# Socio-Economic Status and Children's Schooling Outcomes in Mozambique

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# Socio-Economic Status and Children's Schooling Outcomes in Mozambique

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# Abstract

This study investigates the association between socio-economic factors and children's schooling outcomes (school access as proxied by ever enrolled, dropping out and staying in school – current enrolled or still in school) for children in Mozambique using the probit model. The results show that there is not much difference between factors that affect access and those that affect dropping out or staying in school once enrolled. Children from the poorest families, with less educated parents, from the north region, who live far away from a water source and are not the biological children of the household head were found to be most disadvantaged in all the three schooling outcomes compared to their counterparts with educated parents, from wealthy families and with water at home. The rural–urban divide, availability of electricity and land or livestock at home had no significant correlation with children schooling outcomes. This study therefore argues that policymakers must implement policies that improve the socio-economic backgrounds of children, by dealing with the demand-side factors particularly enhancing adult literacy programmes, providing water sources close to households, encouraging pre-primary education centres and improving the general welfare of households where children live. In a nutshell, results showed that demand-side factors were strong hindrances to children's schooling and have to be prioritized in drafting and implementing of education policies.

# 1. Introduction and background

Education is generally acknowledged to be the most powerful tool in fighting poverty and enhancing a country's economic development. Investing in human capital through education improves the competitiveness of a nation. Empirical studies have found that education boosts social status, improves agricultural productivity and speeds up the process of demographic transition (Kravdal, 2002). Bongaarts (2003) and Riyami et al. (2004) found that females' education decreases fertility and mortality through its effect on age at first marriage. The UN MDG 2 sought to ensure that children complete primary education—universal primary education (UPE) (United Nations, 2015). SDG 4 emphasizes the need for "*inclusive and equitable quality education and promoting life-long learning opportunities for all by 2030*" (United Nations, 2015). The Government of Mozambique embarked on extensive reforms in education in 2000, soon after the end of civil war.

Since the end of the civil war, poverty levels have been high across Mozambique (MEF/DNEAP, 2016; Gradin and Tarp, 2019). The country's human development index (HDI) improved by more than 120% between 1990 and 2019, from a value of 0.209 to 0.46 (United Nations, 2015). However, the country still falls in the low human development category and was ranked number 180 out of 189 countries and territories in 2017. Inequality remains one of the social ills of the country (MEF/DNEAP, 2016; Gradin and Tarp, 2019; Arndt and Mahrt, 2017). The south continues to be better off than the central and the north.

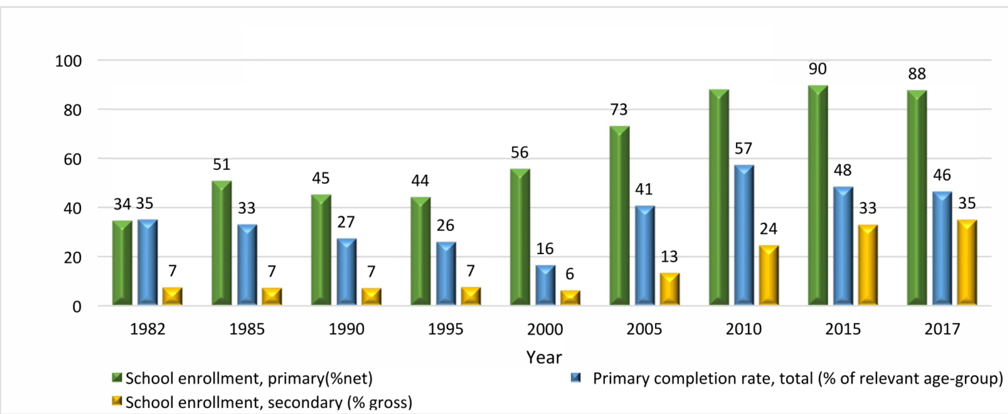
The gross domestic product (GDP) growth rate in Mozambique was impressive post-2000, averaging about 7.5%, until 2015 when the country plunged into a hidden debt crisis (Arndt and Mahrt, 2017). Economic progress, however, did not manage to pull the country out of extreme poverty. The poverty head count ratio was 69.0% in 1996/97; 52.8% in 2002/03; 51.7% in 2008/09 and 46.1% in 2014/15 (MEF/DNEAP, 2016). Studies have found that people were more likely to remain in the vulnerable or poor category than to move into a better category (Salvucci and Santos, 2020; Salvucci and Tarp, 2021). Child poverty was found to exceed that of neighbouring countries (Mahrt, Rossi and Salvucci, 2020). The formal sector still only employs about 14% of the total labour force, and the rest are in the informal sector. The labour force comprises 43% of the total population and almost half the population is aged between 0 and 14 years. The country also still depends heavily on the agriculture sector, which provides 75% of the employment; the service sector provides 21% and the industry sector 4% (MEF/

DNEAP, 2016). The most cited reasons for the slow translation of growth to poverty and inequality reduction is the relatively low skilled domestic labour force (MEF/DNEAP, 2016; Gradin and Tarp, 2019; Arndt and Mahrt, 2017). Mozambique has very low human capital, especially in education, such that companies relied on imported skilled labour during the boom period (MEF/DNEAP, 2016). In addition, the country experiences frequent natural disasters like floods, cyclones, drought and diseases (particularly AIDS and malaria).

The Mozambique schooling system comprises two cycles—lower primary (grades 1–5, known as EP1) and upper primary (grades 6 and 7, which is called EP2). Secondary education also comprises two cycles: grades 8–10 lower secondary, called ES1, and grades 11–12 upper secondary, ES2. Due to shortage of schools and classrooms, some primary schools operate three shifts a day. After seven years of primary education, the pupils have a choice of enrolling for general secondary education, lower primary teacher training colleges, basic technical or at vocational schools.

In colonial times, education was not easily accessible to native Mozambicans, to the extent that in 1975 (the year of independence), 93% of the population was illiterate (UNESCO, 2011). Unfortunately, civil war broke out two years after independence and continued until 1992. The government was thus constrained in making meaningful reforms in the education sector. In 2004, the government embarked on extensive reforms to improve education. National tuition and other fees in primary education were abolished and textbooks were provided for free. Primary school education is completely free in Mozambique, whereas secondary schools charge a fee. The government, through World Bank support in the form of the "Direct Support to Schools" programme, also increased funding for non-salary expenses to schools (World Bank, 2003). School construction and large-scale hiring of teachers accompanied the 2004 reforms, leading to an increase in the numbers of schools and classes.

**Figure 1: Children's enrolment and completion rates**




Source: World Bank: 2014

Figure 1 sheds some light on children's schooling outcomes before and after the 2004 reforms. Primary school enrolment rate and completion were relatively low and declining for a decade from 1985 to 1995, the period that coincides with the war. Secondary school enrolment was stable at a rate of 7% in this period. In the phase post-2004, school reforms were characterized by great improvements in these three educational outcomes. The net enrolment was recorded at 73% in 2005 and 90% in 2015. It fell by 2% to 88% in 2017. The primary completion rate, which was just 16% in 2000, almost tripled and was recorded at 41% in 2005. In 2010, the rate increased by further 16 percentage points to 57%. However, there was a downward trend thereafter and in 2017 the completion rate was at 46%. The secondary school enrolment rate showed an upward trend since 2005 and recorded an improvement of 22 percentage points between 2005 and 2017. However, the secondary enrolment did not respond as much as the primary did. This might be due to the relatively low primary school completion rate and the inability of some parents to afford to send their children to secondary schools, which charge some fees.

The gross secondary enrolment rate stood at just 33% in 2015 while the average in the sub-Saharan African region was 42.5%. This implies that many children do not make it to the seventh grade and, of the few who do, not all of them progress to secondary level. Henceforth, the country will continue to lack an educated and skilled workforce. In a nutshell, Figure 1 shows that reforms brought about improvement in children's education outcomes; much work, however, remains to be done.

A detailed examination of children's access to school and the associated underlying factors is crucial given the challenges with grade progression and lower primary school completion rates in the country. While much literature exists on the determinants of schooling in the world, literature specific to Mozambique is scarce. Most studies have focused on analysing enrolment status separately. For example, their focus is on whether a child is currently enrolled or not (see Robson, 1993; Handa, 200; Mambo, 2017). This study will contribute by analysing first-time enrolment (access to schooling), dropping out and remaining enrolled simultaneously in a bivariate regression model.

The main objective of this study was to investigate the socio-economic factors that drive the process of children's access to school, dropping out and staying in school using the Aids indicator survey data (DHS/AIS, 2015). Specifically, the study sought to examine if the same variable that affects children's first-time access to school (first-time enrolment) are the same ones that affect their continued stay in school.

The rest of the paper is organized as follows. The literature review is presented in Section 2. Section 3 outlines the methodology, and the results are presented in Section 4. The summary of the results and the concluding remarks are given in Section 5.

# 2. Empirical literature review

Overage for grade, high school dropout and low relative grade attainment are three factors that are still prevalent in schools in sub-Saharan Africa despite the extensive research and educational reforms and policies carried out in the region (Mani et al., 2013; Kuépié et al., 2015). Studies on child education focusing on physical access (whether the child is still enrolled or not), ever enrolled and highest grade attained include the ones conducted by Atemnkeng (2010), Zhao and Glewwe (2010), Timaeus et al. (2013) and Branson et al. (2014).

Mozambique practises the grade retention system, whereby children only progress to the next grade after passing the current grade. This causes many children to repeat and, together with late enrolment, most of the children end up being overage for their grade and drop out (DHS/AIS, 2015). The problem of dropping out from school, low primary school completion and low secondary school enrolment has been found to be associated with over-aged enrolments (Kuépié et al., 2015). The country experiences high enrolment in grade 1 and high dropout rate as early as grade 2. Slow and or low progression through grades not only pose a risk of children dropping out of school, but also makes them vulnerable to abuse by teachers in exchange for marks.

Current studies are now focusing on the cognitive outcomes of the children, such as test scores in subjects like Maths and English apart from just enrolment (Mani et al., 2013; Gebremedhin and Mohanty, 2016; Cunningham et al., 2019).

On the determinants of education vast recent literature exists, focusing on supply side factors (school quality and inputs). For example, teacher qualities, pedagogical factors and funding for children's schooling (Chetty, Friedman and Rockoff, 2014; Pellicer and Piraino, 2015; Borkum, 2012; Figlio, 2016).

Buchmann and Brakewood (2000) and Atemnkeng (2010) found that children with educated parents are more likely to be enrolled in school and excel and are less likely to drop out or repeat classes. Educated mothers were found to be more committed to their children's education (Timaeus et al., 2013). Handa (2002) found that building more schools or raising adult literacy would have a larger impact on primary school enrolment rates than interventions that raise household income. Handa(2002) found that adult literacy campaigns were nearly 10 times more cost-effective than the income intervention and about 1.5 to 2.5 times higher than for building more schools. Child enrolments were associated with household characteristics such as household income, level of education of the household head and child-specific factors such as the child being disabled or an orphan (Mambo, 2017).

Wealth is usually measured as total household income, consumption expenditure or as an asset index (e.g., the demographic and health survey (DHS) wealth index which is computed through principal component analysis) or as assets, for example, measuring wealth by availability of land, cattle and electricity. When wealth is measured as income or the assets bunched together like in the DHS wealth index and in monetary terms, for example, cash transfer programmes, studies often find a positive relationship with children's schooling (Morduch, 2000; Mani et al., 2013; Timaeus et al., 2013; Branson et al., 2014; Haushofer and Shapiro, 2016). Availability of financial resources is assumed to make parents able to send their children to school and invest in schooling inputs for their children.

Inconclusive results are found when assets are used to measure wealth. Land and cattle are labour-intensive in nature and families require children to help with this work. In most families, cattle herding is usually done by boys and girls are engaged in tilling land. A study in Vietnam found that women land titling (giving women land-use rights – women within households) which could be exchanged, leased and mortgaged led to improvements in child health and education (Menon at al., 2014). Landholding shows a statistically insignificant impact on children's learning and had a significant negative impact on boys learning when it interacted with rainfall and gender in Ethiopia (Mani et al., 2013).

In Zimbabwe, Oryoie et al. (2017) found a non-linear relationship between household assets and child labour. There is a high probability of removing children from school in middle-wealth rural households during seasons of peak agricultural activity. For a sample of selected African countries, Nkamleu (2006) found that most children working in agriculture, work on farms owned and operated by their families. Thus, land and cattle ownership, instead of improving the children welfare, may act as a hindrance to child schooling.

Rose and Al-Samarri (2001) found that children from larger households are more likely to promptly attend and complete school in Ethiopia. Households with many adult members were found to demand less of children's labour, giving a positive impact on efficient school enrolment of the children). The positive relationship between school enrolment and number of competing children was also found in India (UNESCO, 2005) and Nigeria (Akpotu et al., 2007).

School enrolment is argued to increase as age of a child increases in the lower primary age group (7–10 years) irrespective of sex, and late enrolment of children also increases the likelihood of dropping out before completion (UNESCO, 2005). In Ethiopia, late enrolment was costly for girls, as their parents are more likely to withdraw them from school when they reach puberty due to early marriages and fear of premarital pregnancy (Rose and Al Samarrai, 2001). Marteleto et al. (2006) found that school enrolment rates are low for adolescent females in South Africa. This might be due to early marriage for girls and the need for boys to contribute to family income.

Most studies found that boys are more likely to enrol in school than girls (Beutel and Axinn, 2002; Yu and Su, 2006; Zhang et al., 2007). The possible explanation was that girls must provide care for younger siblings and help with household chores, whereas boys have ample time to go to school. In addition, parents expect higher returns of investment from boys than for girls (Morduch, 2000). Other studies have shown that gender gaps in children's enrolment have diminished over time for most countries (Lloyd and Hewett, 2003; Knodel and Jones, 1996; Lewin, 2009). Berg et al. (2017) found that the gender gap in access to schooling has been closed but large geographical and wealth inequalities remain in Mozambique.

Chudgar (2011) and Singh et al. (2013) found that children that come from female-headed households are no worse off than those from male-headed households and actually attain better schooling outcomes. However, fathers had the advantages of authority, education, money and time to enable them to support their daughters' education (Warrington, 2013). However, orphans were found to lag behind in grade progression (Chuong and Operario, 2012). Rural parents, in general, tend to weigh the direct and indirect foregone earnings that result from enrolling their children. They usually prefer to involve their children in various productive activities rather than to send them to school, since working has an immediate economic outcome compared to investing in education. Never enrolled was found to be 22% in urban as compared to 57% in rural areas – a difference of 35 percentage points in Ethiopia (Gurmu and Etana, 2013). Robison (1993) found that family lifestyles and background, especially the use of Portuguese at home, had a significant influence on academic achievement, although failure rates were also unusually high among elite children.

Single equations modelling on enrolment and/or staying in school have been estimated on Mozambique (Robison, 1993; Mambo, 2015 ). However, if the interest is in both accesses as measured by enrolment and staying in school, it will be a bivariate choice problem. The factors responsible for first-time enrolment may also be responsible for continuing in school after enrolment. Hence, the error terms for the two equations might be correlated, which renders simultaneous estimation of the models the best, otherwise the two models can be estimated separately (Cameron and Trivedi, 2010; Greene, 2012). Our study used a bivariate model and most of the factors found to have a correlation with children's education from this literature review.

# 3. Methodology

## 3.1 Bivariate probit

In discrete choice modelling, the probability that an alternative is chosen can be interpreted as a conditional demand function (Gertler and Glewwe, 1990). The objective of our study was to examine the socio-economic factors associated with children's access to school and remaining enrolled in school. The two binary dependent variables (ever enrolled and still enrolled) are modelled using a bivariate probit equation, following the work of Kuépié et al. (2015), and is specified as follows:

*Ever enrolled* $\equiv Y_{1i}^{*} = X_{1i}\beta_1 + \mu_{1i}; Y_{1i} = 1 \; if \; Y_{1i}^{*} > 0 \;\; \& \, Y_{1i} = 0$ *otherwise* (1)

*Still enrolled* $\equiv Y_{2i}^{*} = X_{2i}\beta_2 + \mu_{2i}; \quad Y_{2i} = 1 \; if \; Y_{2i}^{*} > 0 \;\; \& \, Y_{2i} = 0$ *otherwise* (2)

Where $Y_{1i}$ and $Y_{2i}$ means the child has ever enrolled in school and the child is still enrolled respectively. The Xs are the vectors of the explanatory variables that will be explained in Section 3.6.

From the above two equations, the possible joint outcomes are: ($Y_1 = 0$: never enrolled in school category); ($Y_1 = 1$, $Y_2 = 0$ : the drop out category for the children that enrolled and dropped out) and ($Y_1 = 1$, $Y_2 = 1$: the progressing children: those who enrol and were still enrolled during the time of the survey).

The corresponding joint probabilities are expressed as follows:

$$\begin{aligned} Y_1 = 0&: P(Y_1 = 0/X_1, X_2) = P1 = \varphi_1(X_1{}'\beta_1) \\ \{Y_1 = 1, Y_2 = 0&: P(Y_1 = 1\,, Y_2 = 0/X_1, X_2) = P2 = \varphi_2(X_1{}'\beta_1, -X_2{}'\beta_2, -\rho)\} \\ Y_1 = 1, Y_2 = 1&: P(Y_1 = 1\,, Y_2 = 1/X_1, X_2) = P3 = \varphi_3(X_1{}'\beta_1, X_2{}'\beta_2, \rho\,) \end{aligned} \quad (3)$$

Where $\rho = c(u_1, u_2)$ *and* $\varphi$ is the cumulative distribution functions. The bivariate probit is appropriate when correlation coefficient ($\rho$) is statistically different from zero, otherwise the separate probit will not produce biased results.

The log likelihood function is written as:

*Log L* $= \sum_{i=1}^{n}[(1 - \; Y_{1i})\log(P1) + Y_{1i}(1 - Y_{2i})\log(P2) + Y_{1i}Y_{2i}\log\,(P3)]$ ( 4 ) (Kuepie et al., 2015:408).

## 3.2 Unit of analysis

Children aged between 6 and 18 years were included in the bivariate probit regression equation. The selection of variables to be included in this study was guided by the theoretical approach and the previous studies discussed in the literature review.

### *Dependent variables*

- ***Ever enrolled (EE)***: This is a dummy variable that measures children's school access, that is, first-time enrolment. It uses one for children who have ever enrolled in school and zero otherwise.
- ***Still enrolled (SE)***: This variable takes the value one for those who were enrolled in school during the time of survey and zero otherwise.

### *Independent variables*

As explained in the literature review, the child, household and community-specific characteristics are expected to affect the child's schooling outcomes.

- ***Age of the child***: This was measured in years. Age is expected to be positively associated with ever enrolled in school and negatively affecting staying in school conditional on ever enrolled.
- ***Adult-education***: The education level of the head of the household. A positive correlation is expected.
- ***Male head***: Whether the household head is male or female. The study expects children from male-headed households to have better educational outcomes.
- ***Age of head***: The age of the household head in years. Age of the head of the household is included as an additional regressor to capture household experience and life cycle position. A positive correlation is expected.
- ***Number of adult males and females***: Number of adult males and females is included to capture household demographic composition. Thus, a positive association with schooling outcomes is expected.
- ***Relationship to head***: Children's schooling outcomes are likely to be affected by whether the child is a biological child of the head or other relative.
- The biological children are likely to have better education outcomes than other relatives.
- ***Household wealth (hhwealth)***: The wealth index is a composite measure of a household's cumulative living standard. In the DHS/AIS data set used here, it was generated using a statistical procedure known as principal components analysis. The variables used to compute this welfare index were source of drinking water, type of toilet, sharing of toilet facilities, material for principal floor, walls, roof, cooking fuel, household services and possessions such as TV, radio, watch, type of vehicles, agricultural land size owned, type and number of animals owned, bank account and types of windows. The wealth index is particularly valuable in

countries that lack reliable data on income and expenditure. A positive correlation with better schooling outcomes is expected.

- ***Land***: Studies prefer to use land per adult member or actual hectares of land owned by the household (see Mani et al., 2013). The challenge is that many households in the data set did not have the size of land indicated. Consequently, the study used a dummy variable that indicates whether a household owns land or not. A negative correlation with schooling outcomes is expected.
- ***Cattle***: The number of cattle owned by the household. The study expects the correlation with children's education outcomes to be either way.
- ***Electricity***: This will be a dummy variable with one if a child comes from a household with access to electricity, and zero, if not. Having electricity at home is expected to have a positive correlation with the children's education.
- ***Water***: Time to fetch water is measured in minutes and is total time spent going to and from the water source. Staying close to the water source is expected to have a positive correlation with the children's education. Distance to water will be a proxy for price since there are no variables for school fees or distance to school or nearby market in the data set.
- ***Rural***: This variable was used to capture community characteristics that affect education. The study included a dummy for whether the child stays in a rural or urban area. Urban residents were expected to have better schooling outcomes.
- **Region:** The region where the child comes from. Mozambique is divided into three regions, north, central and south. Those from the south are expected to have better schooling outcomes.

## 3.3 Data

The study used the 2015 AIS data set. This data set comprises nationally representative household surveys that provide data for a wide range of monitoring and impact evaluation indicators in the areas of population, health and nutrition. The data were collected between May and September 2015 (DHS/AIS, 2015). This study used the household member record data set (MZPR71FL.DTA), which has some information on every household member. A sample of individuals between 6 and 18 years old was used. The data set has limitations in that it does not include information on when the child in question enrolled in school or if the child ever repeated any grade. Absent also is information on household monetary income, distance to school and hours spent working for those children who might combine school and work etc., which might have been useful for our study.

# 4. Presentation and discussion of results

## 4.1 Introduction

This section presents descriptive statistics and the regressions results.

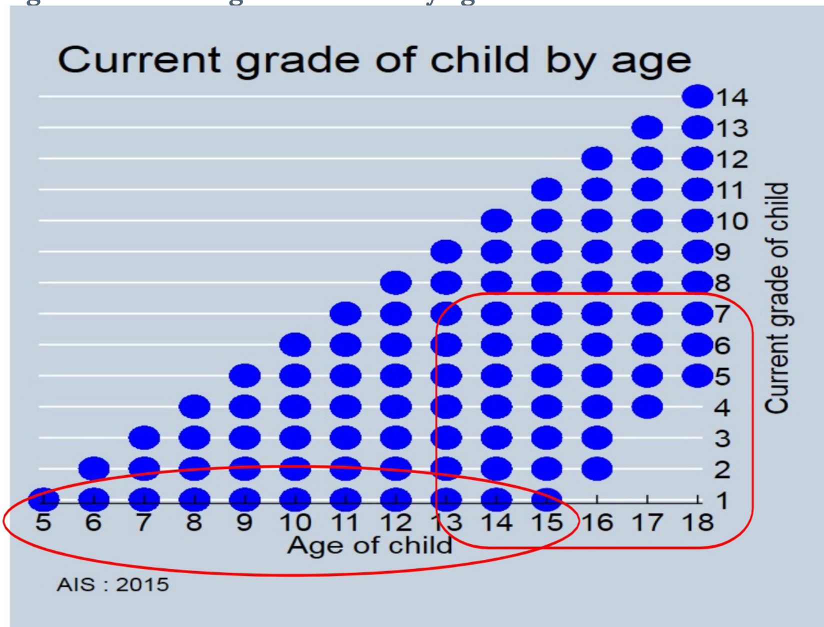
### 4.1.1 Descriptive statistics

The larger percentage of children who have never been to school were aged between 6 and 8 years, constituting 60% (DHS/AIS, 2015). Thus, most children do not start school at the official age of six years. This poses a challenge as some will not be able to proceed to secondary school as they will be under pressure to join the labour market or to get married.

In trying to understand the low mean of the actual completed school years, the study further explored the distribution of ages in each grade for the children who were enrolled in school (the results are in Figure 2). The extended circle shows that during the time of the survey, there were children between the ages 5 and 15 in grades 1 to 3. There were also 6-year-olds in grade 2, implying that some children enrolled earlier than the official starting age, which is 6 years. The rectangle shows students who were supposed to be out of primary school and enrolled in secondary schools based on their age.

With the prevalence of early marriage and child labour, late enrolment may reduce the probability of the children going to secondary schools or vocational training centres where they will acquire basic skills required in the labour market.

## Figure 2: Current grade of child by age




## Table 1: Summary statistics

| | Full Sample | | | Boys sample | | | Girls sample | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **VARIABLES** | N | mean | sd | N | mean | sd | N | Mean | sd | min | max |
| **Electricity** | 10,389 | 0.381 | 0.486 | 5,239 | 0.374 | 0.484 | 5,150 | 0.388 | 0.487 | 0 | 1 |
| **Head is male** | 10,389 | 0.612 | 0.487 | 5,239 | 0.624 | 0.484 | 5,150 | 0.600 | 0.490 | 0 | 1 |
| **Age of head** | 10,389 | 45.32 | 13.31 | 5,239 | 45.56 | 13.37 | 5,150 | 45.08 | 13.24 | 19 | 95 |
| **Age of child** | 10,389 | 11.61 | 3.239 | 5,239 | 11.71 | 3.266 | 5,150 | 11.52 | 3.210 | 6 | 18 |
| **Completed years of education** | 10,381 | 3.381 | 2.860 | 5,232 | 3.368 | 2.788 | 5,149 | 3.394 | 2.932 | 0 | 13 |
| **Minutes to get water** | 9,888 | 17.43 | 20.23 | 4,977 | 17.82 | 20.28 | 4,911 | 17.04 | 20.17 | 0 | 62 |
| **Number of cattle** | 10,386 | 0.704 | 3.261 | 5,238 | 0.767 | 3.502 | 5,148 | 0.640 | 2.995 | 0 | 95 |
| **Household owns cattle** | 10,389 | 0.0974 | 0.297 | 5,239 | 0.107 | 0.309 | 5,150 | 0.0878 | 0.283 | 0 | 1 |
| **Household own land** | 10,389 | 0.643 | 0.479 | 5,239 | 0.651 | 0.477 | 5,150 | 0.635 | 0.481 | 0 | 1 |
| **Rural** | 10,389 | 0.559 | 0.497 | 5,239 | 0.572 | 0.495 | 5,150 | 0.547 | 0.498 | 0 | 1 |

**Table 1 Continued**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gender of child** | 10,389 | 0.496 | 0.500 | 5,239 | 0 | 0 | 5,150 | 1 | 0 | 0 | 1 |
| **Ever enrolled** | 10,378 | 0.886 | 0.317 | 5,233 | 0.893 | 0.309 | 5,145 | 0.879 | 0.326 | 0 | 1 |
| **Still in school** | 10,380 | 0.773 | 0.419 | 5,233 | 0.774 | 0.418 | 5,147 | 0.772 | 0.419 | 0 | 1 |
| **Max adult schooling years** | 10,378 | 6.138 | 4.254 | 5,232 | 6.112 | 4.203 | 5,146 | 6.164 | 4.305 | 0 | 19 |
| **Number of female adults** | 10,389 | 1.335 | 0.802 | 5,239 | 1.331 | 0.806 | 5,150 | 1.339 | 0.797 | 0 | 10 |
| **Number of Male adults** | 10,389 | 0.963 | 0.815 | 5,239 | 0.970 | 0.800 | 5,150 | 0.957 | 0.831 | 0 | 8 |
| **Underachieved children** | 10,381 | 0.774 | 0.418 | 5,232 | 0.789 | 0.408 | 5,149 | 0.759 | 0.428 | 0 | 1 |

Table 1 presents the summary statistics of variables used in this study. About 38% of the children were from households with access to electricity (37% of the girls and 39% of the boys) and 61% of the children were from male-headed households. The average age of household head was 45 years. The youngest household head in the sample was 19 and the oldest 95 years old. The sample included children aged between 6 and 18 years inclusive, and the mean age of the children was 11.61 years. The education years completed (grade attainment) by this group ranged from 0 to 13 schooling years and the average years of grade attainment was 3 years. This implies that most children had completed only a few schooling years.

Time required to fetch water ranged from 0 minutes (for those with water in the homes) to more than one-hour round trip. In the sample, the average time for fetching water was 17 minutes.

About 1% of the children were from households that own cattle. Some children were from households without cattle, and some were from households with as many as 95 head. About 56% of the children lived in rural areas and 64% were from households with access to arable land. The sample was equally divided by gender, as almost 50% were girls. Of the children who had ever enrolled at school, 89% were boys and 88% were girls.

In addition, about 77% of the children aged between 7 and 18 years were still enrolled in school at the time of the survey. The mean relative grade attainment was 58.19. This implies that actual completed schooling years were fewer than the expected schooling years for most of the children. Most of the children lived with an educated adult, with the mean years of education achieved being six years. The mean number of adult males and females in the households was about one person per household.

## 4.2 Regression results

Under this section, the results for the bivariate regression are explored. Separate equations were run for boys and girls and for a pooled or total sample.

The correlation coefficient (Rho) was not statistically significant for all the three equations (see Table 2). There is no correlation of the error terms hence running separate probit regression will not produce biased results. However, for ease of presentation, there is need to pick the category that has ever attended school but is currently not attending ( the dropouts), the bivariate model was still run.

**Table 2. Testing for correlation**

| | | |
|---|---|---|
| Boys H0: rho = 0 | $Chi^2(1)$ = 000515 | Prob > $chi^2$ = 0.9819 |
| Girls H0: rho = 0 | $Chi^2(1)$ = 003174 | Prob > $chi^2$ = 0.9551 |
| Full sample H0: rho = 0 | $Chi^2(1)$ = 006443 | Prob > $chi^2$ =0.9360 |

**Table 3: Probit models: Estimated marginal effects of correlates of ever enrolled (EE) and still enrolled (SE) for the sample of 6–18-year-old children**

| | FULL SAMPLE | | | GIRLS SAMPLE | | | BOYS SAMPLE | | |
|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **Never attended school** | **Dropped out** | **Still in school** | **Never attended school** | **Dropped out** | **Still in school** | **Never attended school** | **Dropped out** | **Still in school** |
| Rural | 2.30 | 8.21 | -10.5 | -0.457 | -8.020 | 8.48 | 0.003 | 0.021* | -0.024 |
| | (0.290) | (0.996) | (-0.860) | (-0.041) | (-0.699) | (0.485) | (0.300) | (1.785) | (-1.412) |
| Household wealth Index: Base poorest | | | | | | | | | |
| Poorer | -0.014 | -0.018* | 0.032* | 0.012 | -0.027* | 0.015 | -0.043** | -0.010 | 0.052** |
| | (-1.102) | (-1.712) | (1.884) | (0.634) | (-1.803) | (0.603) | (-2.493) | (-0.672) | (2.243) |
| Middle | -0.043*** | -0.030*** | 0.073*** | -0.034* | -0.049*** | 0.083*** | -0.057*** | -0.014 | 0.070*** |
| | (-3.476) | (-2.897) | (4.423) | (-1.913) | (-3.328) | (3.489) | (-3.284) | (-0.928) | (3.046) |
| Richer | -0.107*** | -0.063*** | 0.169*** | -0.122*** | -0.081*** | 0.203*** | -0.100*** | -0.047*** | 0.147*** |
| | (-7.399) | (-4.880) | (8.900) | (-5.740) | (-4.336) | (7.355) | (-4.930) | (-2.631) | (5.530) |
| Richest | -0.123*** | -0.078*** | 0.201*** | -0.143*** | -0.097*** | 0.240*** | -0.115*** | -0.062** | 0.176*** |
| | (-7.048) | (-4.651) | (8.111) | (-5.801) | (-4.103) | (6.798) | (-4.518) | (-2.526) | (5.040) |
| Head (male=1) | 0.026*** | -0.004 | -0.022** | 0.015 | 0.005 | -0.019 | 0.036*** | -0.013 | -0.023 |
| | (3.704) | (-0.547) | (-2.061) | (1.437) | (0.446) | (-1.246) | (3.646) | (-1.272) | (-1.516) |
| Age of head (log) | -0.035*** | -0.011 | 0.046*** | -0.029* | 0.008 | 0.021 | -0.034** | -0.030* | 0.063** |
| | (-3.114) | (-0.921) | (2.645) | (-1.854) | (0.491) | (0.849) | (-2.084) | (-1.645) | (2.527) |
| Electricity (yes=1) | 0.005 | 0.002 | -0.007 | 0.022 | -0.006 | -0.015 | -0.010 | 0.007 | 0.003 |
| | (0.456) | (0.146) | (-0.407) | (1.315) | (-0.365) | (-0.629) | (-0.642) | (0.456) | (0.114) |
| Distance to water (log) | 0.009*** | 0.004 | -0.013*** | 0.012*** | 0.004 | -0.016*** | 0.006** | 0.002 | -0.008* |

**Table 3 Continued**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (4.379) | (1.600) | (-3.954) | (4.004) | (1.141) | (-3.331) | (2.015) | (0.605) | (-1.765) |
| Number of cows | 0.002* | 0.001 | -0.002* | 0.003* | 0.001 | -0.004* | 0.87 | 0.21 | -1.08 |
| | (1.673) | (0.830) | (-1.880) | (1.934) | (0.590) | (-1.822) | (0.700) | (0.140) | (-0.610) |
| Own farmland | -0.003 | -0.008 | 0.011 | 0.006 | -0.007 | 0.001 | -0.012 | -0.008 | 0.021 |
| (yes =1) | (-0.380) | (-1.166) | (1.060) | (0.650) | (-0.700) | (0.056) | (-1.339) | (-0.841) | (1.468) |
| Child age (log) | -0.156*** | 0.162*** | -0.006 | -0.151*** | 0.153*** | -0.002 | -0.162*** | 0.163*** | -0.002 |
| | (-17.976) | (17.967) | (-0.484) | (-12.123) | (11.652) | (-0.080) | (-13.034) | (12.062) | (-0.101) |
| Region: Base North | | | | | | | | | |
| Central | -0.023*** | 0.001 | 0.021** | -0.007 | 0.011 | -0.004 | -0.037*** | -0.012 | 0.049*** |
| | (-3.124) | (0.187) | (1.962) | (-0.663) | (1.077) | (-0.238) | (-3.578) | (-1.110) | (3.206) |
| South | -0.056*** | -0.025*** | 0.081*** | -0.057*** | -0.031*** | 0.088*** | -0.050*** | -0.025* | 0.075*** |
| | (-7.016) | (-2.992) | (6.919) | (-5.194) | (-2.668) | (5.409) | (-4.151) | (-1.854) | (4.437) |
| Head education (base: no – Education | | | | | | | | | |
| Primary | -0.066*** | -0.021*** | 0.086*** | -0.064*** | -0.025** | 0.089*** | -0.063*** | -0.020* | 0.083*** |
| | (-7.793) | (-2.751) | (7.441) | (-5.401) | (-2.293) | (5.361) | (-5.359) | (-1.845) | (5.077) |
| Secondary | -0.106*** | -0.068*** | 0.173*** | -0.098*** | -0.064*** | 0.161*** | -0.104*** | -0.079*** | 0.183*** |
| | (-10.350) | (-6.800) | (11.615) | (-6.716) | (-4.469) | (7.444) | (-7.180) | (-5.359) | (8.884) |
| Higher | -0.128*** | -0.103*** | 0.231*** | -0.114*** | -0.108*** | 0.223*** | -0.131*** | -0.104*** | 0.236*** |
| | (-8.196) | (-5.838) | (10.394) | (-4.468) | (-4.041) | (6.762) | (-6.891) | (-4.406) | (7.691) |
| Relationship with head base: (biological child) | | | | | | | | | |
| Son/daughter-in-law | 0.119** | 0.474*** | -0.593*** | 0.119** | 0.562*** | -0.681*** | 0.004 | -0.022 | 0.018 |
| | (2.463) | (8.277) | (-14.712) | (2.243) | (9.540) | (-19.355) | (0.061) | (-0.248) | (0.171) |
| Grandchild | 0.018** | -0.007 | -0.011 | 0.009 | -0.011 | 0.002 | 0.027** | -0.007 | -0.021 |
| | (1.974) | (-0.747) | (-0.839) | (0.742) | (-0.894) | (0.106) | (2.110) | (-0.522) | (-1.099) |

**Table 3 Continued**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sibling | 0.054** | 0.098*** | -0.151*** | -0.008 | 0.076* | -0.068 | 0.106*** | 0.117*** | -0.223*** |
| | (2.187) | (3.401) | (-4.727) | (-0.271) | (1.805) | (-1.544) | (2.778) | (2.840) | (-4.872) |
| Other relative | 0.089*** | 0.055*** | -0.144*** | 0.086*** | 0.070*** | -0.157*** | 0.101*** | 0.029 | -0.131*** |
| | (6.837) | (4.546) | (-8.753) | (4.786) | (4.112) | (-6.876) | (5.051) | (1.632) | (-5.472) |
| Adopted child | 0.032** | 0.035** | -0.067*** | 0.045* | 0.030 | -0.075** | 0.026 | 0.034 | -0.060** |
| | (2.157) | (2.302) | (-2.967) | (1.932) | (1.361) | (-2.225) | (1.354) | (1.548) | (-1.964) |
| Not related | 0.252*** | 0.291*** | -0.543*** | 0.126** | 0.324*** | -0.450*** | 0.380*** | 0.265*** | -0.644*** |
| | (5.148) | (5.801) | (-14.865) | (2.065) | (4.709) | (-8.041) | (5.214) | (3.681) | (-14.937) |
| Number of females | -0.385 | 6.45 | -6.07 | 0.005 | 0.007 | -0.012 | -0.005 | 0.007 | -0.002 |
| Adults | (-0.096) | (1.494) | (-1.026) | (0.936) | (1.088) | (-1.417) | (-0.952) | (1.219) | (-0.216) |
| Number of males | 0.006 | 0.006 | -0.012* | 0.005 | 0.007 | -0.012 | 6.08 | 2.31 | -8.39 |
| Adults | (1.345) | (1.422) | (-1.849) | (0.867) | (1.149) | (-1.312) | (0.918) | (0.330) | (-0.869) |
| Observations | 10,934 | 10,934 | 10,934 | 5,480 | 5,480 | 5,480 | 5,454 | 5,454 | 5,454 |

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3 above presents the marginal effects from bivariate probit regression models for boys, girls and the pooled (full) sample respectively, for children between the ages of 6 and 18 years.

The rural–urban divide did not show a significant correlation with children's schooling outcomes at 5% level of significance. Children from better-off families are more likely to be enrolled in school and less likely to drop out than children from the poorest families. For example, compared with boys from the poorest families, boys from average families are 4.3% less likely to have never enrolled at age 6 and 5.2% more likely to remain in school once enrolled. Coming from a richer family compared to coming from the poorest family is associated with children being 10.7% less likely to have never enrolled at 6 years old, 3% less likely to drop out and 16.9% more likely to remain enrolled in school. Furthermore, coming from richer households is associated with boys being 12.2% less likely to have never enrolled, 8.1% less likely to drop out and 20.3% more likely to continue with school once enrolled compared to boys from the poorest families. For the girls' sample, those from richer families are less likely to never enrol at age 6 by 10%, less likely to drop out by 4.7% and more likely to remain in school once enrolled by 14.7% compared to the girls from poorest families. Children from richest families are 12.3% less likely to have never ever enrolled, 7.8% less likely to drop out and 20.1% more likely to remain enrolled in school compared to children from poorest families. Compared to girls from the poorest families, girls from the richest families are 14.3% less likely to have never enrolled, 9.7% less likely to drop out and 24% more likely to remain enrolled in school. For the boys' sample comparing with those from poorest households, boys from the richest households are 11.5% less likely to have never enrolled, 6.2% less likely to drop out and 17.6% more likely to remain enrolled. The results are as expected and agree with those in the literature reviewed (Branson et al., 2014; Haushofer and Shapiro, 2016).

Children from male-headed households in comparison with those from female-headed ones are 2.6% more likely to have never enrolled and 2.2% less likely to remain in school once enrolled. In addition, boys from male-headed households compared to boys from female-headed households are 3.6% more likely to have never enrolled. The results are similar to the findings of Chudgar (2011) and Singh et al. (2013), who postulate that children from female-headed households are not worse off than those from male-headed household in terms of schooling outcomes. No significant correlation was found between the gender of the household head and the girls schooling outcomes.

An increase of one in the log of age of head is associated with a decrease of 0.035 in the probability of children to have never enrolled and with an increase of 0.046 in the probability of children to remain in school once enrolled. For the boy's sample, the increase of log head age by 1 is associated with a decrease in the probability of being in the never ever enrolled category by 0.034 and an increase in the probability of still enrolled by 0.063.

No significant correlation was found between access to electricity at home and children schooling outcomes. This was unexpected since about 38% of the children were from households with electricity. Due to many household chores at home, children might not find time to study after school even when electricity is available. An increase in the log of distance to water source by one is associated with a decrease in the probability of children remaining enrolled by 0.013, with an increase of 0.012 in the probability of girls being in the never enrolled category and with an increase of 0.006 in the probability of boys to have never enrolled.

As the child's age increases, the probability of never enrolled falls but the probability of dropping out increases. An increase in the log of child age by 1 is associated with an increase of 0.162 in the probability of a child dropping out and an increase of 0.153 and 0.163 in the probability of girls and boys dropping out once enrolled respectively.

Children from the central and southern parts of Mozambique compared to those from the north were more likely to remain enrolled and less likely to have never enrolled or to drop out. For example, children from the southern part of the country compared to those from the north were 8.1% more likely to remain enrolled in school. Girls from the south region were 5.7% less likely to have never enrolled, 3.1% less likely to drop out and 8.8% more likely to continue with school once enrolled than girls from the north. Boys from the south region compared to their northern counterparts are 5% less likely to have never enrolled, 2.5% less likely to drop out and 7.5% more likely to remain enrolled in school.

Education level of the household head is also positively correlated with children’s best schooling outcome, that is, remaining in school once enrolled for both girls and boys. In comparison with children from households where the household head has no education, children from households whose head has higher education were 12.8% less likely to have never enrolled, 10.3% less likely to drop out and 23.1% more likely to remain enrolled. Girls from households with a head with higher education were 11.4% less likely to have never enrolled, 10.8% less likely to drop out and 22.3% more likely to remain in school than girls from households with a household head with no education. As for the boys' sample, coming from households with an educated head with higher education is associated with them being 13.1% less likely to never enrol, 10.4% less likely to drop out and 23.6% more likely to remain in school than the boys from households with no education.

The biological children of the household head are more likely to enrol and remain enrolled in school than all the other children related to the head in other ways. For example, the grandchild is 1.8% more likely to have never enrolled than the biological child. Other relatives who are girls are 8.6% more likely to be on never enrolled category, 7% more likely to drop out and 15.7% less likely to remain enrolled than the biological daughters of the household head. Children who are not related to the household head are 25.2% more likely to have never enrolled, 29.1% more likely to drop out and 54.3% less likely to remain enrolled than the biological children of the head. Boys who are not related to the head are 38% more likely to have never enrolled, 26.5% more likely to drop out and 64.4% less likely to remain enrolled than the sons of the household head. This shows that they might be some preferences on who to send to school in households. The number of female and male adults and the gender of the child did not show a significant correlation with child schooling.

# 5. Conclusion

The objective of this study was to investigate the relationship between socio-economic factors and children's education outcomes (access to schooling, dropping out and staying or remaining enrolled). The government and donor agencies are working tirelessly to ensure universal enrolment of children and completing primary school studies, in line with the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs). The progress, however, shows that the country is still far from realizing these goals.

This study shows that most variables are correlated with the three children education outcomes, which implies that almost the same variables that affect access to schooling, dropping out and or remaining in school are practically the same. Children's schooling is affected by the demand or socio-economic factors such as parents' education, distance to water source, household wealth, child age and the region the child comes from. This calls for the government and other interested agencies to also consider these social-demographic factors in child education polices. Thus, more emphasis is needed on improving these factors as much as the school supply side factors are given priority.

The household where the child comes from has to be conducive and enabling for a child to find time for schooling. For example, if the water source is far away from the household, children will be asked to help fetch water. In addition, if the family is very poor, child labour will be demanded in order for the family to be able to put food on table. In a nutshell, the social-demographic factors show a very high significant correlation with both boys' and girls' education. Hence not only supply-side factors but also the demand-side factors have to be prioritized to ensure children's education.

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