.15 presents data for children aged 12 and 13. Officially, aged 12 children should be attending grade 6, thus having completed lower-primary. The age 13 is included to account for a delay of at least one year. Strangely, in the subsample of children aged 6 to 13 (Table 4.14), none of the children participates in agriculture, which is more likely to be underreporting if considering that all these households live mostly on agriculture, and based on the reality of other countries in similar conditions. Five points down from the previous subsample, 86% of children attend school. Girls' participation continues to decrease, being 43%, but female-headed households increase by one point to represent 23%. For this age group, 49% attended/completed some years of primary education; and 51% have completed lower-primary. Household heads' average age is 42, and their mean educational attainment is slightly lower. Sixty-six percent of household heads either have no formal education or have some years of primary (distributed equally), 15% completed primary,

and the rest attended some post-primary. Thirty percent of households live above the poverty line, and 1/5 are located in urban areas. The pattern seems to hold: older children, lower years of parental education, and living below the poverty line decrease school attendance.

Table 4.15 Summary Statistics of Children Aged 12 & 13

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
School attendance (yes = 1)	403	0.86	0.35	0	1
Educational attainment					
Some years of primary education	403	0.49	0.50	0	1
Lower-primary completed	403	0.51	0.50	0	1
Independent variables					
Pupil's age	403	12.43	0.50	12	13
Female	403	0.43	0.50	0	1
Household head's age	403	42.34	9.97	19	70
Female head	403	0.23	0.42	0	1
Household head's educational attainment					
No formal education	403	0.33	0.47	0	1
Some years of primary education	403	0.33	0.47	0	1
Primary education completed	403	0.15	0.36	0	1
Post-primary education	403	0.19	0.39	0	1
Poverty line (above = 1)	403	0.30	0.46	0	1
Location (urban = 1)	403	0.20	0.40	0	1

Source: Created by the author based on CGAP data (2015)

Table 4.16 summarizes the characteristics of the children aged 14 to 18. This group officially is overaged for primary education, however as presented above, the sampling included children aged 14 to 18 as long as they reported to either be enrolled in the primary level or have not attained more than the upper-primary. Their average age is close to 16, and 70% attend school. Girls represent 48% of the total pupils, and females head 22% of the households. Of the older

children, 40% participate in agriculture, and 43% participate in income generating activities. By educational attainment, 27% of the children have some years of primary, 34% completed lower-primary, and 39% completed all grades of primary education. The age of the household head is the same as before, around 42 years. Twenty-nine percent of the heads did not attend school, 1/3 attended some years of primary education, 17% completed primary, and the remaining attended beyond primary education. Thirty-one percent of the households are above the poverty threshold, however, only 16% are located in urban areas.

Table 4.16 Summary Statistics of Children Aged 14 or More

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
School attendance (yes = 1)	991	0.70	0.46	0	1
Educational attainment					
Some years of primary education	991	0.27	0.44	0	1
Lower-primary completed	991	0.34	0.47	0	1
Upper-primary completed	991	0.39	0.49	0	1
Independent variables					
Pupil's age	991	15.62	1.42	14	18
Female	991	0.48	0.50	0	1
Contribute to agriculture (yes = 1)	991	0.40	0.49	0	1
Contribute to income (yes = 1)	991	0.43	0.50	0	1
Household head's age	991	41.86	10.59	16	70
Female head	991	0.22	0.42	0	1
Household head's educational attainment					
No formal education	991	0.29	0.45	0	1
Some years of primary education	991	0.33	0.47	0	1
Primary education completed	991	0.17	0.38	0	1
Post-primary education	991	0.22	0.41	0	1
Poverty line (above = 1)	991	0.31	0.46	0	1
Location (urban = 1)	991	0.16	0.36	0	1

Source: Created by the author based on CGAP data (2015)

One of the variables in the dataset captures if the household head has a second job or not. Not all the households responded to this question. Therefore, the next subsample only includes the households that responded. Table 4.17 indicates that 85% of the children attend school. The average pupils' age is 12 years, and 46% are girls. The rate of children participating in agriculture and in income generating activities is 14% for each. The age of the household head averages 42, and 22% of households have female heads. The schooling of the household head is 29% never attended, 30% have some years of primary, 20% completed primary education, and 21% attained post-primary, respectively. Households living above the poverty line represent 28%, and 16% live in urban areas. New variables are introduced in this subsample to respond to research questions 2 and 3. Households that report to receive remittances represent 28%. Another variable is land ownership, categorized as "customary law" and "other types". The customary law includes those who inherited the land from parents or families. Other types include renting, buying and borrowing. Those who inherited the land represent 45% of the households. Finally, while 81% of the household heads responded that they had a secondary job (off-farm), around 46% consider agriculture a business.

For children aged 14 to 18, their age average is close to 16 years. By gender, the sample is split in half, and 71% attend school. Respectively, 30% of adolescents attended/still attending primary education (below grade 5), 34% completed lower-primary, and 37% completed the primary education level. Adolescents who participate into agriculture represent 39%, while those in income generating activities represent 41%. Consistently, household heads' mean age is 42, and 22% are female-headed households. As for educational attainment, 28% of parents did not attend school, 32% have some years of primary, 19% completed primary education, and 22% attained beyond the primary level. Twenty-one percent of the households live above the poverty threshold, and 13% live in urban areas (the lowest in all the subsamples). A little over 1/3 of the households receive remittances, and 46% own land based on inheritance. Four points higher than the full sample, 85% of the household heads have a secondary job, and 43% consider agriculture a business.

Table 4.17 Summary Statistics of All Children (Household Head Has a Secondary Job)

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
School attendance (yes = 1)	1134	0.85	0.36	0	1
Independent variables					
Pupil's age	1134	11.93	3.32	6	18
Female	1134	0.46	0.50	0	1
Contributes to agriculture (yes = 1)	1134	0.14	0.34	0	1
Contributes to income (yes = 1)	1134	0.14	0.35	0	1
Household head's age	1134	42.08	10.09	16	70
Female head	1134	0.22	0.42	0	1
Household head's educational attainment					
No formal education	1134	0.29	0.46	0	1
Some years of primary education	1134	0.30	0.46	0	1
Primary education completed	1134	0.20	0.40	0	1
Post-primary education	1134	0.21	0.41	0	1
Poverty line (above = 1)	1134	0.28	0.45	0	1
HH receives remittance (yes = 1)	1134	0.28	0.45	0	1
Land ownership (customary law = 1)	1134	0.45	0.50	0	1
Land size (ha)	1134	2.20	1.19	1	5
Head has a secondary job (yes = 1)	1134	0.81	0.39	0	1
Farm is business (yes = 1)	1134	0.46	0.50	0	1
Location (urban = 1)	1134	0.16	0.37	0	1

Source: Created by the author based on CGAP data (2015)

Table 4.18 Summary Statistics of Children Aged 14 to 18 (Head Has an Off-Farm Job)

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable					
School attendance (yes = 1)	400	0.71	0.46	0	1
Educational attainment					
Some years of primary education	400	0.30	0.46	0	1
Lower-primary completed	400	0.34	0.47	0	1
Upper-primary completed	400	0.37	0.48	0	1
Independent variables					
Pupil's age	400	15.59	1.41	14	18
Female	400	0.50	0.50	0	1
Contribute to agriculture (yes = 1)	400	0.39	0.49	0	1
Contribute to income (yes = 1)	400	0.41	0.49	0	1
Household head's age	400	42.15	10.17	16	66
Female head	400	0.22	0.42	0	1
Household head's educational attainment					
No formal education	400	0.28	0.45	0	1
Some years of primary education	400	0.32	0.47	0	1
Primary education completed	400	0.19	0.39	0	1
Post-primary education	400	0.22	0.41	0	1
Poverty line (above = 1)	400	0.26	0.44	0	1
HH receives remittance (yes = 1)	400	0.34	0.47	0	1
Land ownership (customary law = 1)	400	0.46	0.50	0	1
Land size (ha)	400	2.06	1.06	1	5
Head has a secondary job (yes = 1)	400	0.85	0.36	0	1
Farm is business (yes = 1)	400	0.43	0.50	0	1
Location (urban = 1)	400	0.13	0.33	0	1

Source: Created by the author based on CGAP data (2015)

CHAPTER 5

RESULTS

5.1 Interpretation of the Proportional Odds Model

The interpretation of the ordinal logit model output on the Stata software is somewhat tricky. Let equation 5.1 be:

$$logit(P(Y \leq j)) = \beta_{j0} + \beta_{j1}x_1 + \cdots + \beta_{jk}x_k \quad (5.1)$$

for $j = 1, J-1,$ and k independent variables. The *parallel lines assumption* dictates that each category has a different intercept. However, the slope coefficients are same across all the categories. Thus, the above equation can be rewritten as:

$$logit(P(Y \leq j)) = \beta_{j0} + \beta_1 x_1 + \cdots + \beta_k x_k \quad (5.2)$$

After running the regression model, Stata parameterizes the ordinal logit model as

$$logit(P(Y \leq j)) = \beta_{j0} - \eta_1 x_1 - \cdots - \eta_k x_k \quad (5.3)$$

where $\eta_1 = -\beta_i$.

Taking the example of research question 1.1, the ordinal outcome of pupils' enrollment, categorized as *never enrolled, dropped out* and *enrolled*, can be predicted by the single independent variable *illiteracy* of the household head (1 if illiterate, and 0 otherwise). Even though the dependent variable has three categories, the parallel lines assumption assures that only two equations are estimated, while keeping the coefficients of the independent variables same. Then, illiterate = 1 and illiterate = 0, will be estimated as:

$$logit\big(P(Y \leq j|\, x_1 = 1)\big) = \beta_{j0} - \eta_1 \quad (5.4)$$

$$logit(P(Y \leq j|x_1 = 0)) = \beta_{j0} \quad (5.5)$$

or

$$logit\big(P(Y \leq j|\, x_1 = 1)\big) - logit(P(Y \leq j|x_1 = 0)) = -\eta_1 \quad (5.6)$$

The interpretation of the results would be: for pupils whose parents are illiterate, the log odds of being ulikely to *never enroll* to school (versus having dropped out or being enrolled) is $-\eta_1$ lower

than literate parents. Even after exponentiating both sides, and applying the property $\log(a) - \log(b) = \log(\frac{b}{a})$, to get the exponential function

$$\frac{P(Y \leq j|x_1 = 1)}{P(Y > j|x_1 = 1)} / \frac{P(Y \leq j|x_1 = 0)}{P(Y > j|x_1 = 0)} = exp(-\eta_1) \tag{5.7}$$

such that the proportional odds assumption after simplification gives $\frac{P(Y \leq j|x_1=1)}{P(Y>j|x_1=1)} = p_1/(p_1)$ and $\frac{P(Y \leq j|x_1=0)}{P(Y>j|x_1=0)} = p_0/(p_0)$, and the following odds ratios

$$\frac{p_1/(1-p_1)}{p_0/(1-p_0)} = exp(-\eta_1) \tag{5.8}$$

the Stata output makes the interpretation still carry a double negation, which increases complexity in explaining and understanding the results. A better approach is to consider the likelihood of pupils being more likely to enroll, such that

$$\begin{aligned} exp(-\eta_1) &= \frac{p_1/(1-p_1)}{p_0/(1-p_0)} \\ &= \frac{p_1/(1-p_0)}{p_0/(1-p_1)} \\ &= \frac{(1-p_0)/p_0}{(1-p_1)/p_1} \\ &= \frac{P(Y > j|x = 0)/P(Y \leq j|x=0)}{P(Y > j|x = 1)/P(Y \leq j|x=1)} \end{aligned} \tag{5.9}$$

Given that $exp(-\eta_1) = \frac{1}{exp(\eta_1)}$, then,

$$\frac{P(Y > j|x = 1)/P(Y \leq j|x=1)}{P(Y > j|x = 0)/P(Y \leq j|x=0)} = exp(\eta) \tag{5.10}$$

By directly exponentiating η, we can interpret the results as odds of being greater than the *j*th threshold. Therefore, in the case of the simplified model of the research question 1.1 given above, we would calculate the odds of pupils being enrolled (versus never been enrolled or having dropped out) when parents are illiterate compared to when they are not. The inverse also could be applied, parents who are literate compared to those who are not. Since on Stata software, all the coefficients of the OLM have positive signs, the interpretation depends on the size of the coefficient. A coefficient less than one (1) would indicate negative odds of the explanatory variable

on the response variable, while a coefficient above one (1) indicates positive odds. Reporting standard errors is irrelevant; instead, the confidence intervals, usually at 95%, are reported.

5.2 Family Characteristics and Pupils' School Enrollment

Table 5.2.1 presents the results for school enrolment estimated with the ordinal logistic method (full sample). As mentioned above, to facilitate the interpretation, all the results are in odds ratios, and the confidence intervals are reported in the brackets. Enrollment has three response categories, namely, pupils who have never enrolled, those who have dropped out of school, and those enrolled. For the three subsample groups, namely all-sample, female-headed households and male-headed households, the results are very similar. The data show that for a one standard deviation increase in pupil's age, the odds of being enrolled decrease. The odds of being enrolled are also lower for girls, compared to boys. Both variables are statistically significant. However, since the effect of the independent variables is same across the categories of the dependent variable, the effect of age and being a girl should be taken with caution. Firstly, the coefficients are very close to 1, which means that their negative effect is not high. Secondly, for the case of age, pupils delay enrollments (at least one to two years after the official entrance age), but as they pass the age 12 they also tend to drop out more often. The odds of being enrolled decrease by almost 90% when the household report to not use Portuguese at home, with the same statistical significance across the three subsamples. Although positively correlate with enrollment, the coefficients of family size, and the age of the household head do not seem to exert a large effect (coefficients close to 1).

Household head's schooling has mixed effects. In the full sample (column 1) and male-headed households (column 3), having finished primary education significantly raises the odds of enrollment, 28% and 27%, respectively. However, although negative, the effect in female-headed households is mostly insignificant (column 2). The bigger effect is observed when the head completes secondary education: 95% increase in odds of enrolling (full sample), 63% in male-headed household, and over doubling odds being enrolled in female-headed households (column 2). In the full sample, compared to male heads, female heads increase the odds of being enrolled by at least 30% (statistically significant). Illiterate heads decrease the odds of enrollment across

all the subsamples: 30% (column 1), 36% (column 2), and 29% (column 3). Compared to farming households, pupils living in household where the head works as a senior official (thereafter representing the group of senior officials, professionals, clerks and managers), or in elementary occupations (thereafter representing elementary occupations, crafts, trade and machine operators) have higher odds of being enrolled, except in female-headed household (insignificant effect). Location of the household does not seem to significant effect on enrollments (columns 1 and 2). The only significant result is in male-headed households where pupils have 13% higher odds of enrolling when living in rural areas. Although no controlled for in all the models, having siblings aged under five years harms enrollments (the variable was estimated as trial in most of the models, the results are consistent). As explained before, we only include spouses' education in male-headed household. In column 3, mothers who completed primary education increase the odds of enrolling by 34%, while those who completed secondary education raise the odds by 75%.

Table 5.2.2 reports results of children's enrollment by location. The inverse u-shape effect of age on never enrolled, enrolled and dropped out is still present. Pupils' age continues to have a negative (statistically significant) but not large influence on enrollment (in both rural and urban areas). Less ambiguous, girls have less odds of enrolling compared to boys: 17% in rural areas, and 15% in urban areas. Pupils that do not speak Portuguese at home have less odds of enrolling too: 90% and 91% in rural and urban areas, respectively. The family size and the age of the household head have insignificant effect on the likelihood of enrollment irrespective of the location of the household. In rural areas, household heads who completed primary education increase the odds of enrollment by 32%, while in urban they increase them by 27%. Having completed secondary education increases the odds even more. Even conservatively, it doubles the likelihood of enrolling in both locations. Consistently, female heads increase the odds of school enrollment, 36% (rural) and 60% (urban). Irrespective of location, illiterate heads harm enrollments. In rural areas, an illiterate head decreases the odds of enrolling by 29%, while in urban areas the effect is even larger (35%). The effect of the head's occupation is somewhat interesting. Maybe because there are fewer senior officials in rural areas, their effect is insignificant, while increasing the odds of enrollment by 46% in urban areas. Conversely, household heads who work in elementary

occupations increase the odds of school enrollment by 21% in rural areas while exerting an unimportant effect on enrollments in urban areas.

Table 5.2.3 presents the results from estimating school enrollment subject to household head's gender and the location of the household. Across all the four columns, the effect of age is similar to what observed before (insignificant effect, because it is close to 1). As for the gender of the pupils, there are mixed results. In rural areas (columns 1 and 2), being a girl lowers the odds of school enrollment by 20% and 19% (female-headed and male-headed households respectively). By 17%, girls have lower odds of enrolling when living in urban areas in male-headed households (column 4). However, when living in female-headed households in urban areas, there is no significant gender differences in terms of school enrollment. The educational attainment of the household head also brings mixed results. Compared to parents with no education or who have some few years of primary education, parents who completed primary education increase the odds of enrollment only in male-headed households (both rural and urban). For female-headed, there is negative effect in rural areas and positive effect in urban areas, but both are insignificant. Having completed secondary education has larger positive coefficients: increases children's school enrollment by 60% and more than 100% in female-headed households, but statistically insignificant (columns 1 and 3). In male-headed households, post-primary education increases the odds of enrollment by 90% (rural), and 48% (urban). Mothers' education in rural areas is positive but statistically insignificant for both having completed primary or secondary education (doubling the odds in the later). In urban areas, mothers who completed secondary education increase more the odds of school enrollment (76%), compared to having completed primary education (47%). Illiterate heads decrease the odds of enrolling in all subsamples (statistically significant): by 35% (column 1), 28% (column 2), 42% column 3), and 33% (column 4). Larger coefficients are observed among female headed households. Since they are fewer senior officials among women or in rural areas, in these two sub-groups being a senior official seems to not have a significant effect. However, among male-head families in urban areas, being a senior official increases the odds of enrolling by 46%. Conversely, among women or urban areas, being in elementary

occupations has insignificant effect on enrollments. For male-headed households in rural areas, however, the variable increases the odds by 23%.

Table 5.2.1 Ordinal Logistic Estimation of Children's Enrollment

VARIABLES	(1) Enrollment *All*	(2) Enrollment *Female HH*	(3) Enrollment *Male HH*
Pupil's age	0.987***	0.952***	0.977***
	[0.981 - 0.993]	[0.941 - 0.963]	[0.970 - 0.984]
Female	0.892***	0.903**	0.817***
	[0.855 - 0.931]	[0.833 - 0.979]	[0.776 - 0.860]
Does not speak Portuguese at home	0.101***	0.091***	0.104***
	[0.096 - 0.106]	[0.083 - 0.101]	[0.098 - 0.111]
Family size	1.079***	1.052***	1.093***
	[1.068 - 1.089]	[1.033 - 1.071]	[1.080 - 1.107]
Household head's age	1.010***	1.008***	1.015***
	[1.008 - 1.012]	[1.005 - 1.012]	[1.013 - 1.017]
Head completed primary education	1.281***	0.978	1.271***
	[1.179 - 1.392]	[0.752 - 1.272]	[1.157 - 1.396]
Head completed secondary education	1.954***	2.220*	1.632***
	[1.530 - 2.494]	[0.993 - 4.967]	[1.237 - 2.155]
Female head	1.367***	--	--
	[1.299 - 1.439]	--	--
Illiterate head	0.700***	0.634***	0.710***
	[0.666 - 0.735]	[0.561 - 0.715]	[0.671 - 0.751]
Senior officials, professionals, clerks & managers	1.322***	0.981	1.407***
	[1.150 - 1.519]	[0.683 - 1.409]	[1.202 - 1.647]
Elementary occupations, crafts, trade and	1.120***	1.055	1.144***

machine operators			
	[1.052 - 1.193]	[0.896 - 1.241]	[1.065 - 1.229]
Rural	1.073**	0.948	1.129***
	[1.009 - 1.142]	[0.840 - 1.070]	[1.047 - 1.217]
Number of children less than 6 years	0.320***	--	--
	[0.288 - 0.355]	--	--
Mother completed primary education	--	--	1.340***
	--	--	[1.155 - 1.555]
Mother completed secondary education	--	--	1.745*
	--	--	[0.998 - 3.051]
Constant cut1	0.185***	0.059***	0.244***
	[0.162 - 0.213]	[0.045 - 0.077]	[0.207 - 0.288]
Constant cut2	0.322***	0.103***	0.408***
	[0.281 - 0.369]	[0.080 - 0.134]	[0.346 - 0.482]
Pseudo R-squared	0.197	0.186	0.196
Observations	48,822	13,211	33,127

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Table 5.2.2 Ordinal Logistic Estimation of Children's Enrollment by Location

VARIABLES	(1) Enrollment *Rural*	(2) Enrolment *Urban*
Pupil's age	0.977***	0.936***
	[0.970 - 0.983]	[0.925 - 0.948]
Female	0.828***	0.854***
	[0.790 - 0.868]	[0.779 - 0.935]
Does not speak Portuguese at home	0.104***	0.087***
	[0.098 - 0.110]	[0.077 - 0.097]
Family size	1.076***	1.099***
	[1.064 - 1.089]	[1.078 - 1.121]
Household head's age	1.012***	1.018***
	[1.010 - 1.014]	[1.014 - 1.022]
Head completed primary education	1.318***	1.271***
	[1.173 - 1.481]	[1.127 - 1.433]
Head completed secondary education	2.076***	2.033***
	[1.282 - 3.361]	[1.523 - 2.714]
Female head	1.364***	1.596***
	[1.289 - 1.444]	[1.419 - 1.795]
Illiterate head	0.709***	0.646***
	[0.672 - 0.748]	[0.572 - 0.730]
Senior officials, professionals, clerks & managers	1.111	1.462***
	[0.906 - 1.364]	[1.198 - 1.784]
Elementary occupations, crafts, trade and machine operators	1.206***	1.049
	[1.113 - 1.306]	[0.940 - 1.169]
Constant cut1	0.176***	0.128***
	[0.152 - 0.204]	[0.096 - 0.169]
Constant cut2	0.290***	0.272***
	[0.250 - 0.335]	[0.206 - 0.358]
Pseudo R-squared	0.165	0.180
Observations	34,614	14,208

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Table 5.2.3 Ordinal Logistic Estimation of Children' School Enrollment by Household Head's Gender and Location

VARIABLES	(1) Enrollment *Rural* *Female HH*	(2) Enrollment *Rural* *Male HH*	(3) Enrollment *Urban* *Female HH*	(4) Enrollment *Urban* *Male HH*
Pupil's age	0.958***	0.985***	0.929***	0.946***
	[0.945 - 0.970]	[0.978 - 0.993]	[0.906 - 0.954]	[0.932 - 0.960]
Female	0.895**	0.812***	0.944	0.834***
	[0.818 - 0.979]	[0.767 - 0.860]	[0.783 - 1.137]	[0.746 - 0.932]
Does not speak Portuguese at home	0.090***	0.109***	0.096***	0.085***
	[0.080 - 0.100]	[0.101 - 0.117]	[0.076 - 0.121]	[0.074 - 0.098]
Family size	1.066***	1.081***	1.013	1.126***
	[1.045 - 1.088]	[1.066 - 1.097]	[0.977 - 1.051]	[1.098 - 1.154]
Household head's age	1.009***	1.014***	1.004	1.021***
	[1.005 - 1.013]	[1.011 - 1.016]	[0.996 - 1.013]	[1.016 - 1.027]
Head completed primary education	0.782	1.384***	1.025	1.182**
	[0.511 - 1.199]	[1.218 - 1.572]	[0.725 - 1.449]	[1.026 - 1.362]
Head completed secondary education	1.602	1.905**	2.318	1.476**
	[0.394 - 6.517]	[1.110 - 3.270]	[0.847 - 6.343]	[1.059 - 2.056]
Mother completed primary education	--	1.185	--	1.467***
	--	[0.892 - 1.576]	--	[1.226 - 1.756]

Mother completed secondary education	--	2.381	--	1.763*
	--	[0.454 - 12.478]	--	[0.968 - 3.209]
Illiterate head	0.652***	0.718***	0.582***	0.677***
	[0.566 - 0.751]	[0.675 - 0.762]	[0.460 - 0.736]	[0.581 - 0.789]
Senior officials, professionals, clerks & managers	0.802	1.175	1.137	1.466***
	[0.452 - 1.423]	[0.936 - 1.475]	[0.703 - 1.836]	[1.159 - 1.853]
Elementary occupations, crafts, trade and machine operators	1.056	1.225***	1.088	1.013
	[0.817 - 1.365]	[1.122 - 1.336]	[0.875 - 1.354]	[0.886 - 1.158]
Constant cut1	0.075***	0.225***	0.027***	0.196***
	[0.057 - 0.099]	[0.188 - 0.269]	[0.015 - 0.046]	[0.139 - 0.276]
Constant cut2	0.127***	0.360***	0.056***	0.397***
	[0.097 - 0.167]	[0.301 - 0.430]	[0.033 - 0.096]	[0.283 - 0.558]
Pseudo R-squared	0.171	0.165	0.151	0.197
Observations	9,766	23,265	3,445	9,862

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Table 5.2.4 summarizes the results of estimating pupils' school enrollment grouped by the head's occupation. Pupils' age has the same u-shaped relationship with enrollment. Among officials, gender differences are inexistent (column 1). Respectively, in agriculture and elementary occupations households, being a girl decreases the odds of school enrollment by 16% and 20%. Not using Portuguese at home harms enrollment almost equally: odds of 92% (senior officials), 90% (farmers), and 91% (elementary activities). Family size seems to significantly increase the odds of enrollment among the household where the head works as a senior official. Heads who completed primary education increase the odds by 48% (column 1), 19% (column 2), and 41% (column 3). Larger positive effect is observed when the heads has secondary education. Senior officials increase the odds by 127%, farmers by 86%, and elementary occupations by 99%. Female heads consistently outperform their male counterparts, especially among farmers (40%), and elementary occupations (54%). Being an illiterate head decreases the odds of school enrollment by 50% (senior officials), 69% (farmers), and 74% (elementary occupations). Coming from rural areas does not significantly influence enrollment among senior officials and farmers, but it does increase the odds when living in elementary officials' households.

Since the study focus on examining smallholders, the next models estimate the school enrollment behavior only in families that depend on agriculture. Table 5.2.5 is a summary of the results for the entire sample (column 1), female-headed households (column 2), and male-headed households (column 3). Pupils' age has an insignificant effect (especially in the full sample). Among female-headed households, pupils enroll (or do not) equally, irrespective of their gender (column 2). However, among male-headed households, girls enroll less (column 3). Not using Portuguese at home decrease the odds of enrollment by 91% (female heads) and 90% (both full sample and male heads). Among farmers, female heads who complete primary education do not seem to better those who did not. This might mean that the level of education attainment among female heads in households living on agriculture is low, because none of them has post-primary education. However, among male headed households, a head who finished primary education increases the odds of enrollment by 28%. Even though positive, secondary education of the male

heads and of mothers has non-statistical significance. Mothers who complete primary schooling increase the odds of children's enrollment by 36%. Illiteracy among farming households is more harmful on enrollment if a female head (decreasing odds of 60%), compared to less than half if male head (decreasing odds of 29%). The location of the households seems to play an insignificant role in terms of difference in enrollment behavior of children dependent on farming activities. Across all the households, children less than six years prevent their siblings from enrolling, decreasing their odds by 68% (full sample), 72% (female-headed households), and 67% (male-headed households). Although not far from each other, the coefficient for children living under female heads is larger.

Table 5.2.6 presents the estimation for children's enrollment in the sample of households where the head works in elementary occupations. The first thing to note is that women and rural areas are less represented in these activities. The data does not reveal information far from the already estimated. One result worth mentioning is that girls significantly enroll less if living in rural areas or male-headed households. There are no significant enrollment differences in urban areas by the pupils' gender. The opposite occurs among the female-headed households: girls significantly have almost 30% higher odds of enrolling than boys. Not using Portuguese continues to be the more significant negative variable, with an average of 90% less odds of not being enrolled or having dropped out. Parental education is significantly associated with the probability of enrolling, especially if the head has primary education in rural areas. Female heads consistently outperform their male counterparts. Living in female-headed households increases the odds of enrollment. Children under a female head in urban areas have 64% higher odds of enrolling than their peers under male heads.

The result in rural areas is weak due to the small representation of female heads in elementary occupations but still is positive. Mother's education in male-headed households continues to have more significant coefficients of parental education. Another interesting finding is that in elementary occupations' households, the location goes from non-significant among female heads to rural children enrolling more than their peers from urban areas in the whole sample and among male-headed households, by at least 20% higher odds. When the head's gender and

location subcategorize the estimations, girls are more likely to enroll in female-headed households (statistically significant in rural areas). Equally significant, girls enroll less in rural me-headed households. However, in urban male-headed households, there are no significant gender differences. Head's illiteracy is negative across the four subsamples but insignificant among female heads.

Next, we report the results for children's enrollment in households where the heads work as senior officials or in other professional activities (Table 5.2.7). This category has fewer rural workers and women than in elementary occupations. For example, it was impossible to estimate the female-headed households under the official category due to the sample size. The data indicate that children in these households enroll almost equally, and girls tend to enroll more. In officials' activities, post-primary seems to be the best parental education level that predicts offspring's enrollment likelihood. Mother's education continues to be significant, even completing only primary education. The strong effect that female heads had on predicting the probability of enrollment disappears, although it is still positive on average. The effect of location is also weak, negative by insignificant.

Table 5.2.4 Ordinal Logistic Estimation of Children' School Enrollment by Household Head's Occupation

VARIABLES	(1) Enrollment *Officials*	(2) Enrollment *Agriculture*	(3) Enrollment *Elementary*
Pupil's age	0.900***	0.980***	0.932***
	[0.870 - 0.931]	[0.974 - 0.987]	[0.920 - 0.944]
Female	0.955	0.838***	0.795***
	[0.749 - 1.218]	[0.799 - 0.879]	[0.723 - 0.875]
Does not speak Portuguese at home	0.078***	0.103***	0.092***
	[0.057 - 0.106]	[0.097 - 0.109]	[0.082 - 0.104]
Family size	1.138***	1.072***	1.099***
	[1.081 - 1.198]	[1.060 - 1.084]	[1.076 - 1.123]
Household head's age	1.008	1.011***	1.025***
	[0.996 - 1.021]	[1.009 - 1.013]	[1.020 - 1.030]
Head completed primary education	1.478**	1.189***	1.412***
	[1.092 - 2.000]	[1.052 - 1.344]	[1.246 - 1.599]
Head completed secondary education	2.272***	1.863	1.986***
	[1.579 - 3.268]	[0.737 - 4.714]	[1.257 - 3.138]
Female head	1.130	1.389***	1.535***
	[0.795 - 1.605]	[1.315 - 1.468]	[1.324 - 1.780]
Illiterate head	0.495***	0.687***	0.742***
	[0.307 - 0.799]	[0.651 - 0.726]	[0.657 - 0.839]
Rural	0.826	1.024	1.181***
	[0.633 - 1.078]	[0.945 - 1.108]	[1.058 - 1.317]
Constant cut1	0.043***	0.172***	0.154***
	[0.019 - 0.094]	[0.147 - 0.202]	[0.117 - 0.203]
Constant cut2	0.105***	0.281***	0.330***
	[0.048 - 0.229]	[0.239 - 0.329]	[0.251 - 0.434]
Pseudo R-squared	0.178	0.166	0.179
Observations	2,841	34,175	11,806

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Table 5.2.5 Ordinal Logistic Estimation of Children' School Enrollment in Agricultural Households

VARIABLES	(1) Enrollment *All*	(2) Enrollment *Female HH*	(3) Enrollment *Male HH*
Pupil's age	0.999	0.974***	1.014***
	[0.992 - 1.006]	[0.962 - 0.986]	[1.005 - 1.023]
Female	0.890***	0.937	0.879***
	[0.848 - 0.934]	[0.859 - 1.022]	[0.828 - 0.934]
Does not speak Portuguese at home	0.104***	0.093***	0.107***
	[0.098 - 0.110]	[0.084 - 0.103]	[0.100 - 0.116]
Family size	1.066***	1.047***	1.075***
	[1.054 - 1.078]	[1.027 - 1.067]	[1.059 - 1.091]
Household head's age	1.008***	1.005***	1.009***
	[1.006 - 1.010]	[1.001 - 1.008]	[1.007 - 1.012]
Female head	1.352***	--	--
	[1.279 - 1.428]	--	--
Illiterate head	0.687***	0.595***	0.707***
	[0.651 - 0.726]	[0.520 - 0.681]	[0.664 - 0.752]
Head completed primary education	1.209***	0.722*	1.275***
	[1.069 - 1.368]	[0.491 - 1.062]	[1.112 - 1.461]
Head completed secondary education	1.738	--	1.628
	[0.687 - 4.396]	--	[0.623 - 4.255]
Mother completed primary education	--	--	1.361*
	--	--	[0.983 - 1.883]
Mother completed secondary education	--	--	1.287
	--	--	[0.192 - 8.646]
Rural	1.008	0.953	1.035
	[0.930 - 1.092]	[0.834 - 1.090]	[0.932 - 1.149]

Number of children less than 6 years	0.323***	0.277***	0.328***
	[0.284 - 0.367]	[0.213 - 0.361]	[0.283 - 0.381]
Constant cut1	0.175***	0.062***	0.250***
	[0.149 - 0.205]	[0.047 - 0.082]	[0.204 - 0.306]
Constant cut2	0.286***	0.105***	0.395***
	[0.244 - 0.336]	[0.079 - 0.139]	[0.323 - 0.483]
Pseudo R-squared	0.172	0.177	0.170
Observations	34,175	11,018	21,654

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Table 5.2.6 Ordinal Logistic Estimation of Children' School Enrollment in Elementary Occupations' Households

VARIABLES	(1) Enrollment *All*	(2) Enrollment *Female HH*	(3) Enrollment *Male HH*	(4) Enrollment *Rural*	(5) Enrollment *Urban*
Pupil's age	0.954***	0.918***	0.964***	0.960***	0.951***
	[0.941 - 0.967]	[0.882 - 0.954]	[0.950 - 0.979]	[0.939 - 0.980]	[0.935 - 0.968]
Female	0.875***	1.291*	0.833***	0.766***	0.961
	[0.794 - 0.965]	[0.979 - 1.703]	[0.746 - 0.930]	[0.659 - 0.890]	[0.846 - 1.092]
Does not speak Portuguese at home	0.092***	0.080***	0.094***	0.108***	0.079***
	[0.081 - 0.103]	[0.056 - 0.115]	[0.082 - 0.107]	[0.091 - 0.128]	[0.067 - 0.094]
Family size	1.099***	1.095***	1.103***	1.096***	1.099***
	[1.076 - 1.123]	[1.034 - 1.160]	[1.076 - 1.131]	[1.057 - 1.135]	[1.070 - 1.129]
Household head's age	1.021***	1.031***	1.019***	1.016***	1.026***
	[1.017 - 1.026]	[1.016 - 1.045]	[1.014 - 1.025]	[1.009 - 1.023]	[1.019 - 1.033]
Female head	1.479***	--	--	1.197	1.641***
	[1.274 - 1.716]	--	--	[0.919 - 1.558]	[1.366 - 1.971]
Illiterate head	0.757***	0.778	0.743***	0.819**	0.695***
	[0.669 - 0.856]	[0.570 - 1.062]	[0.646 - 0.855]	[0.695 - 0.966]	[0.577 - 0.837]
Head completed primary education	1.414***	1.504*	1.317***	1.649***	1.347***
	[1.247 - 1.604]	[0.980 - 2.307]	[1.139 - 1.522]	[1.262 - 2.154]	[1.165 - 1.558]
Head completed secondary education	1.808**		1.298	1.536	1.797**
	[1.145 - 2.855]		[0.798 - 2.113]	[0.328 - 7.191]	[1.112 - 2.906]
Mother completed primary education	--	--	1.261**	--	--

	--	--	[1.040 - 1.529]	--	--
Mother completed secondary education	--	--	5.151**	--	--
	--	--	[1.240 - 21.403]	--	--
Rural	1.204***	0.902	1.265***	--	--
	[1.078 - 1.345]	[0.656 - 1.241]	[1.117 - 1.432]	--	--
Number of children less than 6 years	0.316***	0.199***	0.313***	0.329***	0.307***
	[0.260 - 0.385]	[0.109 - 0.366]	[0.252 - 0.388]	[0.242 - 0.447]	[0.238 - 0.396]
Constant cut1	0.172***	0.091***	0.190***	0.139***	0.180***
	[0.130 - 0.227]	[0.042 - 0.199]	[0.138 - 0.260]	[0.091 - 0.214]	[0.125 - 0.259]
Constant cut2	0.374***	0.242***	0.387***	0.265***	0.437***
	[0.284 - 0.492]	[0.112 - 0.523]	[0.283 - 0.529]	[0.173 - 0.406]	[0.305 - 0.627]
Pseudo R-squared	0.187	0.163	0.196	0.181	0.165
Observations	11,806	1,739	9,257	3,905	7,901

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Table 5.2.7 Ordinal Logistic Estimation of Children' School Enrollment in Senior Officials' Households

VARIABLES	(1) Enrollment *All*	(2) Enrollment *Female HH*	(3) Enrollment *Male HH*	(4) Enrollment *Rural*	(5) Enrollment *Urban*	(6) Enrollment *Male HH (rural)*	(7) Enrollment *Female HH (urban)*	(8) Enrollment *Male HH (urban)*
Pupil's age	0.916***	0.959	0.917***	0.945**	0.895***	0.946*	0.899*	0.899***
	[0.884 - 0.949]	[0.866 - 1.063]	[0.881 - 0.955]	[0.894 - 0.998]	[0.854 - 0.938]	[0.889 - 1.005]	[0.797 - 1.014]	[0.850 - 0.951]
Female	1.031	0.972	1.094	0.907	1.139	1.100	1.291	1.045
	[0.805 - 1.322]	[0.449 - 2.101]	[0.827 - 1.449]	[0.617 - 1.335]	[0.822 - 1.580]	[0.716 - 1.688]	[0.556 - 3.000]	[0.705 - 1.549]
Does not speak Portuguese at home	0.079***	0.033***	0.092***	0.113***	0.052***	0.121***	0.029***	0.064***
	[0.058 - 0.108]	[0.011 - 0.099]	[0.065 - 0.130]	[0.075 - 0.170]	[0.033 - 0.084]	[0.075 - 0.193]	[0.006 - 0.137]	[0.038 - 0.108]
Family size	1.144***	1.152**	1.121***	1.043	1.214***	1.038	1.179*	1.170***
	[1.086 - 1.205]	[1.001 - 1.326]	[1.054 - 1.192]	[0.959 - 1.135]	[1.135 - 1.299]	[0.937 - 1.149]	[0.990 - 1.404]	[1.078 - 1.271]
Household head's age	1.004	0.989	1.010	1.005	1.009	1.009	1.016	1.019*
	[0.991 - 1.017]	[0.952 - 1.029]	[0.995 - 1.026]	[0.986 - 1.025]	[0.991 - 1.027]	[0.986 - 1.032]	[0.969 - 1.065]	[0.997 - 1.041]
Female head	1.103	--	--	0.909	1.232	--	--	--
	[0.77 - 1.56]			[0.48 - 1.70]	[0.80 - 1.91]	--	--	--
Illiterate head	0.482***	0.551	0.463**	0.522*	0.432**	0.682	2.201	0.281***
	[0.29 - 0.78]	[0.15 - 2.01]	[0.26 - 0.83]	[0.27 - 1.01]	[0.207 - 0.9]	[0.303 - 1.53]	[0.299 - 16.195]	[0.119 - 0.666]
Head completed primary education	1.435**	0.806	1.389*	1.619**	1.276	1.893**	2.184	0.969
	[1.058 - 1.947]	[0.280 - 2.319]	[0.989 - 1.953]	[1.031 - 2.543]	[0.838 - 1.941]	[1.162 - 3.084]	[0.768 - 6.214]	[0.586 - 1.601]
Head completed secondary education	2.147***	--	1.687**	2.515***	1.947***	2.630**	4.870**	1.184
	[1.489 - 3.097]	--	[1.095 - 2.600]	[1.325 - 4.774]	[1.219 - 3.109]	[1.233 - 5.611]	[1.326 - 17.894]	[0.661 - 2.123]
Mother completed	--	--	1.736***	--	--	1.190	--	2.079***

primary education								
	--	--	[1.183 - 2.548]	--	--	[0.536 - 2.644]	--	[1.329 - 3.251]
Rural	0.850	0.839	0.926	--	--	--	--	--
	[0.650 - 1.111]	[0.335 - 2.100]	[0.681 - 1.259]			--		--
Number of children less than 6 years	0.336***	0.123**	0.390***	0.392**	0.228***	0.384**	0.066***	0.333**
	[0.191 - 0.591]	[0.018 - 0.823]	[0.211 - 0.722]	[0.184 - 0.838]	[0.098 - 0.531]	[0.175 - 0.847]	[0.011 - 0.398]	[0.121 - 0.919]
Constant cut1	0.046***	0.021***	0.066***	0.058***	0.048***	0.085***	0.060**	0.065***
	[0.021 - 0.100]	[0.002 - 0.212]	[0.027 - 0.161]	[0.018 - 0.190]	[0.017 - 0.136]	[0.023 - 0.312]	[0.004 - 0.813]	[0.019 - 0.225]
Constant cut2	0.113***	0.064**	0.151***	0.130***	0.131***	0.186**	0.229	0.157***
	[0.052 - 0.246]	[0.006 - 0.623]	[0.063 - 0.364]	[0.040 - 0.418]	[0.046 - 0.369]	[0.051 - 0.672]	[0.018 - 2.981]	[0.046 - 0.535]
Pseudo R-squared	0.183	0.226	0.178	0.178	0.156	0.170	0.169	0.167
Observations	2,841	317	2,216	792	2,049	655	350	1,416

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

The next table 5.2.8 presents the estimation results of enrollment among farming households by location. The results seem to reinforce that by location, the attitude of farmers toward education is similar. Pupils' age has negligent effect. While among farmers living in urban areas there is no statistical significance, girls have 21% higher odds of not being enrolled in both locations. A similar effect is observed when pupils do not speak Portuguese at home (decreasing odds of at least 90%). Completing primary education seems to have larger significant effect on enrollment among farmers living in rural areas, but the magnitude of the effect is inversed when the head completes secondary education (doubling the odds in urban areas). Female heads outperform male heads in both locations: 34% (rural) and 50% (urban). By a difference of seven percentage points, illiterate heads in rural areas decrease more the odds of enrollment (30%). Close to this magnitude of negative effect is when the household has at least one child under six years of age. It decreases the odds of enrollment for sibling by 67% in rural areas, and 71% in urban areas.

Table 5.2.9 is the last reporting results of family characteristics and school enrollment among farming households by the gender of the head and location. The age of the pupils continues to be insignificant predictor of enrollment, although it is clear that younger children tend to enroll less. Girls and boys also do not differ in terms of the decision to enroll when living under a female head (columns 1 and 3). But under male heads, girls enroll less, especially statistically significant in rural areas. Not using Portuguese has a similar magnitude of decreasing enrollments: 91% (female heads in rural areas), 90% (female heads in urban areas), and 11% for either location of male-headed families. What drives female-headed households to enroll does not seem to be the head's educational attainment. Primary education decreases the odds of enrolling pupils in school, even more so in female-headed households located in urban areas (44% versus 25%). Among male heads, primary education prediction of children's school participation is highly statistically significant in rural areas (column 2), while post-primary has a larger magnitude of the coefficient in urban areas (column 4). In male headed households, mothers' educational attainment (both primary and secondary) seem to not have any significant effect. This is interesting because mothers living with male heads in rural areas are more educated than female heads, even those located in urban areas. Due to data limitation, the highest mothers' educational attainment in urban areas is

primary education. Unlike in rural areas, in urban, it significantly increases the odds of enrollment by well over 100% (doubling effect). An illiterate head has larger negative influence among women. Illiterate female heads decrease the odds of school enrollment by 36% (rural) and 54% (urban), compared to 29% and 26% among illiterate male heads located in rural and urban areas, respectively. Finally, among farmers, children less than six years old decrease the odds of enrollment, and the effect is larger in urban areas. It might be because the cost of living is higher, or because parents tend to wander far from home in their income generating activities or even when farming. In rural areas normally, farming areas are located in the surroundings of the households, and therefore, adults can closely monitor younger children.

Table 5.2.8 Ordinal Logistic Estimation of Children' School Enrollment in Agricultural Households by Location

VARIABLES	(1) Enrollment *Rural*	(2) Enrollment *Urban*
Pupil's age	1.000	0.987
	[0.993 - 1.008]	[0.966 - 1.008]
Female	0.891***	0.885
	[0.847 - 0.937]	[0.761 - 1.029]
Does not speak Portuguese at home	0.103***	0.105***
	[0.097 - 0.110]	[0.089 - 0.125]
Family size	1.067***	1.060***
	[1.055 - 1.080]	[1.027 - 1.095]
Household head's age	1.008***	1.005*
	[1.006 - 1.010]	[0.999 - 1.011]
Head completed primary education	1.226***	1.144
	[1.068 - 1.407]	[0.868 - 1.509]
Head completed secondary education	1.569	2.069
	[0.505 - 4.876]	[0.403 - 10.633]
Female head	1.337***	1.495***
	[1.261 - 1.419]	[1.268 - 1.764]
Illiterate head	0.695***	0.628***
	[0.656 - 0.736]	[0.529 - 0.745]
Number of children less than 6 years	0.332***	0.289***
	[0.288 - 0.381]	[0.208 - 0.400]
Constant cut1	0.181***	0.122***
	[0.155 - 0.212]	[0.079 - 0.188]
Constant cut2	0.293***	0.220***
	[0.251 - 0.342]	[0.143 - 0.337]
Pseudo R-squared	0.165	0.186
Observations	29,917	4,258

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Table 5.2.9 Ordinal Logistic Estimation of Children' School Enrollment in Agricultural Households by Household Head's Gender

VARIABLES	(1) Enrollment *Rural* *Female HH*	(2) Enrollment *Rural* *Male HH*	(3) Enrollment *Urban* *Female HH*	(4) Enrollment *Urban* *Male HH*
Pupil's age	0.974***	1.015***	0.974	1.004
	[0.961 - 0.987]	[1.006 - 1.024]	[0.940 - 1.009]	[0.975 - 1.033]
Female	0.930	0.881***	0.980	0.860
	[0.848 - 1.021]	[0.828 - 0.939]	[0.767 - 1.254]	[0.702 - 1.054]
Does not speak Portuguese at home	0.089***	0.108***	0.108***	0.098***
	[0.080 - 0.100]	[0.100 - 0.117]	[0.082 - 0.143]	[0.078 - 0.123]
Family size	1.061***	1.071***	0.983	1.107***
	[1.039 - 1.084]	[1.055 - 1.088]	[0.937 - 1.032]	[1.056 - 1.161]
Household head's age	1.007***	1.009***	0.996	1.009**
	[1.003 - 1.010]	[1.007 - 1.012]	[0.986 - 1.006]	[1.001 - 1.018]
Illiterate head	0.636***	0.705***	0.459***	0.737***
	[0.548 - 0.737]	[0.661 - 0.753]	[0.328 - 0.642]	[0.593 - 0.917]
Head completed primary education	0.758	1.297***	0.563*	1.173
	[0.459 - 1.253]	[1.115 - 1.507]	[0.300 - 1.056]	[0.842 - 1.635]

Head completed secondary education	--	1.427	--	2.023
	--	[0.437 - 4.661]	--	[0.350 - 11.706]
Mother completed primary education	--	1.132	--	2.187**
	--	[0.772 - 1.660]	--	[1.122 - 4.262]
Mother completed secondary education	--	1.197	--	--
	--	[0.171 - 8.400]		
Number of children less than 6 years	0.301***	0.332***	0.223***	0.320***
	[0.225 - 0.402]	[0.283 - 0.391]	[0.119 - 0.415]	[0.216 - 0.476]
Constant cut1	0.077***	0.241***	0.025***	0.246***
	[0.058 - 0.102]	[0.198 - 0.292]	[0.012 - 0.050]	[0.138 - 0.438]
Constant cut2	0.129***	0.378***	0.045***	0.422***
	[0.098 - 0.172]	[0.311 - 0.458]	[0.022 - 0.092]	[0.237 - 0.750]
Pseudo R-squared	0.173	0.162	0.158	0.211
Observations	9,290	19,307	1,728	2,346

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

5.3 Households Characteristics and Educational Attainment

This section summarizes the estimation results for family characteristics on children's educational attainment. Table 5.3.1 presents the results for the full sample, male and female-headed households. Educational attainment has three response categories: some primary completed, lower-primary completed, and upper-primary completed (in the sample of pupils aged 12 and 13, the categories include *no education* as first, and exclude upper-secondary). The interpretation of the results, like in enrollments, will be done in terms of the likelihood of completing all the grades of primary education (versus some years of education or lower-primary education). The data shows that up to 13 years, the number of children who completed lower-primary is significantly small, therefore, we only estimate attainment for the older group (aged 14-18 years). One standard deviation increase in pupil's age increases the odds of completing primary education by 13% in the full sample (column 1), and 16% in both female and male-headed households (column 2 and 3). By 22% (column 1 and 3) and 20% (column 2), being a girl significantly decreases the odds of attaining the highest grade of primary education. As seen in the results of enrollment, not using Portuguese at home significantly harms attainment. It decreases the odds of completing primary education by 95% (full sample and male-headed households) and 96% (female-headed households).

Consistent with the first results, a one standard deviation change in family size or age of the household does not significantly affect education attainment. Compared to those with few years of primary to no education, family heads who completed primary education significantly increase the odds of completing primary education. The coefficients are 91% for the full sample, 64% among female heads, and 56% among male heads. The coefficients of the full sample and female-headed households are even larger when parents complete secondary education, almost tripling and over double respectively. For male-headed households the increase in odds after completing secondary education has 62% magnitude. Also, in male-headed households, mothers' educational attainment seems to predict better offspring's schooling success. Mothers who complete primary education increase the odds of finishing primary education by over doubling effect, while those who finish secondary education quadruple the odds of finishing primary for the offspring. Children

living with female heads outperform their peers under male heads. Female heads increase the likelihood of finishing the primary cycle by 67%. Unsurprisingly, illiterate heads decrease pupil's odds of attaining upper primary. The coefficients are larger among female-headed households (54%) compared to those among the male-headed households (32%). Children whose family head is a senior official, have 69%, 30% and 75% higher odds of finishing upper-primary in the full sample, female-headed, and male-headed households, respectively. Compared to those dependent on agriculture, children whose household head is employed in elementary occupations also have higher odds of attaining more years of schooling: 30% (column 1), 26% (column 2), and 29% (column 3). Children from rural areas have 35% lower odds of finishing primary when living with a male head, and 36% when living with a female head.

The results from the subsamples by region (Table 5.3.2) are not far from the presented above. Pupils' age significantly increases the odds of attaining upper-primary level, especially in urban areas. The significant negative effect of gender is observed in rural areas, where girls have 21% lower odds of finishing primary education. But female heads continue to increase the odds of attaining more years of schooling, for a solid 59% in rural areas, and 81% in urban areas. Not speaking Portuguese at home gives pupils 94% odds of not attaining primary education, irrespective of the location of their household. The education attainment of the household head significantly predicts schooling, even more so in rural areas. In rural areas, primary education completion doubles the odds, while secondary education completion more than triples the odds of educational success. in urban areas, heads who complete primary education increase the odds by 68%, while heads who complete secondary more than double the odds of the offspring successfully finishing primary. Because more educated parents help the odds of school performance, illiterate heads consistently score negative in the model. Finally, by occupation, compared to agricultural families, heads working as senior officials increase the odds of attaining primary by 40% in rural areas, and more than double that in urban areas. Elementary occupations are inconsistent with the results from enrollments. In the case of educational attainment, they predict better in urban areas (40% higher odds against farmers) than in rural areas (16% higher odds).

Table 5.3.1 Ordinal Logistic Estimation of Children's Attainment (Aged 14-18 Years)

VARIABLES	(1) Attainment *All*	(2) Attainment *Female HH*	(3) Attainment *Male HH*
Pupil's age	1.131***	1.161***	1.116***
	[1.106 - 1.157]	[1.113 - 1.21]	[1.086 - 1.148]
Female	0.777***	0.797***	0.778***
	[0.729 - 0.829]	[0.706 - 0.89]	[0.718 - 0.843]
Does not speak Portuguese at home	0.046***	0.036***	0.053***
	[0.042 - 0.052]	[0.029 - 0.04]	[0.046 - 0.060]
Family size	1.062***	1.048***	1.071***
	[1.048 - 1.075]	[1.023 - 1.07]	[1.054 - 1.089]
Household head's age	1.016***	1.015***	1.019***
	[1.013 - 1.019]	[1.010 - 1.02]	[1.015 - 1.022]
Head completed primary education	1.907***	1.642***	1.560***
	[1.715 - 2.121]	[1.222 - 2.20]	[1.379 - 1.765]
Head completed secondary education	2.918***	2.455**	1.617***
	[2.316 - 3.677]	[1.222 - 4.93]	[1.226 - 2.134]
Mother completed primary education	--	--	2.736***
	--	--	[2.308 - 3.244]
Mother completed secondary education	--	--	4.432***
	--	--	[2.646 - 7.424]
Female head	1.670***	--	--
	[1.546 - 1.803]	--	--
	--	--	[2.646 - 7.424]
Illiterate head	0.613***	0.460***	0.675***
	[0.567 - 0.663]	[0.392 - 0.54]	[0.614 - 0.742]
Senior officials, professionals, clerks & managers	1.693***	1.289	1.746***

	[1.439 - 1.992]	[0.867 - 1.91]	[1.444 - 2.110]
Elementary occupations, crafts, trade and machine operators	1.298***	1.260**	1.294***
	[1.188 - 1.418]	[1.034 - 1.53]	[1.166 - 1.438]
Rural	0.613***	0.641***	0.652***
	[0.563 - 0.666]	[0.546 - 0.75]	[0.588 - 0.724]
Constant cut1	0.554***	0.338***	0.639*
	[0.367 - 0.837]	[0.158 - 0.72]	[0.383 - 1.066]
Constant cut2	10.304***	6.621***	11.708***
	[6.860 - 15.476]	[3.124 - 14.0]	[7.053 - 19.43]
Constant cut3	66.975***	43.860***	79.776***
	[44.307 - 101.24]	[20.48 - 93.9]	[47.635 - 133.602]
Pseudo R-squared	0.236	0.226	0.246
Observations	14,278	3,880	9,491

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Table 5.3.2 Ordinal Logistic Estimation of Children's Attainment by Location

VARIABLES	(1) Attainment *Rural*	(2) Attainment *Urban*
Pupil's age	1.075***	1.258***
	[1.046 - 1.105]	[1.210 - 1.307]
Female	0.709***	0.917
	[0.655 - 0.768]	[0.823 - 1.022]
Does not speak Portuguese at home	0.043***	0.039***
	[0.038 - 0.048]	[0.030 - 0.049]
Family size	1.065***	1.048***
	[1.048 - 1.083]	[1.027 - 1.070]
Household head's age	1.013***	1.024***
	[1.010 - 1.016]	[1.019 - 1.029]
Head completed primary education	2.093***	1.679***
	[1.759 - 2.491]	[1.465 - 1.925]
Head completed secondary education	3.628***	2.482***
	[2.194 - 5.997]	[1.904 - 3.235]
Female head	1.593***	1.813***
	[1.450 - 1.751]	[1.584 - 2.076]
Illiterate head	0.671***	0.469***
	[0.613 - 0.735]	[0.399 - 0.551]
Senior officials, professionals, clerks & managers	1.356**	1.860***
	[1.021 - 1.802]	[1.504 - 2.300]
Elementary occupations, crafts, trade and machine operators	1.157**	1.400***
	[1.024 - 1.307]	[1.222 - 1.604]
Constant cut1	0.299***	6.633***
	[0.181 - 0.493]	[3.289 - 13.376]
Constant cut2	6.665***	72.957***
	[4.066 - 10.926]	[36.428 - 146.115]
Constant cut3	49.166***	438.750***
	[29.713 - 81.354]	[216.167 - 890.523]
Pseudo R-squared	0.226	0.150
Observations	9,564	4,714

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Table 5.3.3 summarizes the results for children attainment by the gender of the head and location of the household. For both male and female-headed households in rural areas, pupils' age does not seem to exert a significant effect. In urban areas, however, the age significantly increases the odds of attaining upper-primary level, especially for pupils living with female heads. Compared to boys, girls attain fewer years in rural areas: 27% negative odds when living with female heads, and 30% when living with male heads. However, among female or male-headed households in urban areas, boys and girls attain higher levels of primary education equally. Not speaking Portuguese at home seems to be the most negative variable. It decreases the odds of educational success by 97% (female heads in both rural and urban areas), 95% (male heads in rural areas), and 96% (male heads in urban areas). As seen in the results above, the education attainment of the household head significantly predicts schooling, especially in rural areas. In rural areas, primary education completion triples the odds of finishing primary education in households headed by women, while increasing the odds by 68% among heads headed by men. In urban areas, parents who complete primary education increase the odds by at least 36%. Probably because female heads in rural areas are less educated, secondary education completion does seem to harm educational attainment (though not statistically significant even at 10% significance level). Female heads who finished secondary education in urban areas more than triples the odds of offspring's educational success. For male heads, finishing secondary while located in rural areas increase the odds by 78%, and, in urban areas, it increases the odds by 41%.

Being an illiterate negatively affects schooling, especially in female-headed households (decreasing odds of 52% in rural areas, and 58% in urban areas) and male-headed households in urban areas (52%). The effect of mothers who complete primary education on offspring's education attainment is four times increase in odds in rural areas, and at least two times in urban areas. When they complete secondary education, the result is even more astounding: a fourteen-fold increase in odds for pupils in rural areas, and 3.6 times increase of the odds in urban areas. Children living with male heads seem to be the least affected (negative odds of around 26%). Although all coefficients are positive, heads working as senior officials have larger positive influence among male heads: 46% increase in odds of attaining primary in rural areas, and double

increase in odds in urban areas. For the case of elementary occupations, 30% increase in odds of attaining primary education in (female heads in rural areas), and 52% increase in odds for pupils living with male heads in urban areas. The results for male heads in rural areas and female heads in urban areas seem to be non-significant.

Table 5.3.3 Ordinal Logistic Estimation of Children's Attainment by Household Head's Gender and Location (Aged 14-18 Years)

VARIABLES	(1) Attainment *Rural* *Female HH*	(2) Attainment *Rural* *Male HH*	(3) Attainment *Urban* *Female HH*	(4) Attainment *Urban* *Male HH*
Pupil's age	1.097***	1.059***	1.319***	1.244***
	[1.042 - 1.155]	[1.023 - 1.095]	[1.220 - 1.425]	[1.186 - 1.305]
Female	0.733***	0.698***	0.954	0.925
	[0.632 - 0.850]	[0.631 - 0.772]	[0.770 - 1.182]	[0.808 - 1.059]
Does not speak Portuguese at home	0.034***	0.049***	0.031***	0.043***
	[0.027 - 0.044]	[0.042 - 0.056]	[0.019 - 0.051]	[0.032 - 0.058]
Family size	1.050***	1.074***	1.044**	1.051***
	[1.020 - 1.081]	[1.052 - 1.097]	[1.004 - 1.086]	[1.023 - 1.079]
Household head's age	1.014***	1.014***	1.016***	1.033***
	[1.008 - 1.020]	[1.010 - 1.017]	[1.006 - 1.027]	[1.026 - 1.039]
Head completed primary education	3.067***	1.681***	1.360*	1.372***
	[1.598 - 5.888]	[1.387 - 2.037]	[0.966 - 1.913]	[1.165 - 1.616]
Head completed secondary education	0.804	1.782*	3.125***	1.414**
	[0.188 - 3.445]	[0.980 - 3.242]	[1.350 - 7.238]	[1.030 - 1.940]
Mother completed primary education	--	4.603***	--	2.388***

	--	[3.122 - 6.784]	--	[1.970 - 2.896]
Mother completed secondary education	--	14.098***	--	3.659***
	--	[2.615 - 75.995]	--	[2.116 - 6.329]
Illiterate head	0.488***	0.736***	0.427***	0.475***
	[0.398 - 0.598]	[0.662 - 0.819]	[0.327 - 0.559]	[0.380 - 0.593]
Senior officials, professionals, clerks & managers	1.155	1.460**	1.191	2.014***
	[0.527 - 2.529]	[1.056 - 2.018]	[0.747 - 1.901]	[1.557 - 2.606]
Elementary occupations, crafts, trade and machine operators	1.305	1.106	1.172	1.523***
	[0.911 - 1.870]	[0.964 - 1.268]	[0.917 - 1.497]	[1.279 - 1.814]
Constant cut1	0.185***	0.282***	4.103**	9.696***
	[0.075 - 0.461]	[0.151 - 0.527]	[1.066 - 15.79]	[4.055 - 23.182]
Constant cut2	4.191***	6.310***	49.784***	103.856***
	[1.711 - 10.26]	[3.402 - 11.703]	[13.214 - 187]	[43.689 - 246.88]
Constant cut3	30.671***	49.562***	301.779***	668.234***
	[12.354 - 76.14]	[26.38 - 93.104]	[78.13 - 1,165]	[275.936 - 1,618]
Pseudo R-squared	0.220	0.232	0.147	0.166
Observations	2,672	6,364	1,208	3,127

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

The next table 5.3.4 group the samples by the occupation of the household head. Consistent with results presented above, pupils' age does not significantly predict educational attainment among the households dependent on agriculture. However, for the senior officials and elementary occupations, pupils' age significantly increases the odds of attaining upper-primary level by 31% (column 1) and 22% (column 3), respectively. While gender differences seem to be insignificant among the senior officials (positive but statistically insignificant – column 1), being a girl decreases the odds of finishing primary education by 26% among farmers, and 18% among elementary occupations. Portuguese language is a significant factor even within occupation groups. Wen pupils do not use it at home their odds of completing primary education reduce by 97% (senior officials), 95% (farmers), and 96% (elementary occupations). Completion of primary education by the household head significantly predicts schooling across all subsamples: 72% increase in odds for senior officials, 99% for farmers, and 81% for elementary occupations. Heads who complete secondary education among senior officials or working in elementary occupations increase the odds of educational success by at least 2.5 times (columns 1 and 3); in households dependent on agriculture, the increase in odds is 50% (statistically insignificant). Female heads outperform their male counterparts. The coefficients are larger within farmers (66%) and elementary occupations (81%). Illiterate heads and living in rural areas negatively influence children's educational attainment. Any of these variables halves the odds of schooling success irrespective of occupation type the head is engaged.

Table 5.3.4 Ordinal Logistic Estimation of Children's Attainment by Household Head's Occupation (Aged 14-18 Years)

VARIABLES	(1) Attainment *Officials*	(2) Attainment *Agriculture*	(3) Attainment *Elementary*
Pupil's age	1.311***	1.083***	1.221***
	[1.198 - 1.435]	[1.053 - 1.113]	[1.170 - 1.275]
Female	1.192	0.735***	0.815***
	[0.930 - 1.527]	[0.678 - 0.796]	[0.722 - 0.920]
Does not speak Portuguese at home	0.034***	0.045***	0.044***
	[0.018 - 0.064]	[0.039 - 0.050]	[0.035 - 0.057]
Family size	1.041*	1.060***	1.060***
	[0.992 - 1.093]	[1.043 - 1.077]	[1.035 - 1.085]
Household head's age	1.017**	1.014***	1.022***
	[1.004 - 1.031]	[1.011 - 1.017]	[1.016 - 1.028]
Head completed primary education	1.728***	1.989***	1.814***
	[1.230 - 2.429]	[1.660 - 2.383]	[1.566 - 2.102]
Head completed secondary education	2.528***	1.496	2.749***
	[1.765 - 3.622]	[0.455 - 4.922]	[1.743 - 4.336]
Female head	1.254	1.655***	1.814***
	[0.882 - 1.782]	[1.512 - 1.810]	[1.533 - 2.146]
Illiterate head	0.478**	0.639***	0.521***
	[0.250 - 0.917]	[0.584 - 0.699]	[0.437 - 0.621]
Rural	0.530***	0.690***	0.580***
	[0.398 - 0.707]	[0.616 - 0.772]	[0.504 - 0.669]
Constant cut1	5.546**	0.251***	2.293**
	[1.032 - 29.814]	[0.151 - 0.418]	[1.059 - 4.966]
Constant cut2	61.917***	5.204***	32.020***
	[11.925 - 321.499]	[3.149 - 8.601]	[14.930 - 68.673]
Constant cut3	357.331***	36.339***	201.942***
	[67.228 - 1,899]	[21.81 - 60.52]	[92.869 - 439.12]
Pseudo R-squared	0.128	0.223	0.174
Observations	957	9,521	3,800

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

For educational attainment, pupils' age is also positively correlated with the likelihood of finishing primary education in elementary occupations, which indicates the global delayed enrollments in Mozambican households (see Annexes 2 and 3). Girls are less likely to finish primary in rural areas. Nevertheless, there is no gender difference in educational attainment in urban male-headed households, while girls seem to outperform boys in female-headed households. Expectedly, parental education is positively associated with schooling, with a more substantial effect if the head at least finished primary education. Mother's education in male-headed households strongly affects offspring's educational attainment, ranging from doubling to tripling the odds of primary education completion. Rural children dependent on elementary occupation's livelihoods have 42% less odds of finishing primary if living with a male head. Among female heads, the effect is negative but insignificant. Compared to their peers in male-headed households, children in female-headed households have much higher odds of finishing primary, from 80% to over 100%.

Annex 3 presents the estimation of educational attainment among the officials' households. Systemic delayed enrollments occur among the senior officials' households too. Pupils' age continues to affect the probability of finishing primary education substantially. Unlike the results reported above, girls are more likely to finish primary education when living with heads working in more professional and better-paid jobs, irrespective of the head's gender and household's location. Maybe because these heads are more educated, having a post-secondary education has more significant effects on educational attainment, as seen when estimating enrollments. However, primary or post-primary are significantly associated with children's primary education completion. A mother's educational attainment also consistently outperforms a father's education. Children in female-headed households have higher odds of finishing primary than their peers from male-headed households, but the effect is statistically insignificant. The negative effect of living in rural areas is pronounced among male-headed households.

The following results model on households that live on farming activities. Table 5.3.5 presents results in three groups: all the sample, female heads, and male heads. Pupils' age seems to predict more of the odds of attaining upper-primary level among female-headed households than

within male-headed households. In terms of educational attainment, boys outperform girls. Being a girl decreases the odds of finishing primary education by 26% (columns 1 and 2), and 285 (column 3). Pupils who do not speak Portuguese have 95% lower odds of finishing primary (full sample and male-headed households), and 96% (female-headed households). Female heads who complete primary education increase the odds of educational success by 94%. For male heads, primary education completion increases the odds of completion for the offspring by 79%. The effect of completing secondary education is mixed: positive and insignificant among female heads (71%), and negative and insignificant among male heads (11%). Mothers' primary education completion increases the odds of attaining the last grade of primary by almost four-fold. Conversely, an even more significant, when mothers complete secondary education, they increase the odds of educational success by a magnitude of 19 times. Illiteracy of the head and living in rural areas has larger negative influence for children in female-headed households, decreasing the odds of competing primary education by 51% and 37%, respectively. By 65%, female heads increase the odds of pupils' educational success, outperforming their male peers.

Table 5.3.6 summarizes the results from the subsamples by location among the farming households. Pupils' age is more significant in urban than in rural areas. Girls attain fewer years of schooling in both locations, 28% less odds in rural areas, and 18% less odds in urban areas. However, as seen above, female heads continue to increase the odds of attaining more years of schooling, for 56% in rural areas, and more than 100% in urban areas. Not using Portuguese at home has the same negative effect in both regions of 96% odds of not attaining the full cycle of primary education. In rural areas, head's primary education completion increases the odds for the offspring by 88%, while secondary education completion more than triples the odds of educational success (although not significant). In urban areas, head's completion of primary education increases the odds by 100%, while unexpectedly heads who complete secondary have a negative correlation with educational attainment (statistically insignificant). Illiterate heads in urban areas decrease the odds of attaining primary by more than half, while in rural areas they decrease the odds by 44%.

Table 5.3.5 Ordinal Logistic Estimation of Children's Attainment in Agricultural Households (Aged 14-18 Years)

VARIABLES	(1) Attainment *All*	(2) Attainment *Female HH*	(3) Attainment *Male HH*
Pupil's age	1.083***	1.135***	1.054***
	[1.053 - 1.113]	[1.082 - 1.190]	[1.018 - 1.093]
Female	0.735***	0.738***	0.722***
	[0.678 - 0.796]	[0.644 - 0.846]	[0.651 - 0.801]
Does not speak Portuguese at home	0.045***	0.036***	0.049***
	[0.039 - 0.050]	[0.029 - 0.045]	[0.042 - 0.058]
Family size	1.060***	1.043***	1.066***
	[1.043 - 1.077]	[1.015 - 1.071]	[1.043 - 1.090]
Household head's age	1.014***	1.014***	1.015***
	[1.011 - 1.017]	[1.009 - 1.020]	[1.011 - 1.019]
Head completed primary education	1.989***	1.938**	1.793***
	[1.660 - 2.383]	[1.130 - 3.324]	[1.464 - 2.196]
Head completed secondary education	1.496	1.713	0.891
	[0.455 - 4.922]	[0.077 - 38.150]	[0.251 - 3.161]
Mother completed primary education	--	--	3.823***
	--	--	[2.318 - 6.305]
Mother completed secondary education	--	--	19.241**
	--	--	[1.771 - 209.064]
Illiterate head	0.639***	0.489***	0.706***
	[0.584 - 0.699]	[0.407 - 0.588]	[0.634 - 0.787]
Rural	0.690***	0.631***	0.801***
	[0.616 - 0.772]	[0.527 - 0.756]	[0.686 - 0.935]
Female head	1.655***	--	--
	[1.512 - 1.810]	--	--
Constant cut1	0.251***	0.216***	0.224***
	[0.151 - 0.418]	[0.092 - 0.507]	[0.116 - 0.433]
Constant cut2	5.204***	4.337***	4.779***
	[3.149 - 8.601]	[1.874 - 10.037]	[2.488 - 9.178]
Constant cut3	36.339***	29.275***	35.713***
	[21.818 - 60.525]	[12.508 - 68.521]	[18.383 - 69.381]
Pseudo R-squared	0.223	0.216	0.226
Observations	9,521	3,096	5,930

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Table 5.3.6 Ordinal Logistic Estimation of Children's Attainment in Agricultural Households by Location (Aged 14-18 Years)

VARIABLES	(1) Attainment *Rural*	(2) Attainment *Urban*
Pupil's age	1.066***	1.187***
	[1.034 - 1.098]	[1.106 - 1.274]
Female	0.718***	0.818*
	[0.659 - 0.784]	[0.667 - 1.002]
Does not speak Portuguese at home	0.044***	0.040***
	[0.038 - 0.050]	[0.028 - 0.058]
Family size	1.061***	1.048**
	[1.042 - 1.080]	[1.008 - 1.090]
Household head's age	1.013***	1.020***
	[1.009 - 1.016]	[1.012 - 1.028]
Head completed primary education	1.879***	2.091***
	[1.515 - 2.329]	[1.490 - 2.935]
Head completed secondary education	3.574	0.586
	[0.715 - 17.870]	[0.108 - 3.189]
Female head	1.561***	2.140***
	[1.415 - 1.722]	[1.709 - 2.679]
Illiterate head	0.666***	0.508***
	[0.605 - 0.734]	[0.399 - 0.647]
Constant cut1	0.257***	1.933
	[0.149 - 0.442]	[0.556 - 6.720]
Constant cut2	5.607***	28.263***
	[3.278 - 9.591]	[8.225 - 97.118]
Constant cut3	42.347***	162.651***
	[24.507 - 73.174]	[46.203 - 572.589]
Pseudo R-squared	0.222	0.181
Observations	8,165	1,356

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Table 5.3.7 summarizes the estimation results for children's educational attainment by the head's gender and the household's location among farmers. For both male and female-headed households in rural areas, pupils' age has a weak relationship with educational attainment. In urban areas, however, the age increases the odds of schooling success, especially for pupils living with female heads (26% increase). Among the four categories, girls are negatively correlated with attainment. While in urban areas the coefficients are statistically insignificant, in rural areas girls have around 20% lower odds of completing primary. In both locations, the negative effect is more significant in female heads households. Children who do not speak Portuguese at home have lower odds of educational success, namely 97% (female heads in both rural areas), 95% (male heads in rural areas), and 96% (female and male heads in urban areas). In rural areas, head's primary education completion increases the odds of finishing primary education by at least 70% (columns 1 and 2). In urban areas, parents who complete primary education increase the odds by 88% (female heads) and 83% (female heads). Completion of secondary education positively influence educational attainment in rural areas (statistically insignificant). However, in urban areas, the negative effect of these level of education remains consistent for male heads. Male heads have lower educational attainment, therefore, there is no enough sample size to estimate the model. Illiterate heads negatively affect schooling, especially in female-headed households (decreasing odds of around 50%) and male-headed households in urban areas (47%). Mothers who complete primary education increase the odds children's educational attainment by almost 5 in rural areas, and at least two and half times in urban areas. When they complete secondary education, the coefficient reports a seventeen-fold increase in odds for pupils in rural areas. Again, in urban areas, there are no enough observations to estimate mothers' secondary education completion on pupils' schooling.

Table 5.3.7 Ordinal Logistic Estimation of Children's Attainment in Agricultural Households by Household's Gender and Location (Aged 14-18 Years)

VARIABLES	(1) Attainment Rural *Female HH*	(2) Attainment Rural *Male HH*	(3) Attainment Urban *Female HH*	(4) Attainment Urban *Male HH*
Pupil's age	1.107***	1.040**	1.261***	1.152***
	[1.050 - 1.168]	[1.001 - 1.081]	[1.131 - 1.406]	[1.043 - 1.274]
Female	0.720***	0.710***	0.815	0.788
	[0.619 - 0.838]	[0.635 - 0.794]	[0.597 - 1.111]	[0.590 - 1.053]
Does not speak Portuguese at home	0.034***	0.050***	0.038***	0.037***
	[0.027 - 0.044]	[0.042 - 0.058]	[0.021 - 0.068]	[0.022 - 0.060]
Family size	1.052***	1.067***	1.014	1.058*
	[1.020 - 1.084]	[1.042 - 1.092]	[0.958 - 1.072]	[0.998 - 1.123]
Household head's age	1.015***	1.013***	1.011*	1.028***
	[1.009 - 1.021]	[1.009 - 1.017]	[0.998 - 1.025]	[1.017 - 1.040]
Head completed primary education	1.721	1.713***	1.884*	1.830***
	[0.761 - 3.892]	[1.357 - 2.164]	[0.898 - 3.955]	[1.210 - 2.766]
Head completed secondary education	1.892	1.679	--	0.498
	[0.082 - 43.531]	[0.253 - 11.158]	--	[0.092 - 2.699]

Mother completed primary education	--	4.954***	--	2.714***
	--	[2.547 - 9.638]	--	[1.273 - 5.788]
Mother completed secondary education	--	17.076**	--	--
	--	[1.544 - 188.87]	--	--
Illiterate head	0.495***	0.734***	0.491***	0.526***
	[0.401 - 0.610]	[0.654 - 0.822]	[0.335 - 0.720]	[0.375 - 0.739]
Constant cut1	0.225***	0.206***	1.551	1.637
	[0.088 - 0.574]	[0.103 - 0.412]	[0.241 - 10.000]	[0.278 - 9.655]
Constant cut2	5.012***	4.506***	18.257***	29.931***
	[1.992 - 12.610]	[2.268 - 8.953]	[2.904 - 114.771]	[5.149 - 173.9]
Constant cut3	36.858***	36.048***	101.123***	184.473***
	[14.429 - 94.150]	[17.894 - 72.61]	[15.570 - 656.77]	[30.56 - 1,113]
Pseudo R-squared	0.218	0.223	0.149	0.209
Observations	2,529	5,212	567	718

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

5.4 Smallholder Household Characteristics and School Attendance in Mozambique

This section presents results for RQ2. For RQ2.1, the study estimates the family characteristics that better explain differences in children's school attendance. In RQ2.2, we estimate the household characteristics that predict educational attainment. The results from RQ1 indicate that school enrollment is subject to age. Pupils enroll late, and around age 12 start dropping out, without finishing the complete cycle of primary, and, in the worst-case scenarios, without even completing the first five years of schooling. Table 5.4.1 shows that this pattern continues in the specific dataset of smallholders. Across the six panels presented in the table, consistently, older pupils are 3% less likely to attend school (all statistically significant at the 1% level). Girls tend to attend less than boys. In the full sample (panel A), girls attend school 3% less than boys, and when the model controls for land size and if the household receives remittances (panel B), the coefficient rises to 5% (both statistically significant). When living with female heads, although still negative, the difference in attendance not only is small but also statistically insignificant in both models (panels C and D). However, in male-headed households, larger coefficients are observed. In panel E, girls are 4% less likely to attend school than boys. In the last model (panel F), which controls for remittances and land size, boys attend 8% more than girls. Although negative, the coefficients of when the pupils contribute to agriculture are insignificant, except for the full sample. This might be because almost all households report that children under 12 years of age do not participate in agriculture.

In panel A, female heads contribute negatively to school attendance, but, in panel B, they do affect attendance positively. But the coefficients are small and statistically insignificant, which might indicate a non-significant difference of attendance by the gender of the household head. The results of the head's educational attainment are mixed. Compared to household heads with no formal education, parents who completed primary education positively and significantly predict attendance (panels B, C and F). Specifically, among female headed households, without controlling for remittances and the land size, children living with a female head who completed primary education attend school 11% more often than their peers. Panel E (male-headed households) is negative but with a negligent coefficient. When the head has attained post-primary

education, children significantly attend school 5% more than their peers in the full sample (panels A and B). In female-headed households, the results are mixed but insignificant (panels C and D), while in male-headed households the coefficients are positive and insignificant. When the household head has only some few years of education, but less than primary, the coefficients have the following pattern: negative and insignificant (panels A, C and E), and positive and insignificant (B, D and F), respectively before and after controlling for remittances and land size. For male-headed households, children with mothers who have completed primary education attend 6% (panel E) and 8% (F) than their counterparts with uneducated mothers. The coefficients are statistically significant at the 1% level. Also significant is mothers with post-primary (panel E). When mothers attended school only briefly, they have a negative and significant effect on attendance without controlling for remittances and land size.

The economic status of the household is important for predicting schooling. The study applies different variables that were tested and did not show any significant level of multicollinearity. First, being above the poverty line (threshold of $1.25/day) is positively correlated with attendance across all the subsamples. Significant coefficients are in the full sample (panel A) and male-headed households (panel E). However, larger coefficients are among female-headed households, namely 4% (panel C) and 6% (panel D). The second variable for economic status is household wealth index (see the derivation in the summary statistics section). The comparison group is the last fifth quintile (the richer). Against it, all the other quintiles negatively affect attendance. In the first and second quintiles, after controlling for remittances and land size, pupils significantly attend school 7% less (panels B and F). In the third quintile, pupils significantly attend 7% less in the full sample (panel B), and, when living in male-headed households, 4% and 8%, for panel E and F, respectively. Children from the fourth quintile significantly attend 6% less in the full sample (panels A and B), and 7% less in when living with male heads before controlling for remittances and land size (panel E). All other coefficients are statistically insignificant. Being in urban areas is positively correlated with attendance, except for the panel F (when living with male heads), but the coefficients are not significant. Not significant is also when the household

receives remittances. But remittances consistently harm attendance across the three modeled samples (panels B, D and F). Land size has insignificant coefficients close to zero.

Next, we estimate school attendance by the household location and the pupil's gender without controlling for whether the household receives remittances and the size of the owned land (Table 5.4.2). Still, an increase in pupils' age by one year significantly (1% level) and negatively affects school attendance by 3% (rural and boys), and 4% (girls). Girls attend school 6% less than boys (5% sign). Among those contributing to agriculture in the household, children from urban areas and girls attend school 8% less (significant at 10% and 1% levels, respectively). Female heads continuously harm attendance, irrespective of the location of the household and the pupils' gender (insignificant coefficients). Household heads who attained few years of education seem to do poorly in sending their children to school, compared to uneducated parents (statistically insignificant). Except in urban areas, household heads who finished primary education positively influence attendance (all coefficients are insignificant). The significance of household head's educational attainment is only when at least they attained secondary education: 6% increase in pupils' attendance in rural areas and among boys. The same pattern is seen when the household is above the poverty line threshold, 4% and 6% increase in attendance, respectively. By the household wealth index, the bottom quintiles have mostly negative and insignificant coefficients, compared to the one on top. Statistically significant at the 5% level, pupils from the fourth quintile attend 6% less in urban areas, and 8% less among boys. The only unusual result is in column 3, where girls from the first quintile attend more than their peers from the richer households. Consistent with previous results, urban pupils attend more (insignificant).

After controlling for whether the household receives remittances and land size, the urban size is excluded due to not enough observations. Still, an increase in pupils' age by one year significantly (1% level) and negatively affects school attendance by 3% (rural and boys), and 4% (girls). Girls attend school 6% less than boys (5% significance level). Contributing to agriculture harms everyone. However, among girls, those participating in farming attend school 8% less than the ones who do not (significant at the 10% level). Female heads positively affect school attendance in rural areas and for girls, and negatively affect boy's attendance (insignificant

coefficients). Household heads who attained few years of education seem to do poorly in sending their children to school, compared to uneducated parents (statistically insignificant). Expectedly, household heads who attained some years of primary education, have completed primary education or have post-primary training outperform uneducated parents. However, not all are statistically significant; only the 6% increase in attendance in rural areas and 7% if a boy and the head complete primary in rural areas (columns 1 and 3). The bigger gain is for boys who live with parents who attended at least secondary education, an increase in attendance by 10% (column 3, significant at the 5% level). The coefficients of pupils living above the poverty line threshold are at least 3% higher than their peers living below the threshold, but all are insignificant. By the household wealth index, the bottom quintiles have mostly negative and insignificant coefficients, compared to the one on top. Statistically significant at 5% level, pupils from the fourth quintile attend 6% less in urban areas, and 8% less among boys. Again, unusually, girls from the first quintile (bottom) attend more than their peers from the richer households.

As seen above, urban pupils attend more (insignificant). Significantly, pupils living in households that receive remittances in rural areas attend school 5% less. By 8% (rural areas) and 9% (among boys), pupils in first quintile attend less school than their top-tier peers. This pattern in terms of statistical significance continues in the other quintiles. Significant at the 5% level, pupils from the second quintile attend 8% and 10% less if coming from rural areas or among the boy, respectively. Children from the third quintile attend 8% (significant at the 10% level) and 10% (significant at the 5% level) less than children from the fifth quintile if coming from rural areas or among the sample of boys, respectively. Pupils from rural areas and boys, respectively, attend school 8% (5% significance level) and 11% (1% significance level) less if living in households in the fourth quintile. In rural areas, if the household receives remittances, pupils attend school 5% less (10% significance level). The coefficients among girls and boys are negative when receiving remittances but are both statistically insignificant. Finally, in each pupils' gender-group comparison, although coming from urban areas outperform rural areas, the coefficients are not statistically significant.

Table 5.4.1 Probit Estimation of Children's School Attendance

	Attendance		Attendance		Attendance	
	All		*Female HH*		*Male HH*	
VARIABLES	(A)	(B)	(C)	(D)	(E)	(F)
Pupil's age	-0.029***	-0.030***	-0.030***	-0.027***	-0.029***	-0.031***
	(0.003)	(0.004)	(0.005)	(0.008)	(0.003)	(0.004)
Female	-0.034**	-0.053***	-0.014	0.010	-0.044***	-0.077***
	(0.014)	(0.020)	(0.030)	(0.042)	(0.015)	(0.022)
Contribute to agriculture (yes = 1)	-0.040**	-0.037	-0.068	-0.079	-0.031	-0.021
	(0.020)	(0.029)	(0.043)	(0.060)	(0.023)	(0.033)
Household head's age	0.002***	0.002**	0.001	0.001	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Female head	-0.017	0.015	--	--	--	--
	(0.017)	(0.024)	--	--	--	--
Household head's educational attainment (base category: no education)						
Head has some years of primary education	-0.027	0.036	-0.036	0.019	-0.015	0.031
	(0.019)	(0.027)	(0.040)	(0.052)	(0.023)	(0.032)
Head completed primary education	0.020	0.062**	0.112***	0.025	-0.0001	0.060*
	(0.021)	(0.028)	(0.038)	(0.061)	(0.026)	(0.033)
Head has post-primary education	0.054***	0.053*	0.048	-0.016	0.033	0.035
	(0.020)	(0.031)	(0.050)	(0.090)	(0.025)	(0.038)
Mother's educational attainment (base category: no education)						
Mother has some years of primary education	--	--	--	--	-0.037*	0.003
	--	--	--	--	(0.022)	(0.030)
Mother completed primary education	--	--	--	--	0.063***	0.083***

	--	--	--	--	(0.022)	(0.031)
Mother has post-primary education	--	--	--	--	0.047*	0.052
	--	--	--	--	(0.027)	(0.042)
Poverty line (above = 1)	0.038**	0.027	0.043	0.059	0.035*	0.017
	(0.018)	(0.029)	(0.040)	(0.059)	(0.020)	(0.034)
Household wealth index (base category: fifth quintile)						
First quintile	-0.012	-0.069**	0.008	-0.061	-0.019	-0.073**
	(0.023)	(0.032)	(0.053)	(0.064)	(0.025)	(0.036)
Second quintile	-0.016	-0.071**	0.036	-0.086	-0.037	-0.070*
	(0.025)	(0.033)	(0.056)	(0.070)	(0.027)	(0.038)
Third quintile	-0.038	-0.073**	-0.019	-0.073	-0.044*	-0.078*
	(0.024)	(0.035)	(0.058)	(0.077)	(0.026)	(0.040)
Fourth quintile	-0.056**	-0.062*	-0.005	-0.103	-0.066***	-0.044
	(0.023)	(0.033)	(0.053)	(0.067)	(0.026)	(0.038)
Location (urban = 1)	0.030	0.034	0.055	-0.011	0.011	0.032
	(0.020)	(0.031)	(0.039)	(0.056)	(0.023)	(0.039)
HH receives remittance (yes = 1)	--	-0.030	--	-0.012	--	-0.032
	--	(0.021)	--	(0.045)	--	(0.024)
Land size (ha)	--	-0.001	--	-0.002	--	0.001
	--	(0.009)	--	(0.017)	--	(0.011)
Pseudo R-squared	0.126	0.176	0.133	0.175	0.141	0.195
Observations	2,651	1,134	587	254	2,055	879

Standard errors in parenthesis *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on CGAP data (2015)

Table 5.4.2 Probit Estimation of Children's School Attendance by Location and Gender

VARIABLES	(1) Attendance *Rural*	(2) Attendance *Urban*	(3) Attendance *Girls*	(4) Attendance *Boys*
Pupil's age	-0.029***	-0.027***	-0.033***	-0.025***
	(0.003)	(0.005)	(0.004)	(0.003)
Female	-0.040***	0.001	--	--
	(0.016)	(0.027)	--	--
Contribute to agriculture (yes = 1)	-0.037	-0.076*	-0.076***	-0.005
	(0.023)	(0.043)	(0.029)	(0.027)
Household head's age	0.002***	0.002	0.002**	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
Female head	-0.020	-0.010	-0.003	-0.026
	(0.019)	(0.031)	(0.025)	(0.022)
Household head's educational attainment (base category: no education)				
Head has some years of primary education	-0.023	-0.063	-0.022	-0.024
	(0.021)	(0.041)	(0.028)	(0.025)
Head completed primary education	0.031	-0.062	0.031	0.018
	(0.023)	(0.051)	(0.032)	(0.028)
Head has post-primary education	0.058***	0.013	0.047	0.060**
	(0.022)	(0.040)	(0.030)	(0.026)
Poverty line (above = 1)	0.038*	0.046	0.020	0.057**
	(0.021)	(0.034)	(0.027)	(0.024)
Household wealth index (base category: fifth quintile)				
First quintile	-0.024	0.045	-0.018	-0.010
	(0.027)	(0.041)	(0.036)	(0.030)
Second quintile	-0.031	0.072	-0.026	-0.012
	(0.028)	(0.045)	(0.038)	(0.032)
Third quintile	-0.039	-0.058	-0.020	-0.051
	(0.027)	(0.057)	(0.036)	(0.031)
Fourth quintile	-0.062**	-0.040	-0.028	-0.079**
	(0.028)	(0.042)	(0.035)	(0.031)
Location (urban = 1)	--	--	0.042	0.012
	--	--	(0.029)	(0.027)
Pseudo R-squared	0.117	0.193	0.163	0.143
Observations	2,154	497	1,224	1,427

Standard errors in parenthesis *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on CGAP data (2015)

Table 5.4.3 Probit Estimation of Children's School Attendance by Location and Gender (Controlling for Remittances and Land Size)

VARIABLES	(1) Attendance *Rural*	(3) Attendance *Girls*	(4) Attendance *Boys*
Pupil's age	-0.033***	-0.035***	-0.026***
	(0.004)	(0.005)	(0.005)
Female	-0.055**	--	--
	(0.022)	--	--
Contribute to agriculture (yes = 1)	-0.037	-0.074*	-0.004
	(0.032)	(0.044)	(0.037)
Female head	0.024	0.049	-0.015
	(0.028)	(0.039)	(0.031)
Household head's age	0.003***	0.002	0.003**
	(0.001)	(0.002)	(0.002)
Household head's educational attainment (base category: no education)			
Mother has some years of primary education	0.031	0.040	0.032
	(0.029)	(0.040)	(0.035)
Mother completed primary education	0.058*	0.046	0.068*
	(0.032)	(0.045)	(0.037)
Mother has post-primary education	0.027	0.002	0.096**
	(0.037)	(0.051)	(0.037)
Poverty line (above = 1)	0.044	0.030	0.032
	(0.034)	(0.045)	(0.039)
Household wealth index (base category: fifth quintile			
First quintile	-0.082**	-0.062	-0.092***
	(0.036)	(0.052)	(0.035)
Second quintile	-0.075**	-0.057	-0.095**
	(0.036)	(0.053)	(0.037)
Third quintile	-0.064*	-0.060	-0.102**
	(0.038)	(0.059)	(0.040)
Fourth quintile	-0.083**	-0.013	-0.111***

	(0.040)	(0.051)	(0.041)
HH receives remittance (yes = 1)	-0.045*	-0.031	-0.032
	(0.024)	(0.034)	(0.026)
Land size (ha)	0.002	-0.009	0.009
	(0.010)	(0.014)	(0.012)
Location (urban = 1)	--	0.033	0.014
	--	(0.048)	(0.041)
Pseudo R-squared	0.179	0.199	0.168
Observations	948	522	612

Standard errors in parenthesis *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on CGAP data (2015)

5.5 Smallholder Household Factors and Children's Educational Attainment

From the estimation results of the first dataset, pupils' age is positively correlated with educational attainment. Meaning, because they enroll late, as they become older, they attain more years of schooling. In the smallholder dataset the same pattern holds true. Table 5.5.1 shows a strong effect of age on educational attainment. The first column presents results of pupils aged 12 and 13. The reason is to separately estimate pupils' completion of lower-primary. Significantly, the odds of completing lower-primary double as the pupils go from age 12 to 13. Girls are more likely to complete lower-primary (13%), and female heads increase the odds of attainment by 16%. Household heads who completed some years of education positively correlate with educational attainment, however, significant effects are observed if the head completed primary education or has post-primary education. Primary education completion increases the odds of attaining lower-primary by 70%, while post-primary education increases the odds by over 2.7 times. Although not significant, being above the poverty line decreases the odds by 13%. Compared to the top quintile, all the other quintiles negatively predict educational attainment for pupils aged 12 and 13. Children from the fourth quintile have 34% lower odds of having finished lower-primary by the age of 12 or 13 (insignificant). Children from the other quintiles have 70% lower odds if coming from the first quintile, 72% lower odds if coming from the second quintile, and 75% lower odds if coming

from the third quintile (all statistically significant). Significantly, pupils from urban areas have 52% higher odds of completing lower-primary by that age-group.

The next three columns present the summary estimations of attainment in the whole sample (aged 14-18), among pupils living in female-headed households, and among those living in male-headed households. Pupils' age predicts better schooling as they become older. In the full sample, one standard deviation increase in age increases the odds of completing primary school by 27%; when living with a female head, age increases the odds of educational attainment by 31%, and when cohabitating with a male head, the odds increase by 26% (all statistically significant). Generally, girls significantly attain fewer years of schooling than boys (column 1). Girls also attain fewer years if living with a male head (33% lower odds). However, when living with a female head, compared to boys, girls have 24% higher odds of finishing primary education. Contributing to agriculture does not seem to significantly impact educational attainment, even in the unusual case of pupils in female-headed households, which has a positive sign. Compared to their peers, female heads increase the odds of attaining primary education by 34% (statistically significant). Although not significant, parents who attained only a few years of primary education predict educational attainment worse than uneducated parents. Primary education completion increases the odds of educational attainment by 49% (full sample), 20% if living with a female head (insignificant), and 69% if living with a male head. Conversely, post-primary education increases the odds of completing primary education by 68% in the full sample, 85% among female heads, and 32% among male heads.

Household wealth positively correlates with educational attainment. Pupils living in households above the poverty line threshold have 39% higher odds of completing primary education (full sample), 38% (among female heads), and 60% (among male heads). Coming from the bottom quintile decreases the odds of attaining primary education by 49% (full sample), 67% if living with a female head, and 40% if living with a male head. Pupils from the second quintile have 54%, 70% and 48% lower odds of completing primary education in the full sample, female-headed households and male-headed households, respectively. When living in the third quintile, pupils have 60% (full sample), 45% (under female heads), and 61% (under male heads) lower odds

of completing primary. The negative coefficients of the fourth quintile represent 30% (full sample), 46% (female heads), and 19% (male heads) lower odds of finishing primary. Living in urban areas and in male-headed households significantly increases the odds of educational attainment by at least 100%. The difference among female heads is 15% higher odds if living in rural areas. Among male-headed households, mothers with few years of education significantly predict educational attainment worse off than uneducated mothers. Mothers who either completed primary education or have post-primary education increase the odds of finishing the last grade of primary by 80% (all statistically significant).

Table 5.5.2 summarizes the results of educational attainment while controlling for remittances and land size. Due to sample size, the model for female-headed households is not estimated. The first column presents results of pupils aged 12 and 13. The odds of completing lower primary are 31% higher for children aged 13 in comparison to those aged 12. Girls are less likely to complete lower primary (20%), and female heads increase the odds of attainment by 58%. Household heads who completed some years of education increase the odds of attainment by 60%. Primary education completion increases the odds of attaining lower-primary by 78%, and post-primary education increases the odds by 48%. Being above the poverty line increases the odds by 76%. Compared to the top quintile, all the other quintiles still negatively and significantly influence educational attainment for pupils aged 12 and 13. Children from the third quintile are harmed the most. They have 89% lower odds of having finished lower-primary by the age of 12 or 13. From the other quintiles, children have around 80% lower odds if in the first quintile or third quintiles, and 60% lower odds if coming from the fourth quintile (all statistically significant). Pupils from urban areas have 42% higher odds of completing lower-primary by the age 12-13.

Columns 2 and 3 present the summary results of attainment in the whole sample (aged 14-18) and among those living in male-headed households. Consistently, pupils' age predicts better schooling as they become older. One standard deviation increase in age increases the odds of completing primary school by 21% in the full sample, and by 14% when living with a male head (all statistically significant). Significantly, girls attain fewer years: 31% lower odds in the full sample, and 33% if living with a male head. Contributing to agriculture does not seem to

significantly influence educational attainment in the full sample after controlling for remittances and land size in the full sample. In male-headed households, the coefficient is 16, but statistically insignificant. Compared to male heads, female heads significantly increase the odds of attaining primary education by 100%. Parents who only attained few years of primary education continue to negatively influence schooling at least 1/3 of the times. The completion of primary education increases the odds of educational attainment by 76% (full sample) and 89% if living with a male head (all statistically significant). Post-primary education doubles the odds of completing primary education in the full sample. Among male heads, those with formal education beyond primary increase the odds of finishing primary education for the offspring by 35% among male heads.

Poorer households negatively affect schooling. Children living in households above the poverty line threshold have 36% higher odds of completing primary education (full sample), and 49% (among male heads). Pupils in the bottom quintile have 59% lower odds of attaining primary education (full sample), and 57% lower odds (in male-headed households). Living in the second quintile translates into 66% and 59% lower odds of completing primary education in the full sample and male-headed households, respectively. Third quintile living arrangements decrease the pupils' odds of educational attainment by an average of 75%, while the fourth's decrease the odds by an average of 43%. Living in urban areas (full sample and male-headed households) significantly increases the odds of educational attainment by at least 150%. Despite being insignificant, mothers with few years of education (below primary education completion) negatively influence educational attainment. Mothers who completed primary education increase the odds of the offspring schooling success by 81%, and those with post-primary education increase the odds 100% (all statistically significant). The land size of the household does not predict schooling significantly. However, households that report receiving remittances significantly reduce the odds of finishing primary education by 44% (full sample) and 34% (when living with a male head).

Table 5.5.1 Ordinal Logit Estimation of Children's Educational Attainment

VARIABLES	(1) Attainment *Aged 12 & 13*	(2) Attainment *All*	(3) Attainment *Female HH*	(4) Attainment *Male HH*
Pupil's age	1.958***	1.268***	1.311***	1.262***
	[1.380 - 2.778]	[1.170 - 1.375]	[1.103 - 1.559]	[1.149 - 1.385]
Female	1.127	0.770**	1.244	0.671***
	[0.792 - 1.603]	[0.621 - 0.954]	[0.772 - 2.006]	[0.524 - 0.859]
Contribute to agriculture (yes = 1)	--	0.982	1.138	0.929
	--	[0.741 - 1.300]	[0.629 - 2.060]	[0.669 - 1.291]
Female head	1.157	1.339**	--	--
	[0.766 - 1.748]	[1.029 - 1.742]	--	--
Household head's age	1.008	1.012**	1.014	1.018***
	[0.990 - 1.026]	[1.001 - 1.023]	[0.990 - 1.039]	[1.005 - 1.032]
Household head's educational attainment (base category: no education)				
Head has some years of primary education	1.170	0.803	0.744	0.995
	[0.749 - 1.827]	[0.610 - 1.058]	[0.420 - 1.318]	[0.700 - 1.414]
Head completed primary education	1.696*	1.489**	1.199	1.693**
	[0.977 - 2.944]	[1.065 - 2.083]	[0.607 - 2.370]	[1.102 - 2.601]
Head has post-primary education	2.705***	1.684***	1.853	1.323
	[1.604 - 4.563]	[1.209 - 2.345]	[0.809 - 4.241]	[0.874 - 2.004]
Mother's educational attainment (base category: no education)				
Mother has some years of primary education	--	--	--	0.635***

	--	--	--	[0.456 - 0.886]
Mother completed primary education	--	--	--	1.799***
			--	[1.203 - 2.690]
Mother has post-primary education	--	--	--	1.803**
	--	--	--	[1.115 - 2.915]
Poverty line (above = 1)	0.866	1.396**	1.376	1.455**
	[0.550 - 1.362]	[1.053 - 1.852]	[0.748 - 2.532]	[1.052 - 2.012]
Household wealth index (base category: fifth quintile				
First quintile	0.303***	0.510***	0.329**	0.598**
	[0.169 - 0.543]	[0.343 - 0.761]	[0.137 - 0.788]	[0.379 - 0.945]
Second quintile	0.283***	0.461***	0.301***	0.524***
	[0.152 - 0.527]	[0.307 - 0.693]	[0.124 - 0.726]	[0.329 - 0.836]
Third quintile	0.225***	0.402***	0.549	0.391***
	[0.122 - 0.416]	[0.271 - 0.598]	[0.217 - 1.389]	[0.250 - 0.611]
Fourth quintile	0.658	0.701*	0.536	0.813
	[0.386 - 1.124]	[0.480 - 1.024]	[0.233 - 1.235]	[0.525 - 1.260]
Location (urban = 1)	1.516*	2.177***	1.153	2.346***
	[0.969 - 2.370]	[1.592 - 2.978]	[0.640 - 2.076]	[1.595 - 3.453]
Pseudo R-squared	0.082	0.064	0.068	0.083
Observations	490	1,221	273	944

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on CGAP data (2015)

Table 5.5.2 Ordinal Logit Estimation of Children's Educational Attainment Controlling for Remittances and Land Size (Aged 14-18 Years)

VARIABLES	(1) Attainment *Aged 12 & 13*	(2) Attainment *All*	(3) Attainment *Male HH*
Pupil's age	1.305	1.207***	1.139*
	[0.761 - 2.239]	[1.064 - 1.369]	[0.986 - 1.314]
Female	0.796	0.688**	0.669**
	[0.460 - 1.379]	[0.487 - 0.972]	[0.451 - 0.993]
Contribute to agriculture (yes = 1)	--	1.095	1.160
	--	[0.698 - 1.718]	[0.686 - 1.961]
Female head	1.584	2.037***	--
	[0.814 - 3.081]	[1.333 - 3.115]	--
Household head's age	0.990	1.007	1.014
	[0.960 - 1.021]	[0.988 - 1.026]	[0.992 - 1.037]
Household head's educational attainment (base category: no education)			
Head has some years of primary education	1.559	0.764	0.770
	[0.781 - 3.113]	[0.492 - 1.186]	[0.451 - 1.315]
Head completed primary education	1.768	1.759**	1.981**
	[0.798 - 3.919]	[1.052 - 2.944]	[1.070 - 3.668]
Head has post-primary education	1.481	2.078***	1.345
	[0.634 - 3.460]	[1.197 - 3.610]	[0.708 - 2.556]
Mother's educational attainment (base category: no education)			
Mother has some years of primary education	--	--	0.808
	--	--	[0.494 - 1.322]
Mother completed primary education	--	--	1.813*
	--	--	[0.944 - 3.483]
Mother has post-primary education	--	--	2.002*
	--	--	[0.913 - 4.389]
Poverty line (above = 1)	1.764	1.362	1.486
	[0.831 - 3.743]	[0.836 - 2.218]	[0.841 - 2.626]
Household wealth index (base category: fifth quintile			

First quintile	0.190***	0.414***	0.431**
	[0.071 - 0.508]	[0.218 - 0.785]	[0.208 - 0.895]
Second quintile	0.203***	0.358***	0.409**
	[0.078 - 0.527]	[0.187 - 0.687]	[0.197 - 0.850]
Third quintile	0.111***	0.241***	0.258***
	[0.040 - 0.310]	[0.123 - 0.473]	[0.121 - 0.549]
Fourth quintile	0.404*	0.446**	0.421**
	[0.155 - 1.050]	[0.233 - 0.852]	[0.199 - 0.889]
Location (urban = 1)	1.419	2.637***	2.531***
	[0.689 - 2.925]	[1.551 - 4.486]	[1.316 - 4.867]
HH receives remittance (yes = 1)	0.350***	0.564***	0.675*
	[0.188 - 0.654]	[0.391 - 0.812]	[0.444 - 1.028]
Land size (ha)	1.095	0.946	0.975
	[0.868 - 1.381]	[0.807 - 1.109]	[0.802 - 1.185]
Pseudo R-squared	0.124	0.104	0.101
Observations	220	506	398

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on CGAP data (2015)

5.6 Parental Expectations and Children's School Attendance and Educational Attainment

In this section, we present estimation results responding to RQ3. Research question 3.1 is an investigation of the relationship between household expectations and children's school attendance, while RQ3.2 investigates expectations and educational attainment. Interestingly, after controlling for whether the household head considers agriculture a viable business or not (Table 5.6.1) and if the head has a secondary off-farm job (Table 5.6.2), most of the variables drop their statistical significance down. Because the results of tables 5.6.1 and 5.6.2 are similar, we will report them together. In both models, pupils' age is negatively correlated with attendance. A one-year increase in age is associated with 3% less likelihood of attending school (all statistically significant at the 1% level). Girls attend school less than boys by 5% (full sample), and 8% (male-headed households). There is no significant difference in attendance by gender within female-headed

households, but girls seem to attend more (column 2). If pupils contribute to agriculture, they are less likely to attend school, especially if they live with a female head.

After controlling for farming as business, compared to male heads, female heads positively influence school attendance, but it is not statistically significant. The results of the head's educational attainment also are different from the ones in table 5.4.6. They are generally positive and significant if the head has at least completed primary education. The negative sign in female-headed households might be due to the sample size. In male-headed households, children with mothers who have formal education attend school more often. A completion of primary education increases attendance by 8% (statistically significant at the 1% level). Being above the poverty line is positively correlated with attendance across all the subsamples, but none of the coefficients is significant. The statistical significance of the household wealth index also drops. However, pupils living below the top quintile still attend on average 6% (Table 5.6.1) and 7% (Table 5.6.2) less (significant coefficients in the full sample and among male heads). All the coefficients within female-headed families are insignificant. After controlling for household expectations, the effect of location, receiving remittances and land size is almost unchanged. However, living in urban areas in a female-head household seems to negatively affect school attendance. The coefficients of the two proxies of expectations have opposite signs. Children from households that consider agriculture a business, unexpectedly, have a higher probability of attending school. But the coefficients are small, 1% in female-headed households, and 2% in male-headed households. In table 5.6.2, having a secondary job is negatively correlated with attendance. The coefficient among female heads in 3%, while among male heads is considerably small (0.3%).

Table 5.6.3 presents the summary results of estimating household expectations on educational attainment. Respectively, columns A and C estimate attainment while controlling for whether the household head considers agriculture a business (first proxy for expectations), and columns B and D control for whether the household head has a secondary job (second proxy for expectations). Under similar sample size constraints as in RQ2.2, the model for female-headed households is not estimated. The results have the same pattern across the four panels, with full models having stronger and more statistically significant coefficients. One standard deviation

increase in age increases the odds of completing primary school by 21% in the full sample (panels A and B), and by 14% when living with a male head (panels C and D). Compared to boys, girls significantly attain less years: an average of 31% lower odds in the full sample, and 34% if living with a male head (both panels). Contributing to agriculture has coefficients ranging from 10% to 18%, but it does not seem to significantly influence educational attainment. Outperforming their male counterparts, female heads double the odds of attaining primary education (statistically significant). Children with parents who only attained few years of primary education continue to have 1/4 lower odds of completing primary education. Heads who completed primary education significantly and positively predict offspring schooling after controlling for agriculture as business and the head having a second job. The coefficients of panels A and B average 72%, and those for children living in male-headed households average 91%. Post-primary education doubles the odds of completing primary education in the full sample. However, they drop to an average of 32% among male heads.

The coefficients of the poverty line, although not significant, predict that children living in households above the threshold have around 36% higher odds of completing primary education (full samples), and 49% (among male heads). Pupils in the bottom quintile have 59% lower odds of attaining primary education (panels A and D). While in panel B they have 52% lower odds, in panel C they have 58% lower odds of educational success. Living in the second quintile translates into a mean of 66% and 61% lower odds of completing primary education in the full sample (panels A and B) and male-headed households (panels C and D), respectively. Pupils from the third quintile have an average of 75% lower odds of attaining primary education, while from the fourth have an average of 43% lower odds. Living in urban areas (full sample and male-headed households) significantly increases the odds of educational attainment by at least 160%. In male-headed households, although insignificant, mothers with few years of education negatively influence educational attainment (an average of 20%). Mothers who completed primary education increase the odds of the offspring schooling success by 82% (panel C) and 83% (panel D). Those with post-primary education increase the odds of offspring educational success by nearly 100% (all statistically significant). Households that report receiving remittances significantly reduce the

odds of finishing primary education by 44% (panel A), 40% (panel B), 33% (panel C), and 30% (panel D). Although negative, considering agriculture a business or not does not seem to significantly affect educational attainment. In the full sample, pupils have 10% lower odds if the household head considers agriculture a business (panel A), while among male-headed households, it is 15% (panel C). Unexpectedly, parents with a secondary job negatively influence attainment: 31% in the full sample (panel B), and 19% among male-head households (panel D).

Table 5.6.1 Probit Estimation of Children's School Attendance Controlling for Farm Is a Business (Aged 14-18)

	(1)	(2)	(3)
VARIABLES	Attendance	Attendance	Attendance
	All	*Female HH*	*Male HH*
Pupil's age	-0.030***	-0.026***	-0.030***
	(0.004)	(0.008)	(0.004)
Female	-0.053***	0.009	-0.077***
	(0.020)	(0.042)	(0.022)
Contribute to agriculture (yes = 1)	-0.039	-0.080	-0.023
	(0.029)	(0.060)	(0.033)
Female head	0.018	--	--
	(0.025)	--	--
Household head's age	0.002**	0.001	0.003***
	(0.001)	(0.002)	(0.001)
Household head's educational attainment (base category: no education)			
Head has some years of primary education	0.038	0.019	0.033
	(0.027)	(0.052)	(0.032)
Head completed primary education	0.066**	0.024	0.064*
	(0.029)	(0.061)	(0.034)
Head has post-primary education	0.055*	-0.016	0.038
	(0.032)	(0.090)	(0.038)
Mother's educational attainment (base category: no education)			

Mother has some years of primary education	--	--	0.004
	--	--	(0.030)
Mother completed primary education	--	--	0.084***
	--	--	(0.031)
Mother has post-primary education	--	--	0.052
	--	--	(0.042)
Poverty line (above = 1)	0.027	0.058	0.017
	(0.029)	(0.059)	(0.034)
Household wealth index (base category: fifth quintile			
First quintile	-0.066**	-0.057	-0.071*
	(0.032)	(0.066)	(0.037)
Second quintile	-0.067**	-0.082	-0.068*
	(0.033)	(0.072)	(0.038)
Third quintile	-0.070**	-0.067	-0.077*
	(0.036)	(0.081)	(0.040)
Fourth quintile	-0.061*	-0.101	-0.045
	(0.033)	(0.069)	(0.038)
Location (urban = 1)	0.037	-0.008	0.034
	(0.032)	(0.057)	(0.039)
HH receives remittance (yes = 1)	-0.029	-0.011	-0.032
	(0.021)	(0.045)	(0.024)
Land size (ha)	-0.001	-0.002	0.001
	(0.009)	(0.017)	(0.011)
Farm is business (yes = 1)	0.019	0.012	0.018
	(0.021)	(0.047)	(0.023)
Pseudo R-squared	0.177	0.175	0.199
Observations	1,134	254	879

Standard errors in parenthesis *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on CGAP data (2015)

Table 5.6.2 Probit Estimation of Children's School Attendance Controlling for Household Head Has a Secondary Job (Aged 13-18)

VARIABLES	(1) Attendance *All*	(2) Attendance *Female HH*	(3) Attendance *Male HH*
Pupil's age	-0.030***	-0.026***	-0.031***
	(0.004)	(0.008)	(0.004)
Female	-0.053***	0.009	-0.078***
	(0.020)	(0.042)	(0.022)
Contribute to agriculture (yes = 1)	-0.037	-0.079	-0.021
	(0.029)	(0.060)	(0.033)
Female head	0.014	--	--
	(0.024)	--	--
Household head's age	0.002**	0.001	0.003***
	(0.001)	(0.002)	(0.001)
Household head's educational attainment (base category: no education)			
Head has some years of primary education	0.035	0.018	0.030
	(0.027)	(0.053)	(0.032)
Head completed primary education	0.061**	0.027	0.059*
	(0.029)	(0.061)	(0.034)
Head has post-primary education	0.053*	-0.012	0.035
	(0.031)	(0.090)	(0.038)
Mother's educational attainment (base category: no education)			
Mother has some years of primary education	--	--	0.003
	--	--	(0.030)
Mother completed primary education	--	--	0.083***
	--	--	(0.031)
Mother has post-primary education	--	--	0.052
	--	--	(0.042)
Poverty line (above = 1)	0.027	0.058	0.017
	(0.029)	(0.058)	(0.034)

Household wealth index (base category: fifth quintile)			
First quintile	-0.071**	-0.063	-0.074**
	(0.032)	(0.064)	(0.037)
Second quintile	-0.072**	-0.086	-0.070*
	(0.033)	(0.070)	(0.038)
Third quintile	-0.073**	-0.071	-0.078*
	(0.035)	(0.077)	(0.040)
Fourth quintile	-0.061*	-0.102	-0.044
	(0.033)	(0.067)	(0.038)
Location (urban = 1)	0.034	-0.010	0.032
	(0.031)	(0.056)	(0.039)
HH receives remittance (yes = 1)	-0.028	-0.008	-0.031
	(0.022)	(0.046)	(0.025)
Land size (ha)	-0.001	-0.002	0.001
	(0.009)	(0.017)	(0.011)
Head has a secondary job (yes = 1)	-0.010	-0.025	-0.003
	(0.028)	(0.055)	(0.033)
Pseudo R-squared	0.176	0.176	0.195
Observations	1,134	254	879

Standard errors in parenthesis *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on CGAP data (2015)

Table 5.6.3 Ordinal Logit Estimation of Children's Educational Attainment Controlling for Farm Is a Business and Household Head Has a Secondary Job (Aged 14-18)

	Attainment		Attainment	
	All		*Male HH*	
VARIABLES	(A)	(B)	(C)	(D)
Pupil's age	1.206***	1.208***	1.138*	1.139*
	[1.062 - 1.368]	[1.064 - 1.371]	[0.985 - 1.313]	[0.986 - 1.314]
Female	0.685**	0.678**	0.660**	0.662**
	[0.485 - 0.969]	[0.479 - 0.959]	[0.444 - 0.981]	[0.446 - 0.984]
Contribute to agriculture (yes = 1)	1.102	1.118	1.176	1.175
	[0.702 - 1.730]	[0.711 - 1.758]	[0.694 - 1.991]	[0.694 - 1.990]
Female head	2.006***	2.035***	--	--
	[1.307 - 3.078]	[1.331 - 3.113]	--	--
Household head's age	1.007	1.006	1.015	1.013
	[0.988 - 1.026]	[0.987 - 1.025]	[0.993 - 1.038]	[0.991 - 1.036]
Head has some years of primary education	0.756	0.736	0.758	0.745
	[0.486 - 1.175]	[0.472 - 1.146]	[0.443 - 1.297]	[0.433 - 1.281]
Head completed primary education	1.730**	1.704**	1.902**	1.923**
	[1.031 - 2.905]	[1.017 - 2.857]	[1.020 - 3.546]	[1.033 - 3.580]
Head has post-primary education	2.043**	2.094***	1.304	1.338
	[1.172 - 3.559]	[1.204 - 3.641]	[0.684 - 2.486]	[0.703 - 2.543]
Mother has some years of primary education	--	--	0.796	0.816
	--	--	[0.486 - 1.304]	[0.498 - 1.335]
Mother completed primary education	--	--	1.817*	1.827*
	--	--	[0.947 - 3.485]	[0.952 - 3.507]
Mother has post-primary education	--	--	1.970*	1.995*
	--	--	[0.897 - 4.325]	[0.908 - 4.382]

Poverty line (above = 1)	1.366	1.363	1.492	1.494
	[0.839 - 2.224]	[0.836 - 2.220]	[0.844 - 2.636]	[0.845 - 2.643]
First quintile	0.407***	0.382***	0.420**	0.410**
	[0.214 - 0.775]	[0.199 - 0.733]	[0.202 - 0.875]	[0.195 - 0.863]
Second quintile	0.349***	0.343***	0.391**	0.395**
	[0.181 - 0.673]	[0.178 - 0.659]	[0.187 - 0.820]	[0.189 - 0.827]
Third quintile	0.237***	0.240***	0.252***	0.254***
	[0.120 - 0.466]	[0.122 - 0.471]	[0.118 - 0.538]	[0.119 - 0.542]
Fourth quintile	0.441**	0.453**	0.421**	0.422**
	[0.231 - 0.845]	[0.237 - 0.868]	[0.199 - 0.890]	[0.199 - 0.892]
Location (urban = 1)	2.581***	2.705***	2.451***	2.566***
	[1.509 - 4.413]	[1.586 - 4.612]	[1.269 - 4.731]	[1.333 - 4.939]
HH receives remittance (yes = 1)	0.560***	0.600***	0.666*	0.704
	[0.388 - 0.808]	[0.412 - 0.873]	[0.437 - 1.016]	[0.455 - 1.088]
Land size (ha)	0.947	0.949	0.982	0.975
	[0.808 - 1.110]	[0.809 - 1.113]	[0.807 - 1.194]	[0.802 - 1.185]
Farm is business (yes = 1)	0.906	--	0.846	--
	[0.635 - 1.293]	--	[0.565 - 1.266]	--
Head has a secondary job (yes = 1)	--	0.688	--	0.808
	--	[0.409 - 1.158]	--	[0.447 - 1.460]
Constant cut1	3.646	2.735	2.568	2.250
	[0.455 - 29.22]	[0.328 - 22.82]	[0.234 - 28.22]	[0.190 - 26.591]
Constant cut2	21.225***	15.980**	13.961**	12.218**
	[2.610 - 172.6]	[1.891 - 135]	[1.256 - 155.2]	[1.023 - 145.96]
Pseudo R-squared	0.104	0.106	0.102	0.101
Observations	506	506	398	398

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on CGAP data (2015)

CHAPTER 6

DISCUSSION AND CONCLUSION

6.1 Discussion

In this chapter, we start by presenting the interpretation of the estimations from the three research questions. The first research question (RQ1) is a general investigation of the factors that better explain school enrollment and educational attainment among Mozambican households (primary education). Based on close characteristics of the household head's occupation, three categories were created: i) senior officials, professionals, clerks and managers; ii) agriculture; and iii) elementary occupations, crafts, trade and machine operators. It is true that, generally, educational attainment in Mozambique is low, but, more importantly, these categories are estimated to uncover specific differences that might exist between the households that depend on agriculture and the rest of households. Smallholders account for at least two-thirds of the entire population and are the most financially vulnerable. If we account for schooling and educational success as functions, at a minimum, dependent on yearly decisions of enrolling pupils over a long period and wealth, then it is vital to study the most constrained families in comparison to the better-off. In the second and third research questions (RQ2 and RQ3), the study narrows down to focus exclusively on smallholders. Specifically, RQ2 investigates the family factors that better explain differences in schooling among the farming households, while RQ3 studies if household expectations can improve attendance and educational attainment.

The study used two datasets, namely the general population and housing census data collected in 2007, and the smallholder data collected in 2015. The interesting fact about the two datasets is that they can be linked and tell a story about schooling in Mozambique after the new educational policy in 2004 that intended to expand the availability of schools and lessen the cost of primary education for parents. As seen in the country context section (Chapter 2), primary education enrollment rates started increasing in 2005, but after 2012, they were declining. Conversely, the rate of finishing primary education also dropped down around the same period as dropout rates rose. Thus, by using the census data, we investigate if pupils from the farming

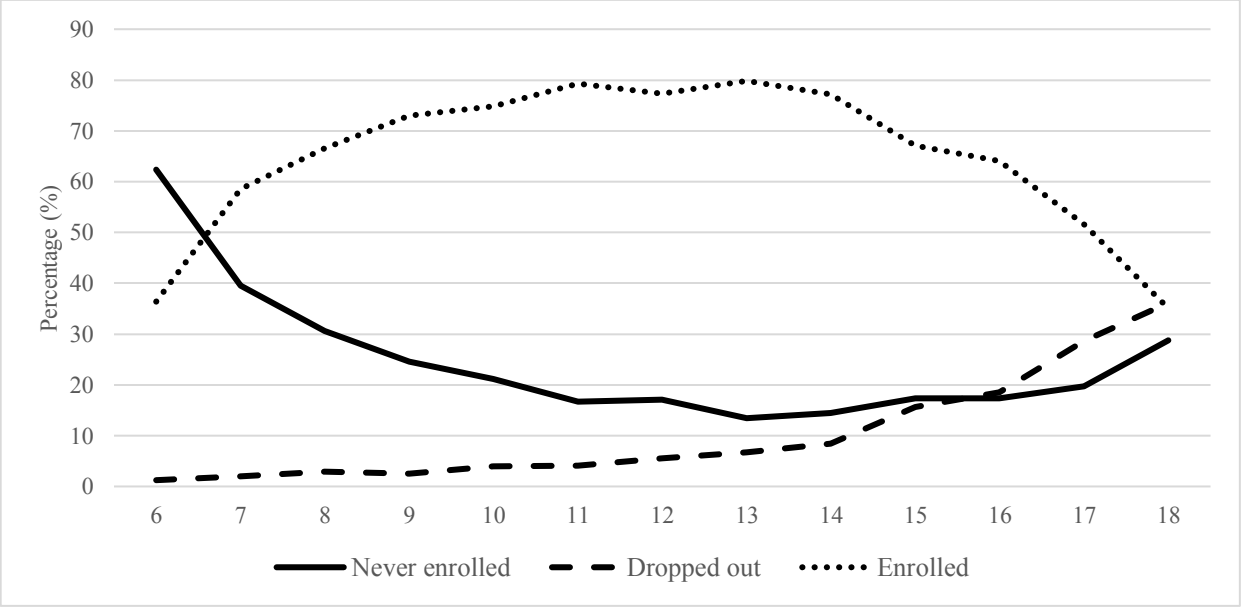
households significantly enroll less and attain fewer years of schooling compared to pupils from households not dependent on agriculture. The second dataset gives specific insights into the school investment decision-making among the smallholders. Time is a variable not controlled for in the models, but it is one variable to be considered when linking the two datasets and making sense of the results. The interpretation of the results does not follow the organization in which the research questions were asked. Instead, it elaborates arguments based on the data and constructs the storyline according to the tracks that the variables seem to create across all the estimated models. Finally, the assumption of proportional odds of the ordinal logistic model is strong and may need a validity test. Firstly, in the two datasets, all the categories of the dependent variables were estimated using the LPM to check for the sign direction. Secondly, although the two datasets are eight years apart, the summary statistics and the estimation results indicate similar trends. This justifies the confidence level for applying the model.

6.1.1 Household Characteristics and Offspring's Schooling in Mozambique

The data indicate that pupils' age decreases the probability of school enrollment. Consistently, the coefficients of age are negative and small (they are close to 1, which means their effect is insignificant in the proportional odds model). Generally, the coefficients are relatively bigger in female-headed households and urban areas. When estimating the models separately by the household head's occupation, the negative effect of age is less observed among the farming households. Since the proportional odds model has the same effect of the independent variables on all the estimated categories of the dependent variable, the interpretation of the weak effect of age on enrollment is more meaningful if "being a dropout" or "never been enrolled" are equally considered. By doing so, the influence of age on schooling becomes less ambiguous. This is because two opposite events happen almost simultaneously. Initially, pupils often delay enrollments (Martinez et al., 2012). As figure 6.1 shows, pupils enroll more as they become older. Concomitantly, pupils also drop out more as they become older. Seshie-Nasser and Oduro (2016) found similar results in Ghana, where boys and girls delay enrollments alike. To confirm this relationship, the results on attainment indicate that pupils' age is strongly and positively correlated

with more years of schooling. Also, consistent, the age variable is stronger within female-headed households and urban areas compared to male-headed households and rural areas. In rural areas and within the farming houses (except if the head is female), age has an insignificant economic effect. As found in Malawi (Jukes et al., 2014), pupil's age mediates schooling and dropping out. For Sabates et al. (2013), in Bangladesh, children's age predicts school dropout rates too. In the case of Mozambique, the effects of age on the probability of being enrolled, never been enrolled, and being a dropout seem to cancel each other. However, for those who eventually enroll, this relationship shows that the effect of age on educational success is a function of the opportunity cost of continuing at school as pupils become older. Therefore, there is an inverted U-shape relationship between age and schooling as depicted by the dotted line (Figure 6.1). Delayed enrollments seem to be systemic in the three subgroups, households dependent on agriculture, those with heads in elementary occupations or senior officials. As will be shown below, delayed enrollments can be caused by a variety of reasons, including low levels of parental education and income (school readiness).

Figure 6.1 Children's Enrollment Status by Age



Source: Created by the author based on Census data 2007 (IPUMS, 2010)

The gender of the pupil has mixed results. It is negatively associated with school enrollment within the male-headed households, rural areas (especially male-headed households). In female-headed households, there is no significant difference in enrollment by the pupil's gender. In fact, in urban areas, including the subsample of households dependent on agriculture, there is no gender difference if the child lives in households headed by a female. In the full samples, girls are less likely to enroll in urban areas, however, the results are not statistically significant, unlike in rural areas where the effect is strong and significant. The negative (insignificant) effect for girls in urban areas may be due to the children living with male heads (tendency to favor boys). But, it also could be that generally there is less unequal treatment of boys and girls if the family is located in urban areas. This is different for the finding by Langsten and Hassan (2018) in Egypt, where enrollments of suburban boys did not increase even after the introduction of the UPE policy. However, if we consider the proportional odds assumption of the ordinal logit model, the findings in Mozambique may be a little similar to those shown elsewhere. It is reasonable to assume that in Mozambique too, suburban families suffer the most from financial pressure (Langsten and Hassan, *op cit.*). In Kenya, Abuya et al. (2013) found that due to extreme poverty, even after the introduction of the UPE programs, children in suburban areas dropped out early, and young adolescent girls were involved in transactional sex. After dropping out, the whereabouts of children in the case of Mozambique are jobs in the informal sector, which, instead of schooling, for the short run, seem to give the best option for the households (Cho and Feda, 2015).

By the head's occupation, households in which the head works in elementary occupations, girls enroll significantly less, followed by agricultural households. Even among the subgroup of the households living on agriculture, girls only enroll less if living with a male head in rural areas. Within the subsample of "officials", boys and girls enroll equally. This can be connected to the location results since most of the people working as senior officials or related activities live in urban areas. For educational attainment, girls are less likely to finish primary education. However, specific sub-samples present non-linear interpretation. In rural households, girls significantly attain fewer years of schooling, irrespective of the household head's gender. Likewise, girls complete fewer schooling cycles if the head works in agriculture (also irrespective of the ender of

the head). Nguyen and Wodon (2014) estimate that the gender gap observed in senior high school completion in Ghana is mainly due to primary school low transitions of poor girls, or from rural areas. Lucas and Mbiti (2012b) show that even after the introduction of free education policy in Kenya, gender differences persist. They also point to the fact that girls have a lower probability of finishing primary education not due to differences in enrollment, but because as they become older, they are more likely to be out of school due to pregnancy or marriage. Early pregnancies and marriages are still prevalent in Mozambique (Unicef, 2015), especially in rural areas. However, if the household depends on agriculture but is located in urban areas, the coefficients become statistically insignificant, especially among female heads. If the head is employed in elementary occupations, girls attain fewer years than boys. Interestingly, in senior officials' households, girls seem to attain more years of schooling (although insignificant). The pattern of educational attainment in urban areas is similar to that of school enrollment. Pupils' education success is not significantly determined by their gender. This shows that the gender differences and parental bias in Mozambique are not as systematic as estimated by Dercon and Singh (2013) in the cases of India, Vietnam, Peru, and Ethiopia.

Although the households average 6 members, family size does not determine schooling in the case of Mozambique. Maralani (2008) found similar results in Indonesia. However, in India, larger families were associated with pulling pupils out from school (Gouda and Sekher, 2014). The age of the household head also exerts insignificant influence on children's schooling and education success. The result of the insignificance of family size might indicate that having more children does not translate into a negative influence on schooling, but it might also indicate that under tight living conditions, the size does not matter because none of the children will stay in school longer. At the macro level, the 2017 census found that family size decreased by one member from 2007, which means that the number of the household members will have even more negligible influence on schooling. The effect of age should be seen more closely. The Mozambique population is relatively young, and as seen in the summary section, there are households with 15-17 aged heads. According to Damon et al. (2016), the low demand for education can be caused by: i) parents not fully knowing the returns to education (including its cost); and ii) household's financial constraints.

Lastly, even if they intend to maximize the number of years of education for their offspring, they may well undervalue it as a result of unawareness of its 'social benefit'. Thus, if the decisions of sending children to school are made equally irrespective of the head's age, it means that there are intergenerational values that are transmitted from parents to children that seem to undervalue education in the context of Mozambique.

The language of instruction is an important instrument in the context of a multi-language country, and it has led to ongoing debates in post-colonial Africa, including Mozambique (Alidou and Brock-Utne, 2011; Chimbutane, 2012). Portuguese is the official language in Mozambique; however, only a minority uses Portuguese at home, let alone it being their mother-tongue. Thus, most of the children only come into contact with Portuguese at school. The debate on the language of instruction (LoI) introduced pilot projects in some regions of the country, with the mother-tongue of the child being used to teach from grades 1 to 3, while introducing Portuguese, to be used from the fourth grade. The data indicate that, significantly, not using Portuguese predicts enrollment negatively. Language has the largest coefficients among those negatively associated with school enrollment: an average of 95% lower odds of being enrolled if the pupil does not use Portuguese at home. When a stratified analysis of whether the pupils speak Portuguese at home or not is applied, the bigger change is observed on pupils' age variable (see Annexes 4 & 5). Pupils' age is positively correlated with enrollment if the household does not use Portuguese daily, while negative odds are observed among the ones using it. As for educational attainment, it occurs the opposite. The result suggests that pupils who speak Portuguese at home are more likely to enroll on time and complete primary education at the official age. In contrast, their counterparts who speak other languages enroll late and are less likely to continue at school as they grow up.

In Turkey, Smits and Hosgör (2006) show that mothers who speak Turkish increase the probability of pupils' enrollment, especially girls. In Mozambique, because Portuguese is the language that increases job opportunities, the negative effect shows that households that use other languages are more likely to delay enrollments as well as dropping out. This can be linked to successfully gaining skills after enrollment. Nakajima et al. (2018) conclude that the literacy skills acquired in the early years of elementary school significantly predict progression and the

likelihood of dropping out. Proportionally, children who do not speak Portuguese inside the household are likely to attain fewer years of education. The coefficients have a similar magnitude effect as that of school enrollment. In both dependent variables, the negative and significant impact is similar irrespective of the categorization by location, pupil's gender, head's gender and occupation. Akkari and Loomis (2020) claim that one huge issue with using LoI not spoken by pupils at home is that, culturally, the education system maintains structures only viable for urban areas (for which the colonial education was designed). Consequently, differences are not only regional (urban versus rural), but, more importantly, they are between the school and home environments.

The educational attainment of the household head predicts schooling positively. These findings echo the ones from Bangladesh, where parental education also prevented dropouts, and children who remain enrolled reported to have more schooling support from parents (Sabates et al., 2013). In the UK, Chevalier et al. (2013) found that low parental education was the mediator on early school leavers than income. Compared to heads with no formal education, parents with primary education completed increase the likelihood of school enrollment. When the head has completed primary education and is a female, the coefficient is negative and statistically insignificant (rural areas), or economic and statistically insignificant across all the other subsamples. It is not clear why female heads would enroll pupils more than their peers who completed primary. However, its insignificance may indicate that there is no difference in decision making between these two groups. Additionally, since the majority of the female heads have no formal education, those who have few years of schooling might be regressed towards zero. Like in the previous research, the findings are sensitive to the sample and model specification (Holmlund, 2011; Pronzato, 2012). The completion of secondary education does predict school enrollment in the full samples and when estimating female-headed and male-headed households or rural areas and urban areas separately. Among the male-headed households (both locations), the completion of secondary education positively and significantly predicts schooling. In female-headed households (rural and urban areas) and agricultural households the effect is positive, but insignificant. It seems that the effect of completing secondary education predicts school enrollment

better in the well-off households. This does not mean that parental education is an irrelevant variable on the decision of enrolling pupils, but that the general educational attainment of the heads among the disadvantaged groups (female heads and agricultural households) is low, and the fact that education is free drives people to enroll their children almost equally.

For offspring's educational attainment, the level of education of the household head has a more straightforward positive interpretation. Better educated parents significantly affect the likelihood of completing primary education. The economic and statistical significances are big in almost all the coefficients; however, the biggest effect is seen in rural areas and within female-headed households. Heads with a secondary education also predict educational attainment better. Studying offspring's income, Sikhova (2021) finds that, in the case of Sweden, parental education predicts it better than parental financial resources. When the data are restricted to the households dependent on agriculture, the effect of education is mixed, especially secondary education. In the full samples, parents who completed primary education completion have better prediction power compared to those with post-primary education. Among male-headed households (full sample and in urban areas), the effect of completing secondary education is even negative (but insignificant). Lundborg et al. (2014) found an insignificant effect of paternal education in offspring's educational outcomes in the Swedish case. Nonetheless, it seems like having some years of education is positively correlated with offspring educational attainment. The negative results among male heads in urban areas who complete more years of education among the farming families may indicate that parents with secondary education and still working as poor farmers do not see the value of education; but it is not clear why the same effect would not be observed among the most disadvantaged farmers (located in rural areas and female heads). One argument in favor of the results is that poor farmers in rural areas do not evaluate their poor living conditions in respect to their educational attainment since there is an unavailability of jobs requiring formal education. In India, Nakajima et al. (*op cit.*) note that the positive effect of fathers' education on girls' completion of upper primary might be as response to the low cost of sending them to school after the abolition of school fees.

Consistently, female heads are positively associated with the probability of school enrollment and the completion of primary education. In terms of enrollment, in the full sample, female heads in urban areas produce better coefficients. By the head's occupation and gender, there is no significant difference in enrollment among the senior officials' households, and the bigger effect is observed among elementary occupations, where female heads outperform their male counterparts by over 50%. In the restricted sample of households dependent on agriculture, female heads also outperform the male counterparts, even more so in urban areas. Equally, for attainment, pupils living with a female head have better educational outcomes than pupils living with a male head, and also urban areas produce larger gains (including when the sample is narrowed to farming families). Like in the case of school enrollment, among the senior officials' households there is no significant difference in attainment by the gender of the head. The findings are straightforward, but the reasons behind them are not. Female-headed households are likely single-parent houses, less educated and poorer. However, they still outperform their male counterparts. According to the literature on household's endowments, parents start to respond and invest differently in pupils depending on how they perceive their abilities even when measured by birth weight; highly endowed children receive more investment (Datar, 2010; Aizer and Cunha, 2012). In the African continent, the same results were found in Tanzania (Adhvaryu and Nyshadham, 2011) and Burkina Faso (Akresh et al., 2012).

The results for the case of Mozambique may be that in male-headed households, parents with financial constraints are more likely to invest in children as a response to their endowments and abilities, while within female-headed households, children are treated more equally. This argument can be attested by the fact that in urban areas there is less gender differences even when pupils live with a male head. Related to male heads, the study controls for mother's education among the male-headed households. Educated mothers, even with few years of primary, increase the rate of enrollments and the likelihood of finishing primary education (the effect is statistically significant in urban areas). Mother's education has a much stronger positive effect on attainment. The gain when the mother completes secondary education is double that of those who finished primary education. The results also indicate that mother's education predicts education better than

father's education. These results confirm previous findings that mother's education is a better predictor of schooling than father's education (Lundborg et al., *op cit*; Erola et al., 2016). Only Chevalier et al. (2013), after applying instrumental variables method, found that the strong effect disappears. In the sample of households living on agriculture, the variable for mother's completion has the largest coefficients among all the variables that positively predict schooling in the estimated models. Because, in the case of Mozambique, the reality is of uneducated parents with meager incomes, the substitution effects of one on another may differ from those in developed countries where parents have at least moderate levels of education and income.

In the literature, parental occupation/status (or wealth of the household) is linked to better educational outcomes. For example, Bukodi and Goldthorpe (2012) found that parental status has a strong relationship with schooling, irrespective of the pupil's gender. In Mozambique too, for the case of wealth, it seems like the results are straightforward. Better-off households (proxied by the occupation of the head) attain better educational outcomes from the start. Even though some studies find only a modest effect of income on schooling (Chevalier et al., *op cit*.), compared to farmers, senior officials and parents employed in elementary occupations enroll their children more, and enjoy better educational success. Income may be important as a school-readiness indicator (Glick et al, 2011). Among farmers, those who have secondary off-farm jobs have better and statistically significant outcomes for male heads in rural areas. However, occupation seems to not matter significantly among female heads, irrespective of the location of the household. An argument could be that in the case of Mozambique, professional jobs, especially around 2007 (census data), are mostly occupied by men. Women, if not farming, are employed in low-paying elementary occupations such as owning a small shop, selling crops, etc., which does not give them strong consumption differentiation with women who exclusively live on farming. In fact, almost all heads employed in elementary occupations, if in rural or suburban areas also farm. That is why professional occupations have stronger differentiating effect in urban areas.

More importantly, children living with a head working as a senior official or in elementary occupations have equal opportunities. Among elementary occupations, girls only enroll less if located in rural areas. When living with female heads, girls are even more likely to be enrolled

than boys. But in urban areas, irrespective of the head's gender, pupils' gender is weakly correlated with schooling. In senior officials' households, boys and girls enroll even more equally. The strong effect of female heads over male heads also disappears. Because this subgroup is more educated, post-primary has larger effect on offspring's school enrollment. In terms of educational attainment, among elementary occupations' households, differences by gender are only observed in rural areas. However, female heads significantly increase the likelihood of finishing primary education. Among the senior occupations' households, the results seem to be the opposite. Girls are more likely to finish primary education, irrespective of head's gender and the location of the household. Although female heads still outperform their male counterparts, the effect is reduced and insignificant. In short, due to delayed enrollments, the effect of pupils' age on schooling is generalized among Mozambican households. However, girls tend to significantly enroll less and attain fewer years of education if living in disadvantaged areas or with male heads employed in agriculture. In female-headed households, and better-off households, girls and boys enroll equally, and the former tend to outperform the latter in long run, estimated by the probability of finishing primary education. Finally, inequalities whether from pupil to pupil and from household to household are more pronounced among male-headed households, female-headed households tend to have very similar outcomes.

6.1.2 Mozambique Smallholder Household Characteristics and Offspring's Schooling

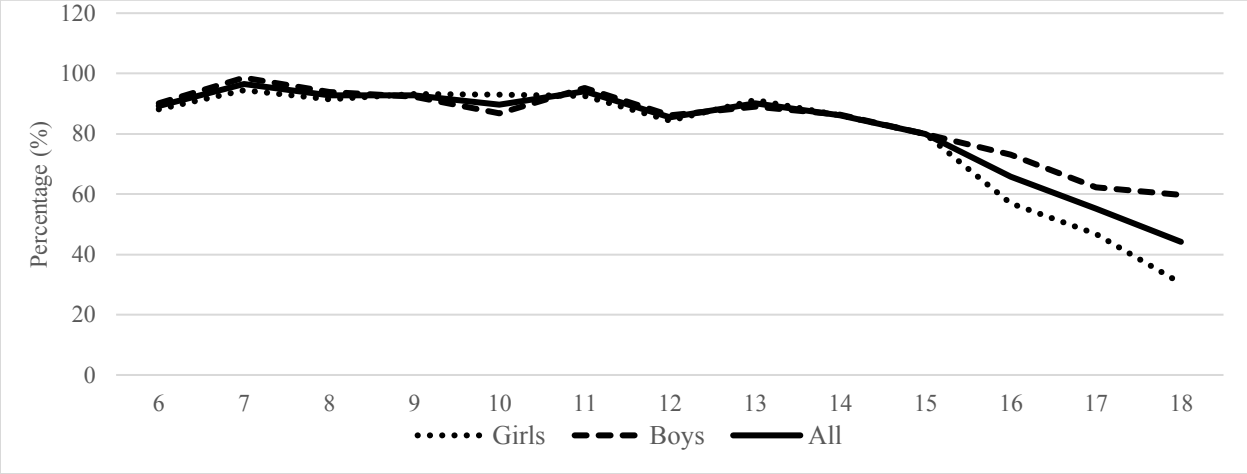
From the discussion in RQ1, pupils' age significantly influences enrollment. Even after the massification of education and reduction in the cost for the demand side, some, if not most, of the households delay enrollment one to two years. Consequently, pupils do not finish educational cycles on time, and in the worst-case scenarios end up dropping out of school. The data of the RQ1 are consistent across all the three subgroups: households in which the head works as senior officials, elementary occupation households, and farming households. However, children from the last group enroll less and attain fewer years of schooling. The historical perspective of the 2007 census data should not be ignored. The country was coming from already low educational outcomes, in part due to the civil war that had ended only a little over a decade earlier. Even when governmental

programs create jobs, they are low paying jobs in agriculture that do not differ much from the daily drudgery of the households dependent on farming (Cho and Feda, 2015). The disadvantages of the smallholders start from consumption to wealth status which leads to under-participation of their offspring in education. Most farm for subsistence. In fact, according to the Ministry of Agriculture, only 1% of the population involved in agriculture is entirely commercial (combining medium and big farms). And still, smallholders produce the majority of the food consumed in the country. The fact that their offspring enroll less and dropout more should be investigated closely in order to understand the motivations behind those decisions/occurrences. By applying the 2015 smallholder dataset that collects the living conditions and the household spending behaviors and investment decisions, the study can unveil: i) the characteristics that explain offspring's schooling among the farming families, and ii) captures the time change from 2007 to 2015, and how that affects schooling.

The smallholder households' data capture school attendance and educational attainment. Starting with attendance, although 83% of children aged 6-18 reported to attend school, the estimation results still show that school attendance is age dependent. The results indicate that pupils' age is negatively associated with attendance. To better illustrate this relationship, figure 6.2 shows attendance in the full sample by age. After 13 years, the probability of attending drops consistently and significantly. Across the three categories – full sample, female-headed households, and male-headed households – pupils attend 3% less when their age increases one year. The results are similar when the samples are grouped by location and gender of the pupils. On the other side, pupils' age significant and positively affects educational attainment. The results are closer for both boys and girls, but the coefficients for the latter are bigger. It seems that for attendance, pupils' age has a similar effect among boys and girls, but, for attainment, the effect of age is stronger for girls. This indicates that girls delay enrollment even more than boys. As a consequence, girls are more likely to engage in household chores, as found in India (Nakajima et al., 2018) and in Ethiopia (Orkin, 2012). Nonetheless, the data do not measure that relationship directly, but it is reasonable to consider that girls may start working at an earlier age. As children become older, Cho and Feda (*op cit.*) estimate that in Mozambique, by the age 15, 70% and 90% of youth is employed as part-

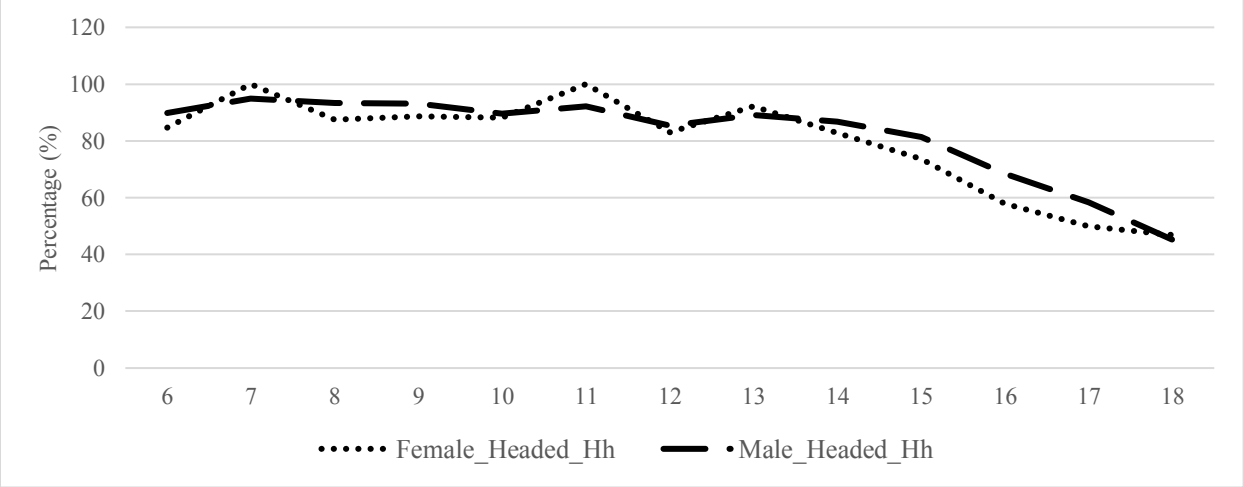
time or full time in urban and rural areas, respectively. If the opportunity cost of continuing schooling at the same time they work is high, it leads to dropouts, especially among the poor and the older groups. In developed countries like the US, high schoolers' part-time jobs do not significantly affect their school performance (Buscha et al., 2012). As found by previous studies, as pupils age, school time may be understood as prevention of other life engagements such as working, matrimony, and childbearing (Zuilkowski et al., 2016).

Figure 6.2 Pupils School Attendance by Age (All)



Source: Estimated by the author based on CGAP data (2015)

Figure 6.3 Pupils School Attendance by Age (Grouped by Head's Gender)



Source: Estimated by the author based on CGAP data (2015)

The results for the influence of the pupil's gender on school attendance is mixed. Overall, girls attend less than boys. Among female headed-households, the coefficients span from negative and insignificant to positive and insignificant. However, the variation among male-headed households shows that girls attend school less frequently than boys, and the coefficients grow larger when the households receives remittances. The significant negative school attendance for girls is also strong when they live in rural areas. In urban areas, girls seem to attend more than their peers, although the coefficient is small and insignificant. It can be linked to findings from Egypt, where boys in suburban areas have higher odds of not attending school or having dropped out (Langsten and Hassan, *op cit*.). Even though the sample is limited, the findings from Mozambique do not seem to be as extreme as Bangladesh, where boys were almost two times more likely to dropout from school (Sabates et al., *op cit*.). It indicates that among smallholders in urban areas, boys and girls attend school equally. The estimation results for the likelihood of finishing primary education are mixed too. When restricting the model for the age group 12 and 13 (in principle, pupils should finish lower primary at the age 11), girls have better odds of having completed the first cycle of primary. In the older sample (aged 14-18 years), probably regressed to the mean by the male-headed observations, girls significantly have lower odds of completing primary school. Conversely, among the male-headed households, boys perform better in terms of attainment. However, in female-headed households, girls seem to perform better. It is not clear whether among the smallholder farmers, parents favor pupils with same sex as them, or simply there are more equal opportunities among female heads, and girls have better performance. One fact that seems to hold is that under financial constraints and disadvantaged families, boys benefit more than girls, while in advantageous families it seems that both are treated equally. In the US, Brenøe and Lundberg (2018) found that boys benefit the most in advantageous households.

There are no statistically significant differences in attendance by the gender of the household head, but the economic interpretation, according to the sign of the coefficients, is mixed. Before controlling for remittances, male heads positively affect attendance, but after, female heads outperform their peer. Separately, by restricting the samples for boys, girls, rural, and urban areas, female heads are negatively correlated with school attendance. However, after controlling for if

the household receives remittances, female heads have positive influence on children's school attendance for girls, and if the household is located in rural areas. For attainment, compared to female-headed households, the existence of mothers in male-headed households should, in principle, mediate the schooling decisions and outcomes in favor of the latter. The reality is that female heads outperform their male-counterparts, in both the younger sample, and the older one. The results are stronger in the older cohort, in which, after controlling for remittances, female heads double offspring's probability of finishing primary education. Studies by Riphahn and Schwientek (2015) in Germany, and Lundberg (2017) in the US find that the rising rate of single-parent houses negatively impacts boy's educational attainment, thus the reversal gender gap, and college enrollment is significantly associated with the father's absence/presence. However, since in the case of Mozambique female heads are associated with better educational outcomes, this seems to be a special case of developed countries. The data from Mozambique ascertain the findings by Carneiro et al (2012), that mother's education solely does not influence children' outcomes; but, that there are channels in which the transmission occurs, such as the household environment. For example, in developed countries, mothers are more educated, likely to be married and have better-educated spouses. However, studies in Malawi and South Africa found that, irrespective of their educational attainment, mother's survival was a strong predictor of schooling (Moyi, 2010; Fleisch et al., 2012). It looks like in Mozambican society, female-headed households, despite the constraints they face, provide a better environment for educational success of the offspring.

The results for the influence of parental educational attainment on attendance are mixed. Compared to household heads with no formal education, heads who attended some years of primary education have a negative association with children's school attendance. The exception is when the variables for remittances and land size area are included in the model. Separated by location and by the pupil's gender, parents with few years of primary education consistently do worse compared to their peers with no education. When estimating educational attainment, parents with few years of education positively influence attendance in the full sample. Additionally, they negatively correlate with attendance among female heads, and they have no significant difference

in children's attendance with "uneducated" parents. Kazeem et al. (2010) found inconsistent effects of educated versus uneducated mothers on girls. The reason for these results might be that parents who attended some years of primary education and dropped out are biased against education, and, thus, tend to undervalue education. On the opposite side, parents with no formal education may be willing to send their children to school so they can be better educated, in comparison to them. Another reason, supported by the results among male-headed households, might be that among parents who have some to no formal education, the motivation of sending children to school is independent from their own levels of educational attainment. The hardness of modeling better educational estimations especially in developing countries might be linked to decision making toward schooling within the household. In mixed-methods research in rural Kenya, Zuilkowski et al. (2016) quote primary school children who said that they decided to drop out because they could not understand the contents or do well on tests; and, more concerning, pupils were the primary decision-makers, rather than parents. In the case of Mozambique, attendance behaviors among the smallholders may well resonate with the Kenyan reality of disadvantaged households. Thus, the share of pupils having poor achievement and how that influences their decision to attend school is unknown (also see Kuépié et al., 2015). Additionally, late enrollment hinders their performance too, since studies have found that younger pupils tend to perform better than older ones irrespective of pupils' gender, family background, and location (Hungi et al., 2014).

Different from these results, parents with either primary education or post-primary positively influence school attendance. The coefficients for when the household head completed primary education are strong within female-headed households, or within male-headed households after controlling for remittances and land size. For the likelihood of finishing primary education, household heads with primary or secondary education completed outperform household with an uneducated head. Post-primary education has better coefficients in the full sample, but restricted to male-headed households, the data show stronger coefficients for heads who completed primary education. This does not imply that secondary education or higher are weakly correlated with education, but that, among the smallholder farmers, the majority did not go beyond primary. Even

in developed countries, where the average parental education is higher, its causal inference on offspring schooling is not clear-cut (Holmlund et al., 2011). Within male-headed households, mothers with primary or post-primary education are significantly correlated with school attendance, and increase the probability of finishing primary education. Glick et al. (2011) cite the time spent with children as the mediator of the strong effect of maternal education over paternal; however, in the case of Mozambique, that does not translate to girls benefiting more (even in single-mother households as seen above).

One proxy for income is the consumption calculated using the poverty line cutoff. The poverty line of $1.25/day indicates that children living in households above the threshold are more likely to attend school. The results are statistically significant among male-headed households and boys. It indicates that among female-headed households and girls, it is beneficial to live above the cut-off of the poverty line, but it does not give significant advantage. Although negative (but insignificant) for the cohort aged 12-13 years, in the older cohort, being above the poverty line threshold is positively associated with educational attainment. The coefficients are statistically significant among male-headed households before controlling for remittances. Poverty status gives mixed results, unlike in rural and poor Turkey, where Smits and Hosgör (2006) found that income was a significant estimator of schooling, especially for boys. In some African countries, poverty status predicts the likelihood of continuing school (Zuilkowski et al., *op cit*.; Abuya et al., 2013; Branson et al., 2014). Also, in the US, children from disadvantaged households, even after the provision of free or reduced-price lunch at school, still attended less and did not improve in performance (Morrissey et al., 2014).

Interestingly, all the households report that pupils aged 6-12 do not participate in agriculture. For those aged more than 12 years, contributing to farming is negatively associated with school attendance; however, the effect is stronger and significant within the girls' sample. Contributing to agriculture does seem to significantly affect educational attainment. Among the smallholder households, consistently, land size does not seem to significantly influence neither school attendance nor educational attainment. At least two reasons can be attributed to it. First, smallholders who farm for subsistence, when they acquire land, might not carefully choose the

richer one for agricultural production. Additionally, most smallholder either inherit or get the land from family members and acquaintances which lessens the probability of selecting more fertile farms. Second, for the case of smallholders with large land sizes, they do not farm in all the available land since the work is done manually; thus, the negative effect on schooling that would be expected from pupils engaging in more farming practices is weak. The last argument to consider is land possession versus no possession, which in Mozambique is not a strong one. However, Gouda and Sekher (2014) found that, in India, land size on schooling is only significant if less than 1ha compared to those with no land.

The household wealth index confirms that better-off households enjoy better schooling and educational outcomes (see Gouda and Sekher, *op cit.* in the case of India), but the differences among the quintiles before and after controlling for remittances are worth looking into more carefully. In the full sample, compared to the top quintile, children from the fourth quintile significantly attend less, lesser than those from the three-bottom quintiles (before controlling for remittances). After controlling for remittances, children from the bottom three-quintiles have lower probability of attending school (similar coefficients). Among female-headed households, children from the top quintile attend better than the other four quintiles, but all the coefficients are statistically insignificant. Additionally, before controlling for remittances, the coefficients are considerably small. After controlling for remittances, the order of less likelihood of attending compared to the fifth is as follows: fourth, second, third, and first quintiles. Therefore, it seems there is less systematic schooling differences among female-headed households by the household wealth index. Among male-headed households, statistically significant results are observed in the fourth and third quintiles, followed by insignificant coefficients of the second and first quintiles (before controlling for remittances). After remittances, the inverse occurs, statistically significant from first to third quintiles, and insignificant in the fourth. It seems like without remittances, the third and fourth quintiles attend less often than the top quintile, while after remittances, the bottom three quintiles are harmed the most. When restricting the sample to explore the differences within-location and the within-pupil's gender, all the children not living in the wealthier quintile attend less. However, the results are only statistically significant if the pupil is in the fourth quintile while

living in rural areas or is a boy. After controlling for remittances, girls' differences in attendance are still statistically not significant. However, for pupils coming from rural areas and among boys, all the coefficients of the four quintiles against the fifth are statistically significant. The data show complex internal relationships among quintiles, but children in the top quintile attend more than their peers. Similar results on the impact of socioeconomic factors, measured by wealth quintiles, on schooling were found in Nigeria by Kazeem et al. (2010).

Next, we analyze the household's wealth index and attainment. Again, the analysis considers differences among the bottom four quintiles in comparison to the top, and before and after controlling for remittances. Overall, there is a significant lower probability of finishing primary education when coming from the poorer quintiles. In the cohort aged 12-13 years, pupils living in the first, second, or third quintiles have 70% lower odds of completing lower-primary education. Pupils from the fourth quintile, also attain lower-primary than the fifth, but the effect is half that of the bottom-three quintiles and insignificant. In the sample of the cohort 14-18 years, all coefficients of the bottom-four quintiles are significantly associated with lower likelihood of attaining more years of school. Pupils living with female heads only have strong and negative association with attainment if in the first and second quintiles. When living with a male head, the negative effect is strong and statistically significant in reversed order, from third to first. After controlling for remittances, the coefficients change, but the premise is the same: all the four quintiles (both age-cohorts) are significant and negatively correlated with education attainment, compared to the top quintile. The results for female head are omitted due to the insufficient sample size. In male-headed households, irrespective of the quintile, if not living on the top, the probability of attaining more years of education are smaller. The order of the negative effect on the quintiles is as follows: third, second, fourth, and first. These mixed findings, as suggested by Fleisch et al. (2012) for the case of South Africa, show that poverty alone does not explain attendance and educational attainment. Since we first use poverty line threshold, and the wealth index is categorized by quintiles, the estimation does not seem to underestimate the effect of income as result of putting "little weights to the large marginal effect" among the poorest, as evidenced by Løken et al (2012).

Surprisingly, when the household receives remittances, pupils are less likely to attend school. The magnitude of the coefficient is higher within male-headed households. When the sample is restricted by the pupil's gender, boys' and girls' attendance is negatively affected by receiving remittances equally. However, all are statistically insignificant. The negative effect of receiving remittances on educational attainment is statistically significant. In the younger cohort (aged 12-13 years), when the household reports to receive remittances, the pupils have 65% odds of not finishing lower-primary. In the group of 14-18 years, children's odds of completing primary education reduce by 46% when the household receives remittances. Among male-headed households, the odds reduce by 32%. The initial hypothesis would consider that remittances increase household wealth, and, thus, school enrollment, attendance, and educational attainment. Smallholders' data do not indicate so. A similar case was found by Shimamura and Lastarria-Cornhiel (2010) in Malawi. Households that received agricultural credit decreased girls' school attendance. The researchers note that the result does not suggest that girls work more after the household enters into the credit program, but that irrespective of gender, pupils simultaneously work and attend school.

Among smallholders in Mozambique, it looks like as long as the pupil is enrolled, the reception of remittances does not do much harm to attendance. The important take from the results on attendance is that male-headed households suffer the most. Unfortunately, the sample size limits the depth of the analysis, but the results on the restricted samples of the cohort-groups 12-13 and 14-18, and male-headed households indicate that the bigger harm is done to educational attainment. In the case of Mozambique, it looks like the household members who send remittances are more likely to be the offspring. Because there are no data for within-sibling variations, it is not obvious what is happening inside the households. It might be that children in poor households quit school equally as response to poverty; but, it could also be that because of an older brother or sister being already employed in income generating activities in urban/suburban areas, younger siblings are more likely to quit too. This last argument can be supported by the group aged 12-13 years. When pupils should have finished lower-primary, they are still negatively influenced by remittances. Their attendance is also negatively influenced by remittances. Because there are no gender

differences for pupils, it seems that boys and girls equally attend less school and attain fewer years of school when the household receives remittances. However, it can be assumed that girls do more household chores, because the negative effect of when pupils contribute to agriculture is stronger for them. In other countries, studies only considered that adults migrate and remit to their regions of origin. That is why, when the absence of a father or mother has a negative effect on schooling, the reception of remittances seems to mitigate the relatiosnhip (Amuedo-Dorantes and Pozo, 2010; Hu, 2012; Zhao et al., 2014; Bouoiyour and Miftah, 2015). Wu and Zhang (2015) estimate the effect of migration on the pupils' side and find that those who migrate are less likely to be enrolled than those born in host cities.

Pupils living in rural areas attend school less than their peers from urban areas. The only different result is among female-headed households after controlling for remittances, where children from rural areas seem to attend school more; however, before controlling for remittances, pupils living with female heads in urban areas attend better. The data show that larger differences are also observed among male-headed households after controlling for remittances, and among girls. This might first indicate that male-headed households in rural areas are more likely to have their children engaged in income generating activities. Another argument to explore is that if girls get married as they proxy 18 years, they can send remittances if they are in better-off households (which can also show a negative relationship between remittances and schooling). It is not clear which direction the data point to. However, it does not strongly confirm the results by Fleisch et al. (*op cit*.), who find that cultural parental attitudes are more influential for gender differences. The results also hint that farming households headed by females in suburban areas are more likely to have children working for money too. This might be because they live in areas where income generating activities are more available and financial pressure is more felt. Lastly, girls from rural areas either are more engaged in household chores, or they simply attend less than those in urban areas. For example, King et al. (2015) found that rural girls in Kenya were more likely to drop out or be absent from school due to sickness (malaria) and menstruation (lack of sanitary pads). The results on boys might be more connected to the reality of the country, which is boys work for income equally, whether in rural or in urban areas. For attainment, location has a stronger

differentiating effect. Pupils living in urban areas are more likely to finish primary education. However, even by location, the mediation of age has to be highlighted. In the younger cohort (12-13 years), there is no strong difference in the likelihood of finishing lower-primary by the location of the household. These findings confirm the ones by Branson et al. (2014). In the older cohort (14 years or more), living in urban areas more than doubles the odds of finishing upper-primary. This can be related to the opportunity cost, suggesting that schooling is much costlier in rural areas, or at least is harder to simultaneously work and attend school.

6.1.3 Parental Expectations in Smallholder Households and Offspring's Schooling

After controlling for the proxy variables of expectations, the coefficients reported above do not significantly change; therefore, we will only highlight few variables. Pupils' age continues to significantly and negatively associate with attendance. When children become older, they become engaged in more chores, either inside the household or outside. As seen above, age is a significant factor that influences attainment. Pupils already finish lower primary overaged due to late entrance. Compared to boys, girls attend less and have lower probability of finishing primary education. Despite girls' lower performance and women being less educated in Mozambique, female heads outperform their male counterparts in both attendance and educational attainment. Compared to the top quintile, the second and third quintiles have more negative influence on children's attendance, followed by the first and fourth quintiles. In terms of educational attainment, children from the third quintile are less likely to finish primary school, followed, respectively, by the second, first, and fourth quintiles. The reasons for this distribution, showing that children in the middle quintile attend less and have lower odds of finishing primary, even in comparison to the poorest, may be that children from these households are more likely to simultaneously attend school and engage in some type of paid work. This is why a linear estimation of income only produces unbiased coefficients if the household is above a certain threshold, not the cutoff captured by the adjusted consumption level or the standard $2.25 poverty line. In rural areas, where only a minority has a regular salary, the effect of income shown in some research might very well be overestimated.

Finally, children living in farming households that receive remittances significantly have lower odds of completing primary education.

Next, we focus on interpreting the two proxies of expectations, and draw general inferences between parental/household aspirations and offspring's schooling. The hypothesis for the first one, if the household head considers agriculture a business, is that parents who respond positively will underestimate the value of education, and therefore, their children will attend less, and attain fewer years of schooling. For the second variable, if the household head has a secondary job, the assumption is that children from households where the heads respond positively will attend and finish primary education more often than their peers. This is linked to wealth status. Heads employed in off-farm activities are more likely to be in any kind of paid jobs; thus, the expected positive association with educational success. The data do not fully support these two hypotheses. First, pupils from households that consider agriculture a business are more likely to attend school. After some interventions, similar results were found elsewhere. In rural Ethiopia, Bernard et al. (2014) found that farmers who watched a documentary of other rural agricultural populations who were portrayed as successful in business linked to farming, after six months, had high aspirations; they also saved and invested more (including in education), and their children enrolled more compared to the control group which watched an entertainment video. In poor Mexico, educational attainment increased after parents were exposed to professionals from diverse backgrounds (Chiapa, 2012). In the case of Mozambique, the fact that children living in households where the heads consider agriculture a business attend school more might show at least three aspects: firstly, expectation of succeeding, whether in business or finding a job as a paid professional, might be catalytic in sending children to school, but not the act of successful farming and farming-related business. Secondly, it may show that smallholder heads who consider agriculture a business, do it in respect to them, not to their offspring (as assumed in Hypothesis 3.1); thus, considering agriculture a business does not make parents want their children to engage in agriculture in the future. Lastly, it might also be that children enroll and attend school irrespective of their aspirations, and that is why delaying school entrance is a general phenomenon in Mozambique, especially among the farming households.

Expectations and aspirations are future-motivated behaviors. Aspirations can have a positive effect, by enhancing educational attainment, but they can also widen the gap among socio-economic groups (Pasquier-Doumer and Brandon, 2015; Janzen et al, 2017). Contrasting the findings of attendance, children whose household heads consider agriculture a business have lower odds of finishing primary education. It seems that children attended school even when their parents considered agriculture a business; however, in the long run, it looks like they lag behind. Many factors can be outlined. Parental aspirations increase attainment because they indicate hope (Graham and Ponzuelo, 2021). It is unknown if, among the smallholders in Mozambique, parents who do not consider agriculture a business bet on school for the future of their children, thus, persisting in investing in education in the long run. Besides, parents who consider agriculture a business might be willing to enroll children in the first place, because, as pointed out, they do not want their children working as farmers. Parents may be aware of the fact that, to succeed in business, one has to combine personal skills and abilities as well as the surrounding business environment, which they do not control (Filmer et al., 2014).

Another issue is to what extent agriculture is linked to entrepreneurship. A study by Robb et al. (2014) reports that in Mozambique, Kenya, and Ghana, young entrepreneurs constantly talk about not receiving support from family and friends in their endeavors. Additionally, in the three countries, people cite cultural behaviors such as seeking "quick money", giving products out for free, and some rooted cultural values as impediments to successful entrepreneurship. The reality is, as time passes, parental bias against education grows, leading to less motivation in keeping children at school. Briley et al. (2014) find that aspirations change over time. In the case of Mozambique, if, in the first place, the choice of education among those who believe agriculture is a viable business is not the dominant one, and they do not change their position over time (maybe influenced by children's performance), the opportunity cost of continuing to send children to school is higher for the household. In India, Ross (2019) finds that children's own aspirations at the age of 12 increase their educational attainment when they turn 19 years old. Among the smallholders in Mozambique, it was shown that by the age 12, the majority has not completed lower primary, and also starts to significantly drop out of school. Therefore, the hypothesis that,

in the long run, children whose parents consider agriculture a business undervalue education is validated, even if only weakly.

Children living with a household head who has a secondary job attend school less than those living with a head only engaged in agriculture. The coefficient is bigger in the restricted sample of female heads than within male head. For attendance, because the coefficients are small and statistically insignificant, it shows that children who have household heads with a secondary job attend less, but the difference with their peers whose parents only work in agriculture is small. This is attested by the fact that the coefficients are larger among female-headed households, where most are single mothers. It seems like the time that female heads, without a secondary job, spend with children make up for the income constraints, as found by Gayle et al. (2018). Among the male-headed households, mother's presence seems to mitigate the negative effect. Although, in the case of developed countries, research has been focused on performance and attainment; the same results were somewhat found by Baker and Milligan (2013).

Linked to that, for educational attainment, children from households in which the head has a secondary off-farm job have lower odds of finishing primary education. Even in male-headed households, the mother's presence does not seem to significantly offset the negative outcomes. The corresponding rationale differs; however, these results are more in line with previous findings. It was hypothesized that the income that household heads obtain from engaging in a secondary job would be dominant over the time spent at home. The reasoning was that in farming households, wealth status is a critical predictor of schooling; therefore, parents with more disposable income would be more likely to have their children enrolled and attending school. However, Erola et al. (2016) found elsewhere that the time parents spend with children at home is a significant estimator of schooling outcomes, especially the maternal time. Similarly, Ermisch and Francesconi (2013) estimate that mother's employment is negatively associated with young adult's educational attainment. Holmes et al. (2018) claim that the mother's employment substitution effect is stronger than the income effect. And highly educated mothers spend more time with their offspring (Kalil et al., 2012). Due to the low parental educational attainment of almost all the smallholder farmers, this argument does not entirely hold. As attested by mothers' presence in the case of the male-

headed households, it seems like having an adult present at home is a significant driver of attendance and attainment. Another aspect might be that the household heads who stay at home develop more motivation to keep the offspring in school so they do not end up with limited choices like them in the future.

One issue with income is that, even in the cases of cash transfer, the received money can be used for other consumption items rather than spending it on education (Del Boca et al., 2014). This reasoning applies for the case of the households dependent on farming in Mozambique; as seen in the summary statistics section, only a small number of households reported spending any money on education. To prevent that, small cash transfers to fathers, unconditional to school enrollment, but explicitly for helping educational expenses, have been shown to enhance school participation, by reinforcing that education is a worthwhile investment (Benhassine et al., 2015). As found in the cross-country study by Ganimian and Murnane (2016), the provision of information about the returns to schooling motivates parents to invest in education, and improves children's performance and attainment. But, it is also critical to consider cases in which these efforts were not as successful as expected. Loyalka et al. (2013), in rural China, found that counseling and provision of information of the importance of high school, not only did not improve enrollment, but it increased the probability of dropouts. Jensen (2010) found that even though in the literature there is an emphasis of the returns to education, Dominican eighth graders had extremely low perceived returns of investing in schooling. This may be a mismatch between the estimations done by studies and the reality of the daily decisions of the financially constrained households. For the former, in the long run, education is the best investment for the offspring; but, for the latter, in the short run, education is a timely and financially consuming item.

6.2 Limitations

Mainly, due to data availability, the study has some limitations. Firstly, the applied dataset for RQ1 is the national population and housing census data (2007). The National Institute of Statistics conducted the following 2017 census; however, as of June 2022, the data are not publicly accessible. Aware of the fact that even if we had the latest census data it would not be panel in

nature, it would have made it possible to assess the time-change in schooling among all Mozambican households before estimating the smallhoder households' dataset. The validation of using the 2007 census data is that, as presented above, the educational indicators in primary education in the case of Mozambique are becoming worse. Thus, even if the narrow factors that explain such reality are different in the period 2007-2017, the broader and general factors are the same, since the macroeconomic level of the country, especially from the demand side did not significantly change.

The second limitation linked to the 2007 census data is the superficiality of the variables collected, making it impossible to apply better models that could address causality, or at least provide more description about the household characteristics in Mozambique. For example, for children, it captures enrollment as "never enrolled", "enrolled", and "dropped out", but it does not ask why children have never enrolled or dropped out. As Nkrumah and Sinha (2020) concluded in their review of the literature on schooling in Sub-Saharan African, more micro-level assessments of the reasons why children enroll and dropout is needed, especially from the children's story side. Qualitative interviews in Kenya found that children were the primary decision-makers of school related-issues, including when they dropped out (see Zuilkowski et al., 2016). In addition, there are no variables that directly capture the household wealth. Most studies calculate the household wealth index based on items or products owned by the family. Therefore, with the 2007 census data, direct household wealth was not captured.

The third limitation of the study has to do with the smallholder households' data. Firstly, the data were not collected with the objective of assessing households' investment decisions on education. The objective was to investigate the demand for agricultural financing through credit intake or household income, and the use of digital technologies among the smallholders. In principle, this limited the collection of variables related to education. Secondly, as a consequence, there are sample size constraints, especially with a lack of a deeper investigation into the livelihoods of female-headed households. It would have been productive to understand whether expectations in female heads are higher, or the pressure of being disadvantaged makes them value education more than the male-headed households. Or it could be that male-headed households

seem to be wealthier because children start working earlier. The reduction in the sample size also made it impossible to study the variations in terms of pupils' gender, especially within female-headed households, and urban areas. In some cases, there were not enough observations.

6.3 Conclusion

Education continues to be the most efficient way of lifting people out of poverty. Educated citizens engage in more productive and better-paying jobs, contributing to the enrichment of the economy of nations. To be successful, even the path to mechanized agriculture and jobs in the secondary sector of the economy in developing countries requires a minimum level of schooling. Apart from the direct financial gains to individuals or enterprises, education has also been extensively estimated to improve other aspects of human capital formation, which brings social gains to countries. Given all these positive aspects of education, on the one hand, each country has internal programs aiming at increasing the school participation or improve schooling outcomes, and on the other, international efforts have been drawing common goals to increase the overall education of populations, especially the inclusion of the poorer pupils and disadvantaged groups. By the end of the Education for All (EFA) movement and the Millennium Development Goals (MDGs) in 2015, the increase in enrollment all over the developing world was substantial. However, due to the recognition of ongoing challenges, the subsequent Sustainable Development Goals (SDGs) did not ignore education. By 2030, SDG4, dedicated to education, aims at an equitable participation of children and youth to a quality primary and secondary education, starting with quality pre-primary. In addition, it encourages investments in technical vocational education, to make it more affordable and increase the number of higher education graduates. The final goal is having populations equipped with literacy, numeracy, and relevant skills that lead to financial success and "global citizenship". One issue inherited from the MDGs is that if we measure education by enrollment, most countries increased enrollment to levels even above projected. However, when we assess attendance, and, more importantly, attainment, children enroll but do not stay longer at school, leading to high rates of dropouts. It is true too that the world has been grappling with educational quality and learning crisis from elementary school, but the reality in developing countries is still

pupils who enroll late, or if they do, they eventually dropout early due to financial constraints and the opportunity cost that rises as they become older.

Why pupils enroll late is not fully clear. It is a mixture of socioeconomic, cultural, and family structure factors, ranging from low level of parental education, which may lead them to think that the pupils are still too young to enter school, to who the child lives with (biological parents, orphan of at least one parent, etc.), and household income (see for ex. Seshie-Nasser and Oduro, 2016). It is also known that pupils who do not attend pre-primary are more likely to delay enrollment, and it is equally known that pre-primary is not available to the majority of the population in developing countries (suburban and rural areas). Capturing those who do not enroll at the official age and examine why they do not is a complicated task since most surveys so far are conducted at school. More specific research has been done on why children dropout before completing even the first cycle of primary education. Again, individual and socioeconomic factors are significant predictors of schooling on the demand side, whether in developed or in developing countries (Kazeem et al., 2010; Sabates et al., 2013; Omwami and Foulds, 2015; Nakajima et al., 2018; Autor et al., 2019).

From the outlook and factors presented above, the number of out of school children (OOSC) has been increasing. Sub-Saharan Africa (SSA) has the highest rates compared to all the other regions. Researchers are deepening the examination of a particular country's factors associated with low rates of enrollments and completion, and the low quality of education. Mozambique, despite spending on education more than the average of SSA countries, both as percentage of the GDP and as share of the government expenditure, does not experience success, starting with the number of the pupils who even complete primary education, let alone the quality of the schooling outcomes. Starting in 2004, with the introduction of the free primary education policy, the rate of school participation increased significantly. The assumption by the Government of Mozambique was that if the service delivery expanded schools to remote and rural areas, and lowered the cost on the demand side, by removing school fees, the country would attain universal primary education for all pupils and young adolescents. Schools' availability, especially primary and lower-secondary, grew rapidly in the period 2004 and 2014. The number of school population

too had an upward slope up to 2011 when it started swinging up and down, even though the government expenditure did not significantly change. Despite the net enrollment rates in primary hovering around 90%, the completion rates went from 30% in 2004 to a high of 58% in 2008 and 2010, and then fell below 50% after that. Additionally, the last national housing and population census (2017) found that in the last 10 years, the rate of OSSC aged 6-17 is increasing.

Arguably, the reasons behind such partial failure of the educational outcomes in primary are shared by both demand and supply side issues. For example, for the latter, studies, either in Mozambique or in other countries with similar backgrounds, have found that although primary schools are fairly available, even in remote areas, teaching quality, teaching practices, including the language of instruction may result in pupils dropping out. In principle, the Government of Mozambique has been responding to these challenges by improving school resources, teacher training, teacher behavior, monitoring, and even piloting bilingual education to prevent unequal learning development in disfavor of children who do not use Portuguese daily at home. For the demand side, however, the reasons are far more complex. Over 2/3 of the population in Mozambique live in rural areas and depend almost exclusively on sustenance agriculture. This environment alone is characterized by illiterate parents or some who did not attend school beyond primary education, and households with no regular income, if any at all. Consequently, the burden of sending pupils to school is more time than income constrained (households do not have money, but primary school is free); as pupils become older their value as contributors to the household income grows, and if continuing to attend school is understood as costly, the offspring drop out of school. One way of showing this relationship is that by the age of 15, 90% and 70% of pupils in rural and urban areas, respectively, engage in at least one kind of paid work (Cho and Feda, 2015).

Since both demand and supply side characteristics matter, the trend of the current studies has been to try to harmonize which ones seem to explain more of the differences in educational outcomes among households or countries. To do so, data containing school and household variables are needed. The developed countries lead the collection of such complex datasets. However, in developing countries, this is not a common practice as it is costly. Most research has been relying on collection of school data, and some family factors provided by the student, for

example, to estimate students' performance. This is the leading way since it was a belief that school factors explain most of the schooling variation, especially in developing countries where teachers are the center of formal knowledge transmission. But, as seen in the background, improving service delivery is one of the factors, not the de facto factor of educational success. Even with school expansion and abolition of school fees in Mozambique and other African countries, pupils do not massively enroll, and leave school before obtaining minimum literacy and numeracy skills, let alone skills that may directly lead to productive jobs in the future. Thus, another body of literature is using household surveys to estimate the best predictors from the demand side, and then the results of both can be harmonized to the variables that can receive interventions and improve educational outcomes. In both cases, a deeper examination of a country is a vital mechanism of dealing with generalization of results across countries that apparently have similar backgrounds. The debate on the demand side finds that parental occupation, education, and income are the best predictors of offspring's school enrollment and educational attainment. But the results have been mixed, and are sensitive to the sample size, the applied method, and model specification.

Given this background, this study developed three main research questions in order to examine the demand for primary education in Mozambique, as follows: 1) How do family characteristics influence school enrollment and educational attainment of children in farming and non-farming households in Mozambique? 2) How do family characteristics influence school attendance and education attainment in primary education in smallholder households in Mozambique? 3) How does parental expectation influence children's school attendance and educational attainment in smallholder households in Mozambique primary education? The storyline that links these research questions stems from the data applied. First, it applied the General Population and Housing Census data collected in 2007 for research question 1. For research questions 2 and 3, it applied the Smallholder Household Survey data, collected by CGAP (2015) aiming at assessing the livelihoods and financial decisions of farming households. Built on previous studies, the rationale and the general hypothesis used in this study to connect the two datasets is that children living in households dependent on agriculture enroll less and attain fewer years of schooling than their peers not dependent on agriculture. Consequently, it first assessed

how the differences manifest, and what the best household factors predict primary schooling in the particular case of Mozambique. From there, the second dataset had two directions: i) it analyzed the school attendance and probability of finishing primary education among the smallholder farmers; and ii) by applying the expectancy-value model, it analyzed how parental expectations among the smallholder farmers influence schooling.

From the results, firstly we summarize those found in this study that are similar to previous research. Individual and socioeconomic status of the household affect schooling in the case of Mozambique too. Although pupils' gender is one variable to consider when designing policies, it seems like there is no systematic favoritism of boys or girls in Mozambican households. The differences observed either in enrollment and attendance or attainment seem to be linked to the gender roles of the society as whole: at an early age, both do household chores, but the work that girls engage in seems to clash with attendance; as pupils become older, boys are more likely to work for pay, thus, they migrate to cities or suburban areas. As found in other studies, girls located in rural areas may be more likely to get married earlier than boys, especially those who are aged over 15 and are still in primary school. One thing that holds is that girls have disadvantages if the household is poor and has a male head. However, within female-headed households or wealthier households, boys and girls enroll, attend, and attain school almost equally. Linked to that, pupils' age is the most significant individual variable in Mozambique. Firstly, for those enrolled, attendance has a steep downward slope. In addition, there is an inverse U-shape relationship between age and enrollment. This has been found in previous studies, where pupils delay enrollment, and later drop out more as they become older. However, due to the delayed enrollment, we observe a positive effect of age on educational attainment. Therefore, at the official completion age of either lower primary or upper primary, most pupils are still in lower grades.

The occupation of the household is vastly used in the literature as a proxy for household's wealth. Like previous studies, disadvantaged households have lower probability of educational success. Confirming the hypothesis, children living in households dependent on agriculture enroll less, attain fewer years of schooling, and are more likely to dropout. However, occupation seems not to matter among female heads. There is no significant difference in schooling if the children

live in female-headed households. One argument put forward in the interpretation of the results is that women are more likely to either be exclusively dependent on agriculture or be employed in low paying elementary occupations. The two groups may not have a large expenditure difference, thus the observed similar outcomes of their offspring's schooling. Another variable used as proxy of the household status is parental education. Overall, as found by research before, parents who finished primary education or more increase the odds of educational success irrespective of their occupation and household head's gender. However, also resonating with the previous findings, mother's education, at least in the pupils' elementary school years, has a stronger explanatory power than father's education.

Linked to the parental education is the language spoken at home. In the context of Mozambique, the language of instruction (LoI) versus the language children speak at home is an old debate. Although Portuguese is the official language and the LoI, only a minority located in the urban cities use it daily. Researchers have argued that pupils do not fully acquire the numeracy and literacy skills taught in the first three years because they cannot understand Portuguese. More quantitative research is needed to assess these assumptions; however, what holds true is that the data indicate that pupils who do not use Portuguese at home are significantly less likely to enroll and finish primary education. This is twofold critical. Firstly, pupils are excluded or exclude themselves because what is taught in Portuguese is foreign to their environments and daily lives. Secondly, in adulthood, they will be excluded from various job opportunities, even low paying ones, because Portuguese is the required language of communication in business settings. Thus, this alone may create an intra-poverty cycle in the majority of disadvantaged households.

This study makes the following four academic contributions. First, previous studies estimate children's schooling as a function of a set of parental characteristics while ignoring the gender of the household head. One reason is that most research undervalues the gender of the household head as long as income, educational attainment, and occupation are controlled for. Others, in the case of developed countries have found that the absence of a father figure creates negative shocks inside the household, especially for boys. Both approaches have their merit. However, in Mozambique, according to the last population census (2017), 34% of families are

female headed; thus, research should not ignore the differentiation of the households by the head's gender. Surprisingly, the results strongly indicated that children living in female-headed households have better schooling outcomes than their peers from male-headed households. Within female-headed households, boys and girls have insignificant schooling differences. It is critical to assess what traits from female-headed households help children's educational outcomes, outperforming their peers in male-headed households. Female heads are considerably poorer, less educated, and even less likely to actively participate in paid jobs in the market, while the latter have a presence of mothers inside the households who, in principle, should mediate the characteristics existent in female-headed families. Female heads outperform their male counterparts even in the sample of smallhoder farmers. Thus, the debate on schooling in Mozambique, and countries alike, should start collecting and paying attention to variables other than the traditional ones.

The second academic contribution has to do with the effect of income on schooling. Previous research found mixed results. In developed countries, income is only found to be weakly correlated with schooling. In developing countries, subject to the country's context, it seems more important as a school readiness indicator (Glick et al., 2011). In the smallholder farmers dataset, this research starts by estimating the poverty line cutoff to proxy household expenditure. Unarguably, households above the threshold have better educational outcomes, both in attendance and educational attainment. However, after calculating the household wealth index and subcategorizing it into quintiles, because none of the households have more expensive items such as motorcycles or cars, the result indicates more subtle variations. As a contribution to the literature, the data indicate that although the top two quintiles outperform the other quintiles in terms of schooling, children from the middle quintiles do worse; i.e., pupils leaving in second and third quintiles attend less and attain fewer years of schooling than the bottom quintile. One considered argument is, when measured by the household possessions, those quintiles rank in the middle because their offspring are more likely to engage in paid work, which increases their household wealth, but harms schooling.

The third contribution to the literature is related to remittances. It is well known that intra or out migration frequently results into remittances that the migrants send to their locations of origin. The literature has captured that migrants from poor households are more likely to remit. Based on that, on one hand, previous research found that the absence of an adult (if the migrating person is the father or mother) has a negative effect on schooling of the offspring. In addition, pupils, especially boys, are more willing to migrate too if they have a migrant family member. On the other hand, the negative effect of migration is offset by remittances. Thus, when a household reports to receive remittances, pupils are more likely to attend school and attain more years of education. In the case of smallholder households, the data indicate the opposite results. When the household reports to receive remittances, children are less likely to attend school and to finish primary education. This holds true even in the younger cohort, children aged 12-13, who should have finished lower-primary. Because the respondent of the survey is the household head, the results hint that remittances are negatively associated with schooling because the remitters are the offspring. Previous studies almost unanimously consider the remitter as a parent who migrate. In Mozambican rural areas, children dependent on agriculture are the ones who move out and help their families financially.

Lastly, the fourth academic contribution is the way the study applies parental expectations in the specific case of smallholder farmers. Because parents in these households have low educational attainment and "low status", if measured by occupation, applying these two variables does not give the full picture of what drives investment decisions among them. Thus, by estimating a direct link between parental expectations and schooling, the study advanced the debate of the variables that may explain decision making in poorer and disadvantaged households in the context of Mozambique. The results from applying parental expectations themselves make a significant contribution to the literature. Firstly, the study applied if the household head had an off-farm activity or not. The assumption was that the income generated by having a secondary job would increase the demand for education, thus becoming the dominant effect. However, the data do not indicate so. Children in households where the head does not have a secondary job attend more and are more likely to finish primary education. This is a significant contribution to the literature

because, again, it validates previous findings that the relationship between income and schooling is not linear. Additionally, it shows that household heads who spend more time at home develop higher expectations towards the schooling of their children. By not being employed in any paid non-agricultural activity, they may become significantly aware of their limited options when it comes to income generation. Secondly, the study applies if the household head considers agriculture a business or not. The hypothesis was that if the head sees agriculture as a viable business, the household would underinvest in education. In the short run, children whose parents consider agriculture a business attend more school than their peers. This may be because parents only consider farming as a business in respect to them, not their offspring. However, in the long run, when the educational attainment was estimated, children from households where agriculture is seen as a business are less likely to finish primary. This is another contribution to the previous literature. Even if the households start with high expectations, in the long run, due to financial pressure and the opportunity cost of keeping older pupils at school, parents end up undervaluing education, and children dropout to participate in informal and low paying jobs, perpetuating the cycle of low educational attainment and poverty.

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ANNEXES

Annex 1 Ordinal Logistic Estimation of Pupils' School Enrollment in Elementary Occupations' Households by Head's Gender and Location

VARIABLES	(1) Enrollment *Female HH (rural)*	(2) Enrollment *Male HH (rural)*	(3) Enrollment *Female HH (urban)*	(4) Enrollment *Male HH (urban)*
Pupil's age	0.904**	0.963***	0.923***	0.966***
	[0.836 - 0.978]	[0.941 - 0.986]	[0.882 - 0.966]	[0.947 - 0.986]
Female	1.869**	0.731***	1.132	0.928
	[1.105 - 3.163]	[0.620 - 0.862]	[0.815 - 1.573]	[0.800 - 1.077]
Does not speak Portuguese at home	0.076***	0.107***	0.075***	0.083***
	[0.041 - 0.141]	[0.089 - 0.130]	[0.048 - 0.119]	[0.069 - 0.099]
Family size	1.197***	1.088***	1.061*	1.110***
	[1.066 - 1.344]	[1.046 - 1.132]	[0.993 - 1.134]	[1.075 - 1.147]
Household head's age	1.042***	1.015***	1.025***	1.023***
	[1.016 - 1.068]	[1.007 - 1.022]	[1.008 - 1.044]	[1.015 - 1.031]
Head completed primary education	1.339	1.672***	1.493*	1.203**
	[0.395 - 4.546]	[1.244 - 2.246]	[0.939 - 2.374]	[1.015 - 1.425]
Mother completed primary education	--	1.317	--	1.262**
	--	[0.774 - 2.238]	--	[1.024 - 1.556]
Illiterate head	0.717	0.813**	0.788	0.659***
	[0.407 - 1.264]	[0.679 - 0.972]	[0.542 - 1.145]	[0.525 - 0.827]
Number of children less than 6 years	0.061***	0.340***	0.263***	0.292***
	[0.014 - 0.261]	[0.248 - 0.468]	[0.136 - 0.508]	[0.218 - 0.391]
Constant cut1	0.215**	0.134***	0.062***	0.215***
	[0.055 - 0.836]	[0.083 - 0.214]	[0.024 - 0.161]	[0.140 - 0.328]
Constant cut2	0.549	0.248***	0.171***	0.479***
	[0.142 - 2.117]	[0.155 - 0.395]	[0.067 - 0.437]	[0.314 - 0.729]
Pseudo R-squared	0.204	0.187	0.132	0.173
Observations	382	3,303	1,367	5,886

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Annex 2 Ordinal Logistic Estimation of Children's Educational Attainment Among Elementary Occupations' Households

VARIABLES	(1) Attainment *All*	(2) Attainment *Female HH*	(3) Attainment *Male HH*	(4) Attainment *Rural*	(5) Attainment *Urban*	(6) Attainment *Male HH (rural)*	(7) Attainment *Female HH (urban)*	(8) Attainment *Male HH (urban)*
Pupil's age	1.221***	1.304***	1.217***	1.113***	1.280***	1.129***	1.410***	1.270***
	[1.170 - 1.275]	[1.166 - 1.457]	[1.158 - 1.278]	[1.029 - 1.204]	[1.215 - 1.348]	[1.034 - 1.232]	[1.244 - 1.599]	[1.195 - 1.350]
Female	0.815***	1.059	0.795***	0.564***	0.927	0.526***	1.060	0.928
	[0.722 - 0.920]	[0.784 - 1.430]	[0.689 - 0.917]	[0.447 - 0.712]	[0.803 - 1.071]	[0.406 - 0.683]	[0.759 - 1.481]	[0.780 - 1.104]
Does not speak Portuguese at home	0.044***	0.019***	0.054***	0.036***	0.037***	0.042***	0.012***	0.046***
	[0.035 - 0.057]	[0.008 - 0.044]	[0.041 - 0.071]	[0.024 - 0.053]	[0.026 - 0.052]	[0.027 - 0.063]	[0.004 - 0.033]	[0.031 - 0.070]
Family size	1.060***	1.069**	1.062***	1.110***	1.044***	1.116***	1.068**	1.038**
	[1.035 - 1.085]	[1.009 - 1.132]	[1.032 - 1.093]	[1.059 - 1.165]	[1.015 - 1.073]	[1.058 - 1.178]	[1.002 - 1.139]	[1.004 - 1.074]
Household head's age	1.022***	1.016*	1.029***	1.011**	1.027***	1.017***	1.021**	1.036***
	[1.016 - 1.028]	[1.000 - 1.032]	[1.023 - 1.036]	[1.002 - 1.021]	[1.019 - 1.034]	[1.006 - 1.028]	[1.002 - 1.040]	[1.027 - 1.045]
Head completed primary education	1.814***	1.499*	1.359***	2.459***	1.654***	1.657**	1.385	1.272**
	[1.566 - 2.102]	[0.987 - 2.277]	[1.141 - 1.619]	[1.727 - 3.501]	[1.404 - 1.949]	[1.104 - 2.488]	[0.890 - 2.154]	[1.046 - 1.548]
Head completed secondary education	2.749***	1.362	1.492	3.402	2.482***	2.463	1.291	1.171
	[1.743 - 4.336]	[0.182 - 10.199]	[0.885 - 2.515]	[0.662 - 17.49]	[1.542 - 3.994]	[0.318 - 19.08]	[0.091 - 18.32]	[0.675 - 2.031]
Female head	1.814***	--	--	2.214***	1.770***	--	--	--
	[1.533 - 2.146]	--	--	[1.508 - 3.251]	[1.465 - 2.138]	--	--	--
Illiterate head	0.521***	0.356***	0.581***	0.686***	0.417***	0.741*	0.355***	0.447***
	[0.437 - 0.621]	[0.247 - 0.513]	[0.469 - 0.721]	[0.524 - 0.900]	[0.329 - 0.528]	[0.547 - 1.003]	[0.236 - 0.534]	[0.325 - 0.614]
Mother completed primary education	--	--	2.725***	--	--	3.323***	--	2.684***
	--	--	[2.187 - 3.396]	--	--	[1.786 - 6.182]	--	[2.118 - 3.400]
Mother completed secondary education	--	--	8.560***	--	--	--	--	--
	--	--	[2.977 - 24.61]	--	--	--	--	--

Rural	0.580***	0.747	0.576***	--	--	--	--	--
	[0.504 - 0.669]	[0.498 - 1.121]	[0.490 - 0.677]	--	--	--	--	--
Constant cut1	2.293**	1.615	3.395***	0.412	7.413***	0.742	8.842*	11.300***
	[1.059 - 4.966]	[0.222 - 11.73]	[1.381 - 8.345]	[0.101 - 1.690]	[2.923 - 18.80]	[0.153 - 3.588]	[0.969 - 80.69]	[3.728 - 34.256]
Constant cut2	32.020***	38.034***	44.629***	11.979***	69.926***	20.409***	149.393***	96.205***
	[14.93 - 68.67]	[5.640 - 256.4]	[18.3 - 108.83]	[2.990 - 47.98]	[27.8 - 175.59]	[4.294 - 97]	[17.42 - 1,280]	[31.99 - 289.2]
Constant cut3	201.942***	271.794***	298.033***	85.398***	442.178***	160.804***	1,113.148***	637.755***
	[92.869 - 439]	[39.03 - 1,892]	[119.9 - 740.3]	[20.73 - 351.7]	[172.9 - 1,130]	[32.56 - 794]	[123 - 10,003]	[207.10 - 1,963]
Pseudo R-squared	0.174	0.154	0.189	0.232	0.115	0.242	0.139	0.124
Observations	3,800	622	2,850	1,151	2,649	953	509	1,876

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Annex 3 Ordinal Logistic Estimation of Children's Educational Attainment Among Senior Officials' Households

VARIABLES	(1) Attainment *All*	(2) Attainment *Female HH*	(3) Attainment *Male HH*	(4) Attainment *Rural*	(5) Attainment *Urban*	(6) Attainment *Male HH (rural)*	(7) Attainment *Male HH (*urban)
Pupil's age	1.311***	1.277**	1.282***	1.248**	1.343***	1.213*	1.336***
	[1.198 - 1.435]	[1.024 - 1.593]	[1.155 - 1.422]	[1.049 - 1.485]	[1.207 - 1.494]	[0.997 - 1.476]	[1.170 - 1.526]
Female	1.192	1.122	1.235	1.413	1.127	1.592	1.207
	[0.930 - 1.527]	[0.598 - 2.102]	[0.927 - 1.645]	[0.868 - 2.301]	[0.842 - 1.510]	[0.914 - 2.771]	[0.842 - 1.731]
Does not speak Portuguese at home	0.034***	0.090***	0.034***	0.036***	0.016***	0.046***	0.011***
	[0.018 - 0.064]	[0.017 - 0.479]	[0.016 - 0.070]	[0.015 - 0.085]	[0.005 - 0.049]	[0.017 - 0.123]	[0.003 - 0.041]
Family size	1.041*	1.076	1.055*	1.004	1.052*	1.015	1.034
	[0.992 - 1.093]	[0.959 - 1.207]	[0.996 - 1.119]	[0.908 - 1.109]	[0.995 - 1.113]	[0.896 - 1.150]	[0.962 - 1.111]
Household head's age	1.017**	1.016	1.023***	1.011	1.025***	1.022	1.036***
	[1.004 - 1.031]	[0.984 - 1.049]	[1.007 - 1.040]	[0.986 - 1.036]	[1.008 - 1.041]	[0.991 - 1.053]	[1.014 - 1.058]
Head completed primary education	1.728***	1.185	1.583**	2.767***	1.393	2.086**	1.375
	[1.230 - 2.429]	[0.445 - 3.159]	[1.074 - 2.334]	[1.460 - 5.245]	[0.922 - 2.104]	[1.004 - 4.333]	[0.849 - 2.227]
Head completed secondary education	2.528***	2.077	1.738**	3.395***	2.188***	1.572	1.596*
	[1.765 - 3.622]	[0.697 - 6.193]	[1.134 - 2.664]	[1.654 - 6.971]	[1.428 - 3.351]	[0.649 - 3.809]	[0.951 - 2.678]
Female head	1.254	--	--	1.420	1.252	--	--
	[0.882 - 1.782]	--	--	[0.633 - 3.187]	[0.846 - 1.853]	--	--
Illiterate head	0.478**	0.416	0.419*	0.596	0.371**	1.206	0.204***
	[0.250 - 0.917]	[0.117 - 1.479]	[0.171 - 1.023]	[0.202 - 1.757]	[0.159 - 0.864]	[0.281 - 5.178]	[0.063 - 0.655]
Mother completed primary education	--	--	2.100***	--	--	6.690***	1.627**
	--	--	[1.483 - 2.976]	--	--	[2.847 - 15.722]	[1.094 - 2.420]
Mother completed secondary education	--	--	2.398***	--	--	7.342	--
	--	--	[1.257 - 4.574]	--	--	[0.626 - 86.069]	--
Rural	0.530***	0.657	0.603***	--	--	--	--

	[0.398 - 0.707]	[0.295 - 1.464]	[0.433 - 0.841]	--	--	--	--
Constant cut1	5.546**	5.591	5.795*	3.102	12.091**	3.492	13.243**
	[1.032 - 29.814]	[0.116 - 269.56]	[0.814 - 41.24]	[0.126 - 76.617]	[1.652 - 88.499]	[0.085 - 143.262]	[1.087 - 161.3]
Constant cut2	61.917***	33.977*	69.214***	49.662**	107.559***	60.675**	140.729***
	[11.925 - 321.499]	[0.737 - 1,566]	[10.135 - 472]	[2.096 - 1,176]	[15.376 - 752]	[1.551 - 2,374]	[12.34 - 1,604]
Constant cut3	357.331***	157.943**	448.470***	321.453***	611.809***	441.149***	983.742***
	[67.228 - 1,899.2]	[3.279 - 7,606]	[63.63 - 3,160]	[12.674 - 8,153]	[85.252 - 4,390]	[10.399 - 18,714]	[82.9 - 11,666]
Pseudo R-squared	0.128	0.0881	0.141	0.172	0.078	0.197	0.104
Observations	957	162	711	248	709	199	461

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Annex 4 Ordinal Logistic Estimation of Pupils' School Enrollment by Whether at Home They Speak Portuguese or Not

VARIABLES	(1) Enrollment *All* (No)[11]	(2) Enrollment *All* (Yes)	(3) Enrollment *Female HH* (No)	(4) Enrollment *Female HH* (Yes)	(5) Enrollment *Male HH* (No)	(6) Enrollment *Male HH* (Yes)	(7) Enrollment *Agriculture* (No)	(8) Enrollment *Agriculture* (Yes)
Pupil's age	1.037***	0.866***	1.014*	0.817***	1.025***	0.856***	1.026***	0.814***
	[1.030 - 1.045]	[0.856 - 0.876]	[1.000 - 1.028]	[0.799 - 0.836]	[1.017 - 1.034]	[0.845 - 0.868]	[1.019 - 1.034]	[0.802 - 0.827]
Female	0.877***	0.846***	0.935	0.800***	0.822***	0.735***	0.852***	0.689***
	[0.833 - 0.924]	[0.784 - 0.912]	[0.846 - 1.034]	[0.696 - 0.920]	[0.772 - 0.875]	[0.671 - 0.805]	[0.806 - 0.900]	[0.627 - 0.758]
Family size	1.060***	1.115***	1.066***	1.037**	1.066***	1.148***	1.064***	1.100***
	[1.047 - 1.073]	[1.097 - 1.133]	[1.041 - 1.090]	[1.009 - 1.066]	[1.049 - 1.082]	[1.125 - 1.173]	[1.050 - 1.079]	[1.078 - 1.123]
Household head's age	1.006***	1.019***	1.006***	1.012***	1.010***	1.028***	1.008***	1.020***
	[1.004 - 1.008]	[1.016 - 1.023]	[1.002 - 1.010]	[1.006 - 1.019]	[1.008 - 1.013]	[1.024 - 1.032]	[1.006 - 1.010]	[1.016 - 1.024]
Head completed primary education	1.330***	1.321***	0.878	1.092	1.366***	1.241***	1.324***	1.078
	[1.169 - 1.512]	[1.182 - 1.476]	[0.497 - 1.553]	[0.805 - 1.482]	[1.191 - 1.567]	[1.090 - 1.412]	[1.129 - 1.553]	[0.894 - 1.299]
Head completed secondary education	1.572	2.252***	3.945	2.013	1.522	1.794***	2.633	1.273
	[0.905 - 2.730]	[1.695 - 2.992]	[0.357 - 43.542]	[0.845 - 4.795]	[0.846 - 2.740]	[1.291 - 2.494]	[0.783 - 8.850]	[0.349 - 4.638]
Female head	1.337***	1.417***	--	--	--	--	1.383***	1.396***
	[1.255 - 1.424]	[1.296 - 1.550]	--	--	--	--	[1.296 - 1.476]	[1.255 - 1.554]
Illiterate head	0.673***	0.756***	0.519***	0.746***	0.687***	0.783***	0.656***	0.755***
	[0.634 - 0.714]	[0.690 - 0.828]	[0.436 - 0.619]	[0.629 - 0.885]	[0.644 - 0.734]	[0.698 - 0.878]	[0.616 - 0.700]	[0.679 - 0.840]
Senior officials, professionals, clerks & managers	1.247*	1.308***	0.508*	1.251	1.397***	1.281**	--	--
	[0.992 - 1.567]	[1.089 - 1.571]	[0.231 - 1.118]	[0.801 - 1.953]	[1.091 - 1.788]	[1.036 - 1.583]	--	--

[11] "No" if the household does not use Portuguese, "Yes" if it does.

Elementary occupations, crafts, trade and machine operators	1.172***	1.047	1.082	1.114	1.202***	1.016	--	--
	[1.077 - 1.275]	[0.949 - 1.155]	[0.828 - 1.413]	[0.901 - 1.378]	[1.097 - 1.317]	[0.904 - 1.142]	--	--
Rural	1.061	1.069	0.872	1.004	1.151***	1.085	0.967	1.087
	[0.972 - 1.158]	[0.976 - 1.171]	[0.733 - 1.038]	[0.845 - 1.193]	[1.036 - 1.279]	[0.969 - 1.215]	[0.869 - 1.076]	[0.963 - 1.228]
Numb of children less than 6 years	0.435***	0.277***	--	--	--	--	--	--
	[0.376 - 0.503]	[0.241 - 0.318]	--	--	--	--	--	--
Mother completed primary education	--	--	--	--	1.099	1.600***	--	--
	--	--	--	--	[0.817 - 1.477]	[1.336 - 1.916]	--	--
Mother completed secondary education	--	--	--	--	--	1.739*	--	--
	--	--	--	--	--	[0.987 - 3.064]	--	--
Constant cut1	2.529***	0.022***	1.086	0.003***	3.024***	0.038***	2.346***	0.007***
	[2.151 - 2.973]	[0.017 - 0.028]	[0.785 - 1.501]	[0.002 - 0.005]	[2.491 - 3.671]	[0.028 - 0.052]	[1.959 - 2.809]	[0.005 - 0.010]
Constant cut2	3.316***	0.111***	1.415**	0.017***	3.951***	0.165***	3.045***	0.045***
	[2.820 - 3.900]	[0.087 - 0.141]	[1.023 - 1.956]	[0.011 - 0.028]	[3.253 - 4.799]	[0.123 - 0.222]	[2.542 - 3.647]	[0.032 - 0.061]
Pseudo R-squared	0.018	0.089	0.011	0.059	0.017	0.083	0.013	0.077
Observations	23,070	25,752	5,962	7,249	16,089	17,038	20,029	14,146

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)

Annex 5 Ordinal Logistic Estimation of Pupils' Educational Attainment by Whether at Home They Speak Portuguese or Not

VARIABLES	(1) Attainment *All* (No)	(2) Attainment *All* (Yes)	(3) Attainment *Female HH* (No)	(4) Attainment *Female HH* (Yes)	(5) Attainment *Male HH* (No)	(6) Attainment *Male HH* (Yes)	(7) Attainment *Agriculture* (No)	(8) Attainment *Agriculture* (Yes)
Pupil's age	0.821***	1.295***	0.820***	1.331***	0.812***	1.285***	0.818***	1.293***
	[0.787 - 0.857]	[1.261 - 1.331]	[0.753 - 0.892]	[1.265 - 1.400]	[0.772 - 0.855]	[1.243 - 1.329]	[0.782 - 0.857]	[1.247 - 1.340]
Female	0.716***	0.812***	0.768**	0.830***	0.694***	0.815***	0.739***	0.741***
	[0.632 - 0.810]	[0.753 - 0.876]	[0.602 - 0.980]	[0.721 - 0.956]	[0.596 - 0.809]	[0.740 - 0.896]	[0.647 - 0.844]	[0.670 - 0.820]
Family size	1.033**	1.065***	1.067**	1.037***	1.013	1.084***	1.037**	1.065***
	[1.006 - 1.060]	[1.049 - 1.081]	[1.013 - 1.123]	[1.010 - 1.065]	[0.981 - 1.047]	[1.063 - 1.106]	[1.009 - 1.067]	[1.044 - 1.087]
Household head's age	1.006**	1.020***	1.007	1.017***	1.007***	1.025***	1.006**	1.019***
	[1.001 - 1.010]	[1.017 - 1.024]	[0.998 - 1.016]	[1.010 - 1.024]	[1.002 - 1.013]	[1.020 - 1.029]	[1.001 - 1.011]	[1.015 - 1.023]
Head completed primary education	1.500**	1.981***	1.346	1.612***	1.435**	1.598***	1.668**	2.215***
	[1.076 - 2.091]	[1.768 - 2.219]	[0.174 - 10.42]	[1.190 - 2.183]	[1.012 - 2.035]	[1.397 - 1.826]	[1.100 - 2.527]	[1.809 - 2.712]
Head completed secondary education	0.981	3.063***	--	2.782***	0.968	1.653***	5.013	1.264
	[0.305 - 3.158]	[2.408 - 3.895]	--	[1.355 - 5.714]	[0.258 - 3.634]	[1.239 - 2.205]	[0.175 - 143.96]	[0.357 - 4.483]
Female head	1.161**	1.965***	--	--	--	--	1.176**	2.070***
	[1.002 - 1.345]	[1.792 - 2.154]	--	--	--	--	[1.009 - 1.371]	[1.846 - 2.322]
Illiterate head	0.747***	0.549***	0.591**	0.440***	0.767***	0.602***	0.724***	0.580***
	[0.648 - 0.859]	[0.499 - 0.605]	[0.360 - 0.971]	[0.369 - 0.523]	[0.659 - 0.894]	[0.532 - 0.682]	[0.621 - 0.844]	[0.518 - 0.650]
Senior officials, professionals, clerks & managers	1.190	1.771***	1.955	1.243	1.264	1.808***	--	--
	[0.695 - 2.036]	[1.487 - 2.109]	[0.401 - 9.526]	[0.820 - 1.883]	[0.689 - 2.318]	[1.473 - 2.220]	--	--
Elementary occupations, crafts, trade and machine operators	1.060	1.366***	0.987	1.250**	1.099	1.351***	--	--
	[0.872 - 1.288]	[1.234 - 1.512]	[0.533 - 1.830]	[1.011 - 1.545]	[0.888 - 1.362]	[1.195 - 1.528]	--	--

Rural	1.100	0.564***	1.013	0.584***	1.208	0.589***	1.059	0.619***
	[0.893 - 1.356]	[0.514 - 0.620]	[0.666 - 1.540]	[0.490 - 0.697]	[0.933 - 1.562]	[0.524 - 0.662]	[0.818 - 1.371]	[0.544 - 0.704]
Mother completed primary education	--	--	--	--	1.025	2.849***	--	--
	--	--	--	--	[0.471 - 2.233]	[2.387 - 3.401]	--	--
Mother completed secondary education	--	--	--	--	--	4.397***	--	--
	--	--	--	--	--	[2.604 - 7.425]	--	--
Constant cut1	0.069***	4.386***	0.055***	1.997	0.060***	5.932***	0.065***	3.214***
	[0.031 - 0.151]	[2.685 - 7.163]	[0.011 - 0.273]	[0.816 - 4.890]	[0.023 - 0.155]	[3.203 - 10.98]	[0.028 - 0.153]	[1.687 - 6.124]
Constant cut2	0.886	109.704***	0.722	53.904***	0.762	148.326***	0.827	109.714***
	[0.405 - 1.942]	[67.454 - 178]	[0.146 - 3.577]	[22.373 - 129]	[0.296 - 1.965]	[80.338 - 273]	[0.350 - 1.953]	[57.866 - 208]
Constant cut3	8.878***	745.010***	4.438*	373.348***	10.421***	1,053.380***	10.208***	789.550***
	[3.751 - 21.009]	[453 - 1,223]	[0.819 - 24.03]	[152.45 - 914]	[3.566 - 30.44]	[563 - 1,970]	[3.905 - 26.684]	[410 - 1,517]
Pseudo R-squared	0.028	0.081	0.026	0.073	0.031	0.100	0.028	0.048
Observations	4,477	9,801	1,087	2,793	3,159	6,332	3,878	5,643

Confidence intervals (95%) in brackets *** p<0.01, ** p<0.05, * p<0.10

Source: Estimated by the author based on Census data 2007 (IPUMS, 2010)