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Determinants of children's schooling: The case of Tigray Region, Ethiopia

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We analyze the determinants of educational outcomes of primary school children in Tigray region of Ethiopia using a survey data gathered from four villages in 2013. Four different measures of schooling were used to examine the impact of household and child-specific factors. First, we examine the determinants of school attendance (ever-attendance, current enrollment) using probit model. We then analyze determinants of schooling progression (highest and relative grade attainment) for children who have ever-attended school using Heckman's sample selection model. The results reveal that child age, the literacy of household head and of adult male family members and household income as measured by per capita consumption expenditure had a significantly positive impact on most of the measures of children's schooling outcomes analyzed. The estimates of birth-order revealed that first born children had better schooling outcomes in terms of ever-attendance and timely progression in school, while family size had a negative influence on both schooling progression indicators. These findings can help design differentiated policy interventions for influencing schooling attendance and progressions.

Key words: Children's schooling, Ethiopia, current enrollment, highest grade attainment, relative grade attainment.

INTRODUCTION

Eight out of ten of the world's children live in developing countries. The well-being of these children when they become adults greatly depends on the education they receive. Education is generally regarded as a powerful means for reducing poverty and achieving economic growth. It empowers people, improves individuals' earning potential, promotes health, and helps build a competitive economy (World Bank, 2006; Hanushek and Wößmann, 2007; UNESCO, 2007).

In particular, children's schooling is universally

acknowledged as one of the prerequisites for human development. However, despite considerable progress in expanding enrollment and increasing years of schooling since 1960, millions of children of school age in developing countries are not in school, and many others leave school at a young age and often learn little while in school. In the poorest regions of the developing world, there are still many factors that constrain households' decisions concerning investment in their children's human capital (Francavilla et al., 2013).

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Moreover, grade repetition and dropping out of school are quite common, teachers are often absent from classrooms, and many children learn much less than the learning objectives set in the official curriculum (Hanushek, 1995; Glewwe, 1999; Glewwe and Kremer, 2006). In addition, the quality of schooling in developing countries is often very low. The conditions of schools are very poor, most of which lack the basic equipment and school supplies – textbooks, blackboards, desks, benches, and sometimes even classrooms. The situation is even worse in rural areas.

Ethiopia is one of the poorest countries in the world, and has a low level of human capital. The education sector in general and the basic education sub-sector in particular is characterized by low access, efficiency, quality and inequitable distribution of educational opportunities for many decades. In particular the sector was suffering from multifaceted problems during the previous regime. Cognizant of this situation, the current government developed a twenty-year Education Sector Indicative Plan that is in turn divided into a series of five-year Education Sector Development Programs (ESDP) in 1997.

Consequently, the number of children in school has steadily increased in the last two decades from as low as 2 million in the 1990s to over 22 million in 2012, almost tripling its Gross Enrollment Rates from as low as 30% in 1990s to 95% in 2012. However, a number of problems still persist. More than a quarter of children who enroll in the first grade drop out before they complete their first school year. Nearly 20% female and over 15% male primary school-age children did not go to school during the 2008/09 school year. The drop-out rate of primary school students tends to rise during the last four years while the repetition rate in primary school remains constant with a slight decline (Gurmu and Etana, 2013; Gebre-Egziabher, 2011; EEA, 2011). With a low mean years of schooling of 2.2, expected years of schooling of 8.7, and adult literacy rate (below 50 %)¹, Ethiopia still compares unfavorably with other countries in sub-Saharan Africa.

The 2013 United Nations Human Development Report ranks Ethiopia 173 out of 187 countries and territories in terms of HDI (HDR, 2013).

Given the progress and challenges on both the supply and demand side of education discussed thus far, a detailed examination of the situation is crucial to gain an understanding on the underlying causes, particularly in rural areas. This is quite important in the context of rural Ethiopia. First, Ethiopia is still an agrarian economy with about 80% of its population living in rural areas. Second,

the level of human capital formation in the country has been extremely low for several decades. According to data from the 2011 DHS, over 50% of the population is illiterate (nearly 60% rural and 22% urban). Moreover, it is a country of the young with children under 15 years accounting for over 46% of the population (CSA and ICF International, 2012). Last but not the least, poverty is very widespread in rural areas. Rural poverty is more severe both in terms of intensity and scope (Hurissa, 2011). Consequently, children's schooling in rural Ethiopia faces major challenges both on the demand as well as supply side. Specifically, analysis of the demand side determinants of schooling is important in addressing the wider problems constraining progress in the sector. Against this backdrop, the paper aims at addressing what determines children's schooling outcomes in rural Ethiopia.

This study is, therefore, motivated by the need to examine the situation with emphasis on the demand side factors of schooling and indicate ways of improving it. Specifically, the study investigates factors that influence children's school attendance and progression, two important dimensions of educational attainment. In the context of rural areas in developing countries, children's educational outcomes are constrained by several factors right from entry to successive progression in school and through to completion. At school entry, children are either not enrolled in time or may not be enrolled at all. Understanding the factors that affect this dimension of children's education can guide policy makers to prioritize appropriate strategies to such groups of children. We examine school attendance dimension using information on whether children in our sample have ever-attended school as well as whether they are currently in school. On the other hand, once children are in school, they may not be able to progress through successive grades as required. Policies aimed at addressing constraints faced by such groups of children may require different consideration and treatments. Accordingly, we examine school progression using the highest grade attained as well as the grade attainment relative to age (a measure of timely progression with age).

The study contributes to the analysis of the determinants of schooling in rural areas in developing countries in three ways. First, it presents a comprehensive analysis considering various dimensions of schooling outcomes for assessing what determines children's schooling in rural areas. Second, the study uses new data, which helps shed light on the latest trends and progresses in schooling in the context of rural Ethiopia. Third, it tries to address sample selection and endogeneity biases in the econometric analysis.

The rest of the paper is organized as follows. The following section provides a brief overview of related literature. This is followed by a description of the data in

¹ All figures are for the year 2012

section III and an outline of the conceptual and analytical framework and the empirical strategy of the study in section IV. Section V presents the results of the study. Discussion is presented in section VI. Conclusion and policy implications of the study are outlined in section VII. The last section provides limitations of the study.

Children's schooling and its determinants

Children's schooling has been the subject of much research in the past. Scholars agree that children's schooling outcomes are primarily investment decisions at the household level. In fact, the theory of human capital recognizes participation in education as an investment decision made now in exchange for returns later in life (Mincer, 1958; Becker, 1964). In the case of children in developing countries, such investment decisions are generally made by the parents through an implicit cost-benefit assessment. Parents are assumed to compare the future benefits of sending their children to school against the immediate costs. These benefits are for the children as well as for the parents themselves, especially in the context of developing countries where children are considered as old-age security for parents (Huisman and Smits, 2009).

The costs of schooling include the direct costs as well as indirect or opportunity costs associated with children's schooling decisions. The direct costs are mainly costs of books, school fees, uniforms and travel costs. The opportunity costs relate to the benefits foregone due to children being in school rather than working at home, on the family farm, or engaging in wage labor or commercial activities (Basu, 1999; Admassie, 2003; World Bank, 2006; Huisman and Smits, 2009).

Previous empirical studies have identified a number of factors influencing the direct and opportunity costs of going to school as well as the value parents attach to education. At the household level, parents' education, sex of household head, number and gender of children, and culture are important determinants of the investment decisions for children's schooling. At individual level, children's age, gender, and position among siblings within the family (i.e. birth-order) have been identified as important factors. The importance of supply-side factors has also been widely acknowledged in influencing schooling decisions. These mainly include factors like the quantity and quality of the local educational facilities.

A number of studies have also highlighted the relationship between socio-economic factors and children's education (Handa et al., 2004; Cardoso and Verner, 2006; Zhao and Glewwe, 2010; Mani et al., 2013). Children from families with higher socio-economic status as measured by household resources or income are more

likely to be in school and remain longer in school, whilst those who are poorer are more likely to have never attended, or to drop out once they have enrolled. The costs of sending children to school (both direct as well as opportunity costs) are less likely to be an obstacle to richer families (Basu, 1999). On the other hand, the economic contribution of children to families in developing countries (especially in rural areas) and hence the opportunity cost associated with school attendance may be substantial. Consequently, attendance will suffer when parents perceive that the return associated with time spent in school does not justify the loss of a child's immediate economic contribution to the household (Bedi and Marshall, 2002).

Parental education is another important factor influencing children's schooling decisions. Better educated parents are expected to be more aware of the importance of education and hence invest more in their children's education. Moreover, educated parents may be able to help their children with their education at home, thereby positively influencing the schooling outcomes of children. There is ample evidence that children from better educated parents more often go to school and stay in school longer (Buchmann and Brakewood, 2000; Colclough et al., 2000; Ersado, 2005; Smits and Hosgor, 2006; UNESCO, 2005). The education level of mothers might be especially important for the schooling of girls (Emerson and Souza, 2007).

Parental occupation is also an important determinant of children's education. The opportunity costs of going to school are believed to be more important for parents who are self-employed, such as (small) farmers, since they are more likely to expect their children to help out when there is much work to be done, like during harvests. This will especially be the case in countries where laws regarding compulsory education are not strictly enforced (Huisman and Smits, 2009).

Children's education is also influenced by the demographic structure of the household in which they live. Competition for scarce educational resources among sons and daughters, and older and younger siblings, may reduce the chance of a particular child going to school. There is evidence that in developing countries the cost of high fertility is borne by older siblings, rather than by the parents (Buchmann and Hannum, 2001; Emerson and Souza, 2008). The younger children in such families have more opportunities to go to school, because the older children do the household chores or contribute to the household income by earning some extra money. However, other studies have documented a negative association between birth-order and child education (Black et al., 2005; Booth and Kee, 2009; Hotz and Pantano, 2013; De Haan et al., 2014).

The number of siblings a child has might also be

important. In general, family size tends to be negatively associated with schooling. This is probably because the available resources at the household level have to be divided among more children (Buchmann and Hannum, 2001). However, this may not be always the case. For instance, Chemichovski (1985) found that the number of 7 to 14 year-old children in the household is positively related to enrollment in rural Botswana. The reason for this could be that with more children, there are also more helping hands at home, which increase the chance that at least some children can go to school (Huisman and Smits, 2009).

In general, based on the framework of choice within a set of constraints, certain characteristics of a child and the child's family are expected to be important determinants of enrollment and completion (Bedi and Marshall, 2002).

However, there seems to be little consensus as to the factors that influence children's schooling outcomes in the existing literature. This is particularly true of studies focusing on rural areas.

Another important issue relates to the choice of relevant measures of schooling outcome. This is particularly critical in terms of designing a strategy or guiding a policy aimed at influencing the outcome of interest. In this regard, we find a number of indicators that capture various aspects of schooling outcomes in the literature. The most common ones include current enrollment, years of schooling, grades attained, age-adjusted grades, promotion rates, and dropout rates among others. A number of studies have considered current enrollment as an indicator of schooling outcomes (Rosati and Rossi, 2003; Cockburn and Dostie, 2007; Emerson and Souza, 2008; Seid and Gurnu, 2013). Others have employed age adjusted grades (Haile and Haile, 2012; Abebaw et al., 2007; Mani et al., 2013). The bulk of past studies based their analysis on a single measure of schooling (mainly current enrollment or years of schooling).

However, children's schooling outcomes have several dimensions that make it hard to capture by a single indicator. The various dimensions could be influenced by different sets of factors and effective interventions aimed at addressing them may also need varied approaches. This necessitates consideration of a comprehensive analysis based on a number of schooling outcomes. With the exception of Handa et al. (2004), the analysis in majority of the studies reviewed here lack comprehensiveness in terms of the indicators used for measuring schooling outcomes. Hence the current study aims to fill such gaps and provide further evidence on the determinants of education using data from a recent household survey conducted in four villages in Northern Ethiopia.

The data

Study area

In this study, we analyze educational outcomes in four villages in Hwazen district in the Tigray region of Ethiopia based on a survey conducted in 2013. Tigray is a province of Ethiopia, sharing the border with Eritrea in the north and with Sudan in the west. Its capital city is Mekelle. Tigray is divided into five sub regions, Western Tigray, North-western Tigray, Central Tigray, Eastern Tigray, and Southern Tigray. It consists of 47 districts (woredas) and 673 villages (tabias). Ethnic composition is almost mono-ethnic. According to 2007 census, there are 4,316,988 people and 992,635 households in Tigray. Ethnically, 96.55% of the residents are Tegarú who speak the local language, Tigrinya. Many residents cannot speak Amharic, which is the working language of the Federal Government.

Hawzen is a district in the sub-region of Eastern Tigray. According to 2007 census, in Hawzen there are 117,954 people and 25,067 households. This implies that the average household size 4.71. Ethnically, 99.68% were Tegarú, speaking Tigrinya. Religiously, 99.45% are Orthodox Christians (Figures 1 and 2).

Data collection

The basic frame of the survey instrument was adopted from the Townsend Thai Rural Survey. We modified the survey questionnaire to emphasize the interdisciplinary aspect and to reflect the special features of the rural villages in Tigray, Ethiopia.

The survey was implemented in three stages. In the first stage, a pilot survey was implemented to check the applicability of the survey instrument to the context of the rural villages in Hawzen, Ethiopia. Forty households were interviewed in the pilot survey. After analyzing the data and evaluating which questions worked, we reorganized the questionnaire and reworded the questions in order to make it fit better to the local context. In addition to checking the validity of the questionnaire, the pilot survey provided us with an opportunity to design the logistics for the main survey.

In the main survey we aimed to interview 100 households for each village and selected the sample randomly using the village roster. In the rural area of Ethiopia there is no address and the houses are scattered far apart from one another. Without the help of the village head or a village manger it was not possible to find households in the sample. Sometimes the enumerator finally found the house only to discover that no one was home. Given the limits in budget and time,

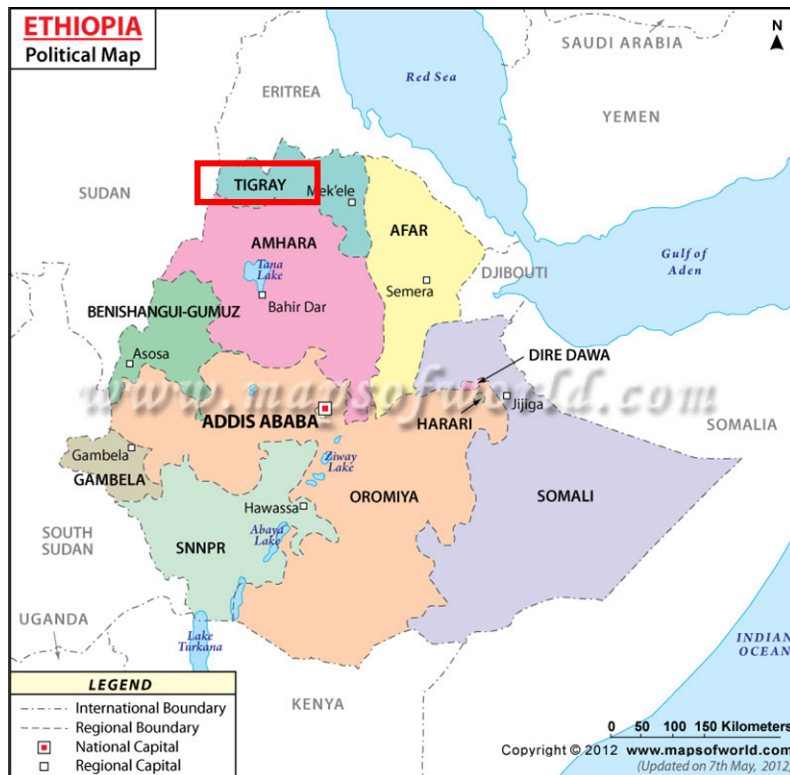


Figure 1. Location of Tigray Province.



Figure 2. Location of Hawzen District.

Table 1. The sample.

Villages	2007 Census		Sample in 2013 Survey	
	Households	Population	Households	Population
Koraro	1,261	5,682	78	436
Selam	1,451	7,412	81	467
Debre Hiwot	1,022	4,759	81	506
Simret	972	4,474	85	465
Total	4,706	22,327	325	1,874

Source: 2007 Population and Housing Census of Ethiopia and authors' calculation

the difficulty in logistics allowed us to finish the interview only with 325 households from four villages: Koraro, Selam, Debre Hiwot and Simret. Table 1 summarizes the results of the 2007 Census and our 2013 survey sample. The sample covers 6.9% of the households of the four villages and 8.4% of the population.

Fifteen graduate students and lecturers of Mekelle University were hired and trained as the enumerators. All of them are bilingual in Tigrinya and English. The enumerators visited the households selected in the sample to interview them; they asked the questions in the questionnaire and wrote down the responses of the interviewees. Most of the time, the head of the household answered the questions. But sometimes the spouse or other member of the household answered the questions. On average, it took fifty minutes or so to complete the interview with one household.

The data set collected includes information on demographic composition, farm and non-farm assets, expenditures and income, ownership of land and livestock units, crop production and input use, water management, lending and borrowing, health, energy use, schooling, and other individual and household characteristics. Overall, the survey design is quite similar to that of Ethiopian Rural Household Survey for the sections that overlap in terms of the information gathered. However, our survey data are more specific and detailed than a nationwide large scale survey such as Ethiopian Rural Household Survey, so they provide researchers an opportunity to formulate a more comprehensive and deeper understanding of the research area.

As our study focuses on primary school children, our sample considers 584 children coming from the main sample of 325 households surveyed. Table 2 shows the definition of variables used in our analysis and their descriptive statistics. 84.1% of children have ever attended school and 78.4% of children were currently enrolled at school. The highest grade attained is 3.78, suggesting many children do not finish even primary school education. School gap is 0.737 indicating that

many children do not proceed into a higher level of education on time. Average age of children in our sample is 11.5 years and the proportion of boys is 52.7%, so our sample is balanced in terms of sex. 31.7% is first-born children in the family and each family has on average about 7 members.

Each household has an average land area of 0.613 *ha* and only 43% of villagers have their own land, which confirms the fact that the research area is home to quite poor communities. Household heads are on average 49 years old and more than three quarters of them are male. Only about one quarter of household heads can read and write and the mean education level of adult male members (4.9 years) was higher than that of female members (3.6 years). Log of per capita consumption is 8.52 (about \$260) and the number of livestock is 2.5, which indicate that the villages are poorer than other areas in Ethiopia.

CONCEPTUAL FRAMEWORK AND EMPIRICAL STRATEGIES

The theoretical framework for the analysis of children's schooling outcomes is derived from the standard household production model of Becker (1964). The framework highlights the importance of child characteristics such as gender and age; family composition and child's relative position in terms of age within the family; family income and parental labor force participation. It also considers labor market factors such as the wages of adults (and of children); and community infrastructure such as the supply of school, availability of water, electricity, market, etc (Vuri, 2008).

It is assumed that decisions about children's time allocation are mainly made by parents. In particular, it is assumed that parents maximize a utility function, where the time children spend in school (and/or on work) is one of the arguments, together with domestic and market goods, given the head's hours of market work and

Table 2. Definition of variables.

Variable description	N	Mean	SD	Min	Max
Ever attended school (1= yes, 0 = no)	584	0.841	0.366	0	1
Currently enrolled (1= yes, 0 = no)	584	0.784	0.412	0	1
Highest grade attained	584	3.781	2.658	0	8
Relative grade attainment**	584	0.737	0.517	0	4
Age of child (years)	584	11.545	2.915	7	17
Child is male (1= yes, 0 = no)	582	0.527	0.500	0	1
Child involved in fuel wood collection (1= yes, 0 = no)	584	0.423	0.494	0	1
Child involved in other household work at home (1= yes, 0 = no)	584	0.192	0.394	0	1
Birth order	584	2.178	1.075	1	6
Family size	584	6.998	1.836	2	14
Land area, hectare	541	0.613	0.307	0.05	2
Land possession (1= yes, 0 = no)	584	0.430	0.495	0	1
Age of the head, years	563	49.348	11.105	25	85
Sex of head (1 = male, 0 = female)	563	0.769	0.422	0	1
Literacy of head (1= yes, 0 = no)	565	0.264	0.441	0	1
Mean education of adult male members	520	4.900	4.282	1	14
Mean education of adult female members	568	3.574	3.890	1	14
Log of per capita consumption expenditure	580	8.519	1.042	5.14	11.15
Livestock possession, tlu	570	2.522	1.919	0	22.63
Number of cattle owned	584	5.236	5.051	0	30

**This is calculated as child's actual grade attained divided by the grade the child is supposed to attain given her/his age.

unearned income (Francavilla et al., 2013). Basically, parents make these choices on the basis of the relative costs and benefits of their children's education (Admassie and Bedi, 2003; Vuri, 2008).

Apart from factors that are expected to increase the benefits from education (including supply side factors), the effects of parental choices are also likely to be differentiated depending on the characteristics of the household and of the child. For example, parental choices over their children's time use and returns to education, as well as child productivity, can depend on children's age and gender, but also on parental characteristics (parents' education and presence in the household). Similarly, the level of household income and wealth is likely to influence the relative size of the income and substitution effects.

On the other hand, there is ample evidence that child labor has a negative impact on children's schooling. Particularly, if the cost (direct as well as indirect) of sending children to school is high, poor households will be forced not to send their children to school or to take them out of school. To the extent that this is true, policy reforms targeted at affecting the cost (direct or indirect) of schooling will affect the allocation of children's time.

The utility-maximizing framework explained above, therefore, can be used to model household decisions

regarding children's school and work activities as a function of individual, parental, household and community characteristics. These reduced form expressions for schooling and work will form the basis for specifying the estimable form of demand equations. Accordingly, the following equation is specified for the estimation of children's schooling outcomes:

$$S_{ij} = f(C_{ij}, H_j, D, \varepsilon_{ij}) \quad (1)$$

Where S_{ij} is the schooling outcome for child i belonging to household j , C_{ij} is a vector of child-specific characteristics (e.g., age, gender); H_j is a vector of household characteristics (e.g., age, gender and level of education of head, household income, assets); D is a vector of community-level dummies which proxy for a wide range of factors such as prices, agro-ecological conditions, infrastructure, and school quality; and ε_{ij} is a normally distributed error term with mean zero and variance σ .

In line with the standard practice in studies of household demand for education in developing countries, we use per capita consumption expenditure rather than income as a measure of household access to resources. However, this variable is likely to be determined jointly with schooling decisions at household level and is, therefore, endogenous. We instrument it through a

separate regression given below,

$$PCE = \beta_0 + \beta_1 H + \beta_2 W + \beta_3 D + \nu \quad (2)$$

where PCE is the logarithm of per capita household consumption expenditure, W is a set of wealth or household asset indicators and H and D are as defined in equation (1) above. We include land holding, which is a major wealth indicator in rural areas, in W . We also include, a wealth index constructed through principal components analysis (PCA) technique based on Flimer and Pritchett (2001)². These two variables are only used in equation (2) and hence are our identifying variables. We use equation (2) to obtain the predicted values of per capita consumption expenditure (our proxy for household income) for use in our main regressions of schooling in equation (1). Children's schooling outcomes have several dimensions that are dependent on the schooling decisions that households are faced with regarding their children's well-being. We consider four dimensions of these schooling decisions. The first dimension is school entry. This can be captured in two ways: whether or not a child has ever entered school; and whether or not the child is currently in school. We analyze the impact of child and household characteristics on the chances that a primary school-age child has ever attended school (ever attendance), and is currently attending school (current enrollment). This is the most important stage in the schooling of a child. Delays in schooling at this time will have a serious implication for child education with a possibility that some of them may never attend school or if they do they are likely to lag behind in their progress, perform poorly or even drop out early (Handa et al., 2004). We employ a probit model for assessing how each selected explanatory variable influences the probability of children's school attendance as explained above.

Once in school, children should stay in the school and progress through each level until completion. In this regard, the major challenge for such children would be being able to progress in their schooling through each subsequent level or grade. To understand the determinants of this dimension of schooling, we examine the highest grade or years of schooling attained by children who have ever attended school. Some of the children who ever attended school may still be attending school, while others may no longer be in school (may have dropped out or completed school). Following Handa et al. (2004), we account for possible selection biases using Heckman sample selection model.

Besides grade attainment, measurements of children's progress needs to take into account schooling efficiency.

This refers to the length of time it takes for a student to achieve a given level of education. Delays in starting schools, interruptions and repetitions in schooling reduce efficiency and negatively affect children's motivation for schooling.

This outcome is measured as the child's actual grade attained divided by the grade the child is supposed to attain given his or her age (Handa et al., 2004; Mani et al., 2013). We proxy this trend by the schooling efficiency or relative grade attainment variable, calculated as grade completed divided by the grade that should have been completed, given the child's age. We also analyze the determinants of this outcome for children who have ever attended school. We do so by employing a Heckman sample selection model in the same way as for highest grade attainment to account for selection bias.

RESULTS

About 78% of children in our sample were in school by the time of the survey, lower than the 88% net enrollment rate reported for Tigray region as a whole³. Female children generally showed better schooling outcomes for all measures, and the differences were significant for a proportion of current enrollment (Table 3).

Table 4 shows schooling outcomes by sex and age groups. For children of age 7-10 more girls ever attended school and are currently enrolled, which is not the case for age groups of 11-14 and 15-17. Thus, a better schooling outcomes of female children of Table 3 seems to be caused by young children, which suggests that female education has significantly improved recently.

The results of the regression analysis carried out on each of the four measures of schooling considered in this paper are outlined as follows.

Determinants of the probability of ever attending school

Table 5 presents the results for determinants of ever-attending school estimated using a probit model. Multicollinearity has been addressed in all specifications.⁴ To control for the possible impact of child labor, we have included involvement of children in household chores such as collection of fuel wood, cattle

² We used a series of questions on household asset ownership in our survey (see annex for details).

³ Education Statistics Annual Abstract 2012/13, Ethiopian Federal Ministry of Education

⁴ The results of the uncentered VIF revealed that with the exception of age, age2 and household size, remaining variables had very low values, implying that there was no serious multicollinearity problem. The high VIF for age and age-squared is obvious, and that of household size could be safely ignored since it is a control variable and not really a variable of interest.

Table 3. Schooling outcomes of children (7-17 years old) by sex.

	All	Male	Female	D
Proportion who ever attended, %	84.0	81.8	86.6	2.48
Proportion currently in school, %	78.4	74.9	82.2	4.51**
Highest grade attained, mean	3.78	3.75	3.81	0.25
Relative grade attainment, mean	0.74	0.71	0.77	1.49

Notes: D is test of significance for the difference (chi-squared test for the first two measures and t-test for the last two measures); ** indicates a statistical significance at 5% level.

Table 4. Schooling outcomes of children by sex and age groups.

	7-10		11-14		15-17		All	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Ever attended	101 (55.5%)	81 (44.5%)	95 (44.2%)	120 (55.8%)	42 (45.7%)	50 (54.3%)	238 (48.7%)	251 (51.3%)
Currently enrolled	99 (54.7%)	82 (45.3%)	87 (44.4%)	109 (55.6%)	40 (50.6%)	39 (49.4%)	226 (49.6%)	230 (50.4%)
Highest grade (mean)	2.09	1.97	5.16	4.79	5.09	4.71	3.81	3.75
Relative grade	0.86	0.76	0.8	0.76	0.53	0.49	0.77	0.71

Table 5. Determinants of ever attending school, 7–17 year-old children.

	(1)		(2)		(3)	
	Coef.	P-value	Coef.	P-value	Coef.	P-value
Child's age	0.998***	(0.000)	0.945***	(0.000)	0.945***	(0.000)
Age squared	-0.0436***	(0.000)	-0.0406***	(0.000)	-0.0406***	(0.000)
Child is male	-0.132	(0.417)	-0.165	(0.355)	-0.162	(0.366)
Birth order						
Second	-0.329	(0.150)	-0.436*	(0.089)	-0.434*	(0.089)
Third	-0.380	(0.177)	-0.453	(0.147)	-0.453	(0.147)
Fourth or higher	-0.917***	(0.006)	-1.015***	(0.006)	-1.019***	(0.006)
Head is male	0.206	(0.275)	0.236	(0.315)	0.246	(0.308)
Age of head	0.0137**	(0.044)	0.00975	(0.216)	0.00936	(0.243)
Family size	-0.0573	(0.299)	-0.0652	(0.284)	-0.0651	(0.284)
Predicted Log of per capita cons. expenditure	0.0945	(0.180)	0.117*	(0.094)	0.115*	(0.096)
Livestock, tlu	-0.0476	(0.275)	-0.0470	(0.320)	-0.0468	(0.322)
Head is literate	0.208	(0.239)			-0.0389	(0.844)
Mean education of male members			0.0445**	(0.036)	0.0467**	(0.048)
Mean education of female members			-0.0100	(0.629)	-0.00985	(0.634)
Child involved in fuel wood collection	0.0547	(0.766)	-0.114	(0.565)	-0.122	(0.551)
Child involved in other household chores	0.393	(0.115)	0.426	(0.110)	0.433	(0.110)
No of cattle	0.0225	(0.239)	0.0248	(0.226)	0.0252	(0.218)
Constant	-4.748***	(0.000)	-4.484***	(0.002)	-4.458***	(0.003)
No. of observation	557		490		490	
pseudo R-sq	0.155		0.173		0.173	

Note: Included but not shown are village dummies. ***, ** and * stand for statistical significance at 1, 5 and 10% levels.

herding⁵, and other works at home like cooking. As already mentioned in section IV, per capita consumption expenditure is instrumented by the predicted log of per capita consumption expenditure, the estimates of which are provided in the table annexed at the end of the paper.

Among the variables included, child age, age of the head, household income (per capita consumption expenditure) and education of male family members were found to have significantly positive impacts on the probability of ever-attendance. Age of child had a positive and significant impact on the probability of ever attending school as expected with such impact decreasing with age (as evidenced by a significantly negative coefficient for age-squared variable). The implication of this finding is that, the older a child is the more likely it is that the child would have at least entered school (irrespective of current enrolment). This is obvious since the older children would have a higher chance of going to school than younger children until their ages. This could be due to the generally expanding school availability in rural areas over time (a supply-side factor not analyzed in this study due to lack of data in our survey).

The log of per capita consumption expenditure (a proxy for household income) carried the expected positive and significant coefficients as shown in columns 2 and 3. This implies children from a richer family have a higher probability of having attended school than those from poorer families. Similarly, education of adult family members had a significantly positive influence on the probability of attendance. Specifically, a higher mean level of education of male adult family members was found to be associated with a significant increase in the likelihood of school attendance (columns 2 and 3).

Birth order had also a significant impact on the probability of ever attending school. Specifically, children born fourth or later were found to be significantly less likely to have ever attended school than their first born siblings. The same was true of children born second, though the significance level was not as strong. In fact, estimates for a dummy of first born child (not reported here) had a significant positive coefficient, implying that first born children are more likely to have ever attended school than their younger siblings. The implication of this could be that earlier born children may have more intra-household resources directed to them, and hence better outcomes including schooling as argued by Emerson and Souza (2008). Our findings on birth order are in agreement with those reported by Haile and Haile (2012) on Ethiopian data. However, findings on the effect of birth order have been generally inconclusive, some documen-

ting negative relationships in agreement with our result (Booth and Kee, 2009; Hotz and Pantano, 2013; De Haan et al., 2014), while others reported the opposite (Ejrnæs and Pörtner, 2004). A recent study by Seid and Gurmu (2013) found no effect of birth order on the probability of school attendance for Ethiopia.

On the other hand, there was no significant difference in children's school attendance by gender of household heads. However, children from families with older heads were found to be more likely to ever attend school than their counterparts from families with younger heads (column 1). This could possibly be due to accumulation of wealth and experience that comes with age, which enables older heads to invest in their children's schooling for many reasons including benefits in old age. Although family size carried the expected sign, it did not have any significant influence on the probability of children ever attending school. Similarly, all the three variables associated with child labor demand turned out to be insignificant, implying that they didn't have any influence on the likelihood of attendance.

Determinants of the probability of current enrollment

The estimates for the determinants of current enrollment are given in Table 6. The results show quite a similar pattern to that of ever-attendance. One major difference relates to the gender variable. The probability of a child being currently enrolled was found to be higher for girls as indicated by the negative and significant coefficients. This finding contrasts with existing findings in past studies. Rosati and Rossi (2003) found that Pakistani female children are less likely to attend school than their male counterparts. Other papers also report a lower likelihood of school attendance for female children (Canagarajah and Coulombe, 1997; Jensen and Nielson, 1997; Cockburn, 2001; Haile and Haile, 2012). However, our finding could be the result of a trend of narrowing down of educational inequality between boys and girls observed over time as shown in Table 4, so that the impact of gender would be more likely associated with current enrollment than the ever attendance variable⁶.

Another noticeable difference relates to the impact of birth order. Birth order did not influence current enrollment outcomes though it carried the expected negative sign for younger children born after three siblings. This finding is consistent with that of Seid and Gurmu (2013) for Ethiopia. This reflects the trend that more families send their children to school over time since they realize the power of education for children'

⁵ As there was no direct information on this, we included number of cattle (oxen, cows, sheep and goats) owned by households as a proxy. Similar strategy was also employed in Cockburn and Dostie (2007).

⁶ However, this needs further analysis. We provide more evidence from other papers in discussion section.

Table 6. Determinants of current enrollment, 7–17 year-old children.

	(1)		(2)		(3)	
	Coef.	P-value	Coef.	P-value	Coef.	P-value
Child's age	0.517 ^{***}	(0.005)	0.507 ^{***}	(0.010)	0.509 ^{***}	(0.009)
Age-squared	-0.0226 ^{***}	(0.004)	-0.0221 ^{***}	(0.009)	-0.0222 ^{***}	(0.009)
Child is male	-0.307 ^{**}	(0.042)	-0.289 [*]	(0.073)	-0.277 [*]	(0.088)
Birth order						
Second	0.155	(0.429)	0.180	(0.402)	0.194	(0.361)
Third	0.257	(0.299)	0.304	(0.269)	0.308	(0.264)
Fourth or higher	-0.102	(0.737)	-0.137	(0.679)	-0.146	(0.656)
Head is male	-0.0307	(0.863)	-0.152	(0.492)	-0.102	(0.656)
Age of head	-0.00895	(0.128)	-0.00815	(0.226)	-0.0104	(0.145)
Family size	-0.0399	(0.392)	-0.0289	(0.593)	-0.0270	(0.611)
Predicted Log of per capita cons. expenditure	0.185 ^{***}	(0.006)	0.127 ^{**}	(0.043)	0.118 [*]	(0.071)
Livestock, tlu	-0.0133	(0.765)	-0.0173	(0.697)	-0.0151	(0.735)
Head is literate	0.00835	(0.956)			-0.235	(0.186)
Mean education of male members			0.0281 [*]	(0.103)	0.0397 [*]	(0.058)
Mean education of female members			0.0199	(0.297)	0.0207	(0.281)
Child involved in fuel wood collection	0.0402	(0.808)	-0.0720	(0.679)	-0.127	(0.475)
Child involved in other household chores	0.0157	(0.943)	0.162	(0.487)	0.193	(0.417)
No of cattle	0.0244	(0.204)	0.0206	(0.270)	0.0217	(0.260)
Constant	-2.421 [*]	(0.056)	-2.116 [*]	(0.104)	-1.982	(0.115)
No. of observation	557		490		490	
pseudo R-sq	0.102		0.113		0.117	

Note: Included but not shown are village dummies. ^{***}, ^{**} and ^{*} stand for statistical significance at 1, 5 and 10% levels.

future. It could also be due to the supply side factor that school system is getting better over time.

Children who are older, and who come from richer and better educated families, have a higher chance of being currently enrolled in school. This finding is in agreement with many past studies (Handa et al., 2004; Hail and Haile, 2012). More importantly, household resources as captured by the log of per capita consumption expenditure is consistently significantly associated with the probability that a child is currently enrolled in all three specifications, which was not the case for ever-attendance. A possible explanation could be that current income is key for present enrollment and hence is highly correlated with it, while the same may not be the case for ever-attendance, which also captures past enrollment status of children not enrolled currently.

Determinants of highest grade attained

Table 7 presents estimates for the determinants of grade attainment. The variable 'highest grade attained' is crucial in order to understand how well children progress or stay in school once enrolled. We report both OLS and

Heckman sample selection regressions. The latter was aimed at taking care of sample selection bias due to the fact that our sample includes children who have never attended school. As the sample selection model is our preferred specification, our explanations are mainly based on the Heckman's model in columns (3) and (4), while providing comparisons between the two estimations wherever needed.

Similar to the previous two measures of school attendance outcomes, child age was found to have a significantly positive influence on the highest grade attained. It is obvious since the older children may have achieved higher grades than younger children at the time of survey. However, this effect is getting dampened as the negative sign of age squared variable indicates, which is consistent with Tables 5 and 6. This could partly be due to improvements in school availability as explained above (for schooling attendance outcomes). Our results also reveal that there was no gender difference in terms of grade attainment.

This implies that boys and girls did not significantly differ in terms of grade attainment. Children from male-headed households were found to attain more grades in school than those from female-headed families

Table 7. Determinants of the highest grade attained.

	OLS				Heckman's selection model			
	(1)		(2)		(3)		(4)	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
Child's age	2.194 ^{***}	(0.000)	2.097 ^{***}	(0.000)	2.119 ^{***}	(0.000)	2.159 ^{***}	(0.000)
Age-squared	-0.0763 ^{***}	(0.000)	-0.0706 ^{***}	(0.000)	-0.0655 ^{***}	(0.000)	-0.0676 ^{***}	(0.000)
Child is male	0.0296	(0.891)	0.0485	(0.825)	-0.0587	(0.740)	-0.0199	(0.916)
Birth order								
Second	-0.106	(0.704)	-0.121	(0.676)	0.186	(0.377)	0.183	(0.425)
Third	-0.526 [*]	(0.098)	-0.472	(0.160)	-0.119	(0.658)	-0.148	(0.610)
Fourth or higher	-0.831 ^{**}	(0.037)	-0.750	(0.078)	-0.0834	(0.819)	-0.126	(0.747)
Age of head	0.0192 ^{**}	(0.028)	0.0140	(0.155)	0.00330	(0.681)	0.00948	(0.322)
Head is male	0.548 ^{**}	(0.032)	0.565	(0.058)	0.545 ^{***}	(0.007)	0.510 ^{**}	(0.045)
Livestock, tlu	-0.0598	(0.282)	-0.0690	(0.239)	-0.0519	(0.313)	-0.0600	(0.266)
Family size	-0.110 [*]	(0.094)	-0.148 [*]	(0.061)	-0.159 ^{***}	(0.008)	-0.155 ^{**}	(0.021)
Predicted Log of per capita cons. exp.	0.157 [*]	(0.088)	0.179 [*]	(0.079)	0.107	(0.786)	0.132	(0.768)
Head is literate	0.451 ^{**}	(0.040)	0.165	(0.478)	0.334 [*]	(0.060)	0.297 [*]	(0.064)
Mean education of male members			0.0452 [*]	(0.057)			0.00175	(0.935)
Mean education of female members			0.00175	(0.942)			0.000105	(0.996)
Child involved in fuel wood collection	0.321	(0.196)	0.146	(0.580)	0.338 [*]	(0.069)	0.253	(0.204)
Child involved in other family work	0.376	(0.209)	0.474	(0.131)	0.0864	(0.713)	0.238	(0.343)
No of cattle	0.0146	(0.513)	0.0106	(0.648)	0.0135	(0.495)	0.0101	(0.626)
Inverse Mills ratio					2.914 ^{***}	(0.006)	2.807 ^{***}	(0.008)
No. of observation	557		490		538		489	
R-sq	0.406		0.451					

Note: Village dummies are included but not reported for brevity. ***, ** and * stand for statistical significance at 1%, 5% and 10% levels

(column 1, 3 and 4), which confirms to our expectation. On the other hand, although the OLS estimates show that there was a significant difference in terms of birth order, where children born late attained less in terms of timely progression than their elders and significantly so for those born fourth or later at least in one of the specifications (column 1), the same did not hold after accounting for sample selection bias using Heckman's model (columns 3 and 4). Therefore, this finding indicates that birth order was not an important determinant of schooling progression once children are in school.

Per capita consumption expenditure shows positively significant coefficients in OLS but is consistently insignificant in Heckman model. The adult education seems to have a significantly positive influence on grade progression (columns 1, 3 and 4). Specifically, education of the head was found more important than those of other adult family members as represented by a statistically significant positive coefficients in columns (3) and (4). Finally, family size was found negative and statistically significant in our preferred model as expected (columns 3 and 4).

The implication is that children from larger families achieve less in terms of timely progression. A possible explanation could be that, other things being equal, larger families require more resources to feed themselves and hence have less remaining resources for children's education.

Determinants of relative grade attainment

Table 8 presents the estimates for relative grade attainment, a longer-term measure of schooling progression that allows for delays in grade accumulation. We followed the same estimation procedure as for grade attainment and hence the estimates reported are both for OLS (columns 1 and 2) and Heckman's sample selection model (columns 3 and 4).

As can be seen from the table, the coefficient of age is not significant unlike the other three indicators. This means that age is not important in explaining differences in relative grade attainment, i.e., whether or not a child is in school at the right age, progressing each year to the

Table 8. Determinants of the relative grade attainment.

	OLS		Heckman's selection model					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
Child's age	0.0442	(0.593)	0.0359	(0.668)	0.0818	(0.174)	0.0927	(0.198)
Age-squared	-0.00423	(0.192)	-0.00360	(0.279)	-0.00518**	(0.042)	-0.00553	(0.070)
Child is male	-0.0292	(0.588)	-0.00638	(0.905)	-0.0218	(0.602)	-0.0219	(0.689)
Birth order								
Second	-0.0235	(0.661)	-0.00952	(0.852)	0.0949***	(0.000)	0.0994*	(0.098)
Third	-0.0605	(0.455)	-0.0156	(0.841)	0.0299	(0.296)	0.0649	(0.408)
Fourth or higher	-0.296***	(0.009)	-0.288***	(0.010)	0.0650**	(0.036)	0.0938	(0.382)
Age of head	0.00624**	(0.017)	0.00535**	(0.015)	0.00304	(0.126)	0.00432	(0.120)
Head is male	0.0696	(0.267)	0.0788	(0.244)	0.142**	(0.011)	0.191**	(0.008)
Livestock, tlu	-0.00591	(0.686)	-0.00302	(0.840)	-0.00467***	(0.000)	-0.00979	(0.545)
Family size	-0.0292**	(0.025)	-0.0307*	(0.038)	-0.0511***	(0.000)	-0.0532***	(0.005)
Predicted Log of per capita cons. exp.	0.0373	(0.147)	0.0589**	(0.030)	0.0651	(0.218)	0.0540	(0.678)
Head is literate	0.111**	(0.025)	0.102*	(0.072)	0.105**	(0.030)	0.119**	(0.048)
Mean education of male members			-0.00228	(0.674)			-0.00300	(0.615)
Mean education of female members			-0.00358	(0.547)			0.00175	(0.763)
Child involved in fuel wood collection	0.0279	(0.584)	0.0318	(0.539)	0.0652*	(0.104)	0.0567	(0.283)
Child involved in other family work	0.0701	(0.243)	0.0982	(0.121)	0.0107	(0.693)	0.0182	(0.788)
No of cattle	0.00227	(0.640)	0.00102	(0.839)	0.00507	(0.117)	0.00452	(0.423)
Inverse Mills ratio					1.378***	(0.000)	1.521***	(0.000)
No. of observation	557		490		518		468	
R-sq	0.170		0.169					

Note: Included but not shown are village dummies and constant term. ***, ** and * stand for statistical significance at 1%, 5% and 10% levels

next or higher grade level successively (a measure of efficiency). As explained above, the mere expansion of availability of schooling infrastructure in rural Ethiopia may not be sufficient in improving efficiency as measured by relative grade attainment. Quality of schooling in terms of better facilities and staffing becomes more important for ensuring timely progression. Although our paper did not consider such aspects, this could be an interesting future research topic to address.

Birth order mattered here as can be seen from the consistently significant coefficients in three of the four specifications. This implies that children born late attained less in terms of timely progression than their elders specifically for those born fourth or later. Our study site is a rural area occupied by poor villagers and each family may not have enough resources to help finish the education of their children in time.

As for relative grade attainment (efficiency), household income seems to be less important. As can be seen in Table 8, this variable is insignificant in three out of four specifications. More importantly, it is insignificant in our

preferred model. On the other hand, the literacy of the head was found to be a strong determinant of timely progression as indicated by the statistically significant positive coefficient estimates in all specifications. Thus, the literacy of household head and household income seem to have quite different roles in terms of schooling attendance and progression.

Finally, family size was negative and statistically significant implying children from larger families were found to achieve less in terms of relative grade attainment. This finding together with that found for highest grade attainment implies that family size acts as a deterrent factor for children's school progression. The variables included to control for possible child labor influences were all found to be insignificant with the exception of children's involvement in fuel wood collection which had significance at 10% level. Hence, it can be said that overall these variables did not have significant influence on the schooling outcomes considered. Cockburn and Dostie (2007) found generally insignificant effects of cattle herding (proxied by number

of cows, oxen, bulls and calves) on schooling, and they find negative effects with regard to fetching wood and water (proxied by the distance to the water source). Haile and Haile (2012) also find similar results for the effect of child work hours on schooling. However, since the variables we used as proxy for child labor (dummies for involvement in household chores and number of cattle for herding) are only indirect measures, they may not capture child labor aspects fully.

DISCUSSION

In this paper we attempted to provide a comprehensive analysis of the determinants of children's schooling outcomes in rural Tigray region of Ethiopia. We used four different measures of schooling to examine the impact of household and child-specific factors on children's schooling. First, we analyzed the determinants of school attendance using ever-attendance and current enrollment dimensions of schooling. The estimates from probit models revealed that the probability of school attendance was generally positively influenced by child's age, household income, and the literacy of male adult family members, which is consistent with existing literature (Handa et al., 2004; Hail and Haile, 2012). Moreover, birth order had a significantly negative influence on the probability of attendance as measured by whether a child has ever gone to school (with later born children less likely to have ever attended school). Our findings on birth order are in agreement with those reported by Haile and Haile (2012) for Ethiopia. On the other hand, children from families with older heads were more likely to have ever-attended school. However, these two variables didn't have any significant influence on current enrollment.

Next, we analyzed determinants of school progression based on highest grade attainment and relative grade attainment (efficiency). The estimates from OLS and Heckman's sample selection models revealed that the gender and literacy of the household head had a significantly positive impact on schooling progression, while family size was significantly and negatively associated with progression. Moreover, child age was found to be an important determinant of highest grade attainment, while it did not have any significant impact on timely progression (relative grade attainment).

Several studies in the past have found that the education of the household head and the household standard of living are important factors in explaining variations in children's schooling outcomes (Lloyd and Blanc, 1996; Handa et al., 2004; Abebaw et al., 2007; Mani et al., 2013). With regard to household level human capital, our study further considers the role of the education of adult family members besides that of the

household head. We find that the education of male adult family members (measured by the mean level of education) was important in explaining part of the differences in children's schooling in terms of school attendance. Handa et al. (2004) have reported similar findings for Mozambique generally for education of adult members without any distinction by gender.

However, findings on other factors remain inconclusive. A case in point is child gender. While available evidence for developing countries is generally indicative of favorable outcomes for boys, Lloyd and Blanc (1996) report that sex differences are generally much less striking specially in the countries of Southern and Eastern Africa and even better outcomes for girls in the case of Namibia. The authors also indicate that girls' enrollments in Sothern Africa is boosted by an earlier start in school, as their enrollment rates are higher than those of boys for younger age groups (6-9). This appears to be consistent with those reported in table 4, further supporting the negative coefficient on gender reported in table 6 for current enrollment. Thus, though this finding of ours deviates from the majority of similar studies in the past, it could be indicative of recent changes happening in some African regions in terms of gender disparity in education.

A closer look at the various factors considered in our analysis reveals that the impact of income as measured by per capita consumption expenditure was found more important for school attendance (whether or not a child has been or is currently in school) than school progression (how rapidly children enrolled in school progress from grade to grade). On the other hand, education of household heads was more important in influencing school progression than attendance. This impact was net of the 'income' effect of household resource endowment since we have instrumented for the latter through the inclusion of the predicted log per capita consumption expenditure in all our analyses. Similarly, while family size had the expected negative association with all the schooling outcomes considered, it only deterred school progression dimension than attendance.

An important policy implication to be drawn out of these results is that interventions aimed at raising children's educational attainment in rural Ethiopia should follow a differentiated approach by targeting specific dimensions of schooling outcomes. Accordingly, interventions aimed at enhancing household income and hence reducing poverty would have more impact on raising school attendance, while increasing educational opportunities in rural areas and hence promoting human capital development would be more successful in achieving children's progression in school. Family planning awareness and interventions could also help reduce the negative influence on schooling arising from pressure on household resources.

Conclusion

Investment on children's education is widely recognized as one of the basic requirements for economic development. This study uses four different measures of schooling (ever-attendance, current enrollment, highest grade attainment and relative grade attainment) to examine the impact of household and child-specific factors on children's educational outcomes in rural Tigray region of Ethiopia. The results revealed that among child specific variables, the age and birth order of children were important determinants of their schooling outcomes. The estimates of birth order revealed that first born children had a better schooling outcome on ever attendance and relative grade attainment. The estimates for the effect of gender indicated that girls attain better schooling outcomes as measured by current enrollment. However, there was no significant gender difference in terms of the remaining three measures of schooling.

Among the household-level factors, the literacy of household head, the literacy of adult male family members and household income (measured by per capita consumption expenditure) had a significantly positive impact on most measures of children's schooling outcomes. More specifically, household income was found more important for school attendance than school progression. On the other hand, education of household heads was more important in terms its influence on school progression than attendance. Family size had a negative influence on both school progression measures.

Our results generate more refined policy implications. Interventions that enhance household income or reduce poverty would help raise school attendance, while those aimed at increasing educational opportunities in rural areas would be more effective for enhancing children's educational progress at school. Family planning may also help alleviate the negative influence of family size on children's schooling.

Limitation

In this paper, children's schooling outcomes were analyzed with emphasis on the demand side factors affecting those outcomes. However, supply side factors such as school availability, school distance, cost of schooling, school facilities, and classroom contexts will also have an influence on schooling outcomes. We could not perform analysis on these due to data availability and leave this dimension as a future research agenda.

Moreover, children's own perceptions on schooling might also explain variations in their schooling outcomes. Due to data limitation, we could not explore such aspects in our analysis. However, the assumption that children's

schooling is mostly determined by parents is not unreasonable when considering a society with patriarchal property.

Conflict of Interests

The author(s) have not declared any conflict of interests.

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Annex: OLS estimates for per capita consumption expenditure.

	Coef	P-value
Head is literate	0.271**	(0.021)
Presence of literate adult female family members	0.203**	(0.027)
Presence of literate adult male family members	0.0568	(0.617)
Gender of household head	-0.0621	(0.626)
Age of household head	-0.0105*	(0.010)
Household size	-0.0665**	(0.006)
Livestock possession	0.0212	(0.321)
Land possession	0.176**	(0.049)
Wealth/asset index	0.131***	(0.000)
Access to credit	0.0109	(0.900)
Constant term	8.996***	(0.000)
No. of observation	518	
Pseudo R-sq	0.107	

Note: Village dummies are included. Estimation method is OLS. ***, ** and * stand for statistical significance at 1%, 5% and 10% levels. Dependent variable is log of per capita consumption expenditure. Wealth index and land possession are used as identifying variables for this instrumental regression and hence were excluded from all the main regressions in our analyses. They were both found to be significantly correlated with per capita consumption expenditure. The wealth index variable was constructed using principal components analysis (PCA) technique based on indicator variables of possession of durable household assets such as TV, radio, stoves, bed, house, furniture, etc. The overall KMO measure of sampling adequacy was acceptable (0.642).