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An analysis of school dropout in Mozambique, 2014–15

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Abstract: The level of educational attainment in Mozambique is one of the lowest in the world and primary school completion rate is also very low, not reaching 40 per cent. Using data from the Mozambican Household Budget Survey 2014/15, we study (1) the determinants of school dropout; (2) the variables that are associated with school dropout in the year of the survey, exploiting its panel structure; and (3) infrastructural or social protection interventions in rural villages that can influence dropout, using a propensity score matching analysis. We find that age, child labour, household head's gender and education, and access to services are particularly associated with the probability of dropout, and that early marriage and teen pregnancy are consistently associated with higher dropout rates. Our results also suggest that building or renovating a school or a water facility, or setting up a social protection programme can reduce the probability of dropout. This can be of support to the redesign of the country's education, infrastructural, and social protection policies, especially in rural areas.

Keywords: Mozambique, panel regression, propensity score matching, school dropout determinants
JEL classification: I21, I28

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1 Introduction

Despite the high economic growth rates experienced until 2015, Mozambique's poverty rates remain high (46.1 per cent of the population), and higher than those of most neighbouring countries (DEEF 2016). Moreover, the population growth has been relatively high, meaning that the absolute number of poor people in 2014/15 is comparable to the number observed in 1996/97—about 12 million people (DEEF 2016). At the same time, inequality has rapidly increased between 2008/09 and 2014/15, particularly in urban areas and in the more developed southern region (DEEF 2016). A simple analysis of the determinants of poverty performed on the same data has shown that the relation between consumption levels and education seems to be strong and increasingly positive in the levels of education achieved (Ibraimo and Salvucci 2017). However, the educational attainment in Mozambique is one of the lowest in the world, being 2.5 years on average. According to UNICEF (2014), the net primary school attendance of 81.2 per cent in 2008 had fallen to 77.1 per cent in 2011, and gross primary completion rate (at grade 7), which was just over 50 per cent in 2008, had declined slightly to 47 per cent in 2012. Citing a previous study (UNICEF 2012), UNICEF (2014) offers estimates of 1.2 million out-of-school children of primary and lower secondary age in Mozambique at the time of the report.

In this paper, we contribute to the literature on school participation and school dropout in Mozambique. First, we explore the determinants of school dropout, using the most recent Household Budget Survey available; second, we take advantage of the panel structure of this Household Budget Survey to further explore the drivers of school dropout and establish a more precise causation link between dropout and time-varying child/household characteristics; finally, we study the relation between school dropout and the characteristics of the communities where school-age children live. This is done by using propensity score matching methods to evaluate the relevance of changes that occurred at the community level, such as the building or improvement of new and existing infrastructure (such as education, water, electricity, roads, or health infrastructure), or the introduction of social protection programmes.[1]

We find that age, child labour, household head's gender and education, access to services, and distance to school are particularly associated with the probability of dropout. We also find that if a girl gets married or becomes pregnant the probability of staying in school decreases. When analysing the dropout determinants for 2014/15 using the panel structure of the data, we observe that teen pregnancy is confirmed as one of the most important characteristics associated with dropout. When the analysis is performed at the community level, we find that building a new school or renovating an existing one, building or improving a water facility, or setting up a social protection programme can influence the probability of dropping out. The paper develops as follows: in Section 2 we describe the context and motivation of the paper; Section 3 introduces the data and the variables used in the analysis; Section 4 presents the methodology, while Section 5 describes the main results; Section 6 concludes.

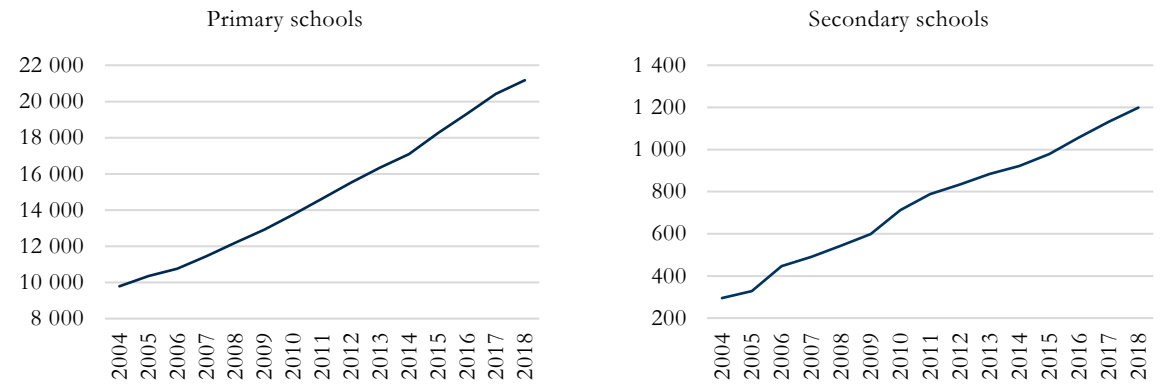
[1] The determinants of school participation are not analysed here as they were already studied in a previous paper by Mambo (2017).

2 Context

According to the population projections of the Mozambican National Statistics Institute (INE), nearly 40 per cent of the population in Mozambique is estimated to be of school age, between 5 and 19 years old. This leads to education being one of the most critical sectors in the country. A review of some of the country's statistics on primary education suggests that there is a significant investment by the government of Mozambique (GoM) and its development partners in improving access to education from the beginning.

This is shown by the GoM's investment in school construction. In 15 years from 2004 to 2018, the number of primary schools in the country more than doubled, with more than 1,000 being built each year in the 2015–17 period. Growing from a lower base, the number of secondary schools quadrupled during the same period (Figure 1).

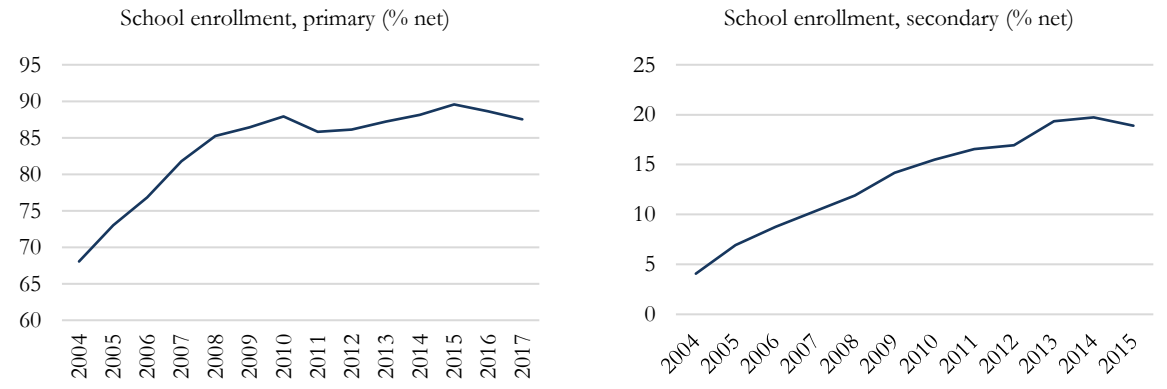
Figure 1: Number of schools, 2004–18



Source: authors, based on GoM Ministry of Education (2018), Education Management Information System.

Together with this investment, primary school enrolment has risen significantly, from 67.3 per cent in 2004 to 86.9 per cent in 2010. Since then, the growth in school enrolment has slowed down, but still reached 89.6 per cent in 2015 (Figure 2).

Figure 2: Net school enrolment rates, primary and secondary (%), 2004–18



Source: authors, based on the World Bank's *World Development Indicators* (2019).

UNICEF (2014) acknowledges that the investment by the GoM led to the improvement in school enrolment, in particular related to measures directed to households and their demand for education, such as the abolition of school fees in 2003/04 or the provision of direct support to schools and free textbooks. Other improvements are related to measures directed to improving education supply, such as investments in classroom construction and teachers. The resulting increase in primary and secondary enrolment was also, according to the UNICEF report, accompanied by a significant improvement in the intake of children at the age of six, from 36 per cent in 2002 to 72 per cent in 2012, an improvement that rose to 81 per cent in 2014 according to ROSC (2015). Gender parity in primary and secondary enrolment is also reported to have improved.

Despite these improvements, there are still many challenges remaining in the provision of and access to basic education in Mozambique. As mentioned above, UNICEF (2014) noted that the number of primary- and secondary-school aged children out of school could exceed one million. De Walque and Valente (2016) highlight that the significant improvements in school enrolment did not translate into much higher completion rates of the very first level of education—primary school—by most Mozambican children. This has repercussions for education achievement. De Walque and Valente (2016) report that on average in 2011, 18-year-old men had completed 6.3 years of education, while young women of the same age had only competed 5.5 years of education. For both men and women this is less than the seven-year primary school education in Mozambique. Furthermore, only around half of the 18-year-old men and 41 per cent of the women had completed primary school, something a child entering at age 6—and not repeating years—would have achieved at age 13. The rate of completion of primary school is reported to be much lower among women, in rural areas, and in the central and northern areas of the country. Only 34 per cent for 18-year-old men and 23 per cent of 18-year-old women had completed upper primary schooling (EP2) in rural areas. Fox et al. (2012) reported even lower official statistics of EP2 completion rate, especially in rural areas, where even at age 19 it is only about 14 per cent for males and 8 per cent for females.

This is a worrying reality and was acknowledged by the Minister of Education in a public speech in April 2018:

> From 2007 to 2016, students who complete seven years of schooling annually represent only 45.6 percent on average. And only 30 percent of the students who enter 1st grade annually complete the 7th grade in seven years.... Only last year about 550,000 primary school pupils stopped going to school as failure rates were also at alarming levels. In the 10th class, for example, the failure rates in the last five years were 46 percent on average. (Quoted in *APA-Maputo* 2018)

These realities highlight the need for more research on the factors behind the high dropout rates. Among these we find the economic costs of education. As indicated above, studies such as that by Fox et al. (2012) suggest that the abolition of direct costs of education in the 2004/08 reform of the Mozambican education system is behind the great increase in school enrolment of children aged 6–19.

Other factors, such as distance to school, parents' education (particularly the mother's), the head of household's gender, household income (proxied by consumption), and children's characteristics (age, gender, disabilities and other vulnerabilities, whether or not they live with their fathers) can significantly affect it (UNICEF 2010, 2012). UNICEF (2012) also highlights other factors related to poverty and sociocultural norms that keep children from finishing school, such as early marriage and pregnancy, as well as factors related to the quality of education, such as lack of safe school spaces, overcrowded classrooms, and a shortage of good teachers.

Aspects of quality of education (or lack thereof) are also highlighted by the respondents of the 2014/15 Household Budget Survey (IOF14). Table 1 shows the results from the survey, in which the households reported on problems at the schools their children attended. A majority reported lack of desks and chairs, one-third reported infrastructure being in very poor condition, and around one-tenth reported lack of books, other school material, or even teachers.

Table 1: Problems experienced in the school the child attends

	Percentage
Lack of desks/chairs	50.46
Infrastructure in very poor condition	34.37
Lack of books	13.26
Lack of school material	12.72
Lack of teachers	8.86
Other problems	2.49
Corruption	1.20
No problems	42.35

Note: multiple options could be chosen.

Source: authors' calculations based on IOF14.

When asked why their children were not attending school, the respective families highlighted a set of reasons (Table 2).

Table 2: Reasons why child does not attend school

	Percentage
School is useless/no interest	49.85
Other problems	12.17
School is very costly	9.13
School is very far	7.81
Got married	5.93
Works (at home or outside)	4.31
No available places	3.55
Pregnancy	3.14
Failed	1.72
Next grade does not exist	1.20
Reached the desired grade	0.66
Child is very young	0.46

Note: multiple options could be chosen.

Source: authors' calculations based on IOF14.

These factors could partly, or together, be behind the worrying levels of school dropout. However, as seen in Table 2, almost 50 per cent of the respondents answered that school is useless/no interest. This study seeks to contribute to validate these insights and to add further knowledge on the factors that lead to them.

3 Data and variables used

The analysis is based on the Mozambican Household Budget Survey 2014/15 (IOF14). The data were collected by the INE throughout a one-year period, between August 2014 and August 2015. Households were interviewed three times; in the first (mid-August to mid-November 2014), second

(mid-November 2014 to mid-February 2015), and fourth quarter of that 12-month period (mid-May to mid-August 2015). The IOF14 dataset contains data from a representative sample of around 11,000 households (11,505 in the first quarter of the survey, 10,368 in the second, and 11,315 in the fourth quarter).[2] The sample is representative of the Mozambican population and also of rural and urban populations, and of those in each of the 11 provinces of the country, including Maputo City. The main household questionnaire is accompanied by a community questionnaire for rural areas only. Additional information is available in the survey report by INE (INE 2015).

IOF14 provides information on a wide set of individual, household, and community characteristics, including demographics; education; health; employment; daily, monthly, and annual expenditures; durable goods, land, and livestock; receipts and transfers. In our analysis, we make use of child-specific variables like age, sex, birth order, mother/father alive, number of siblings, child labour, chronic deficiencies; household-level variables like household head's gender, age, education level, and occupation; socioeconomic characteristics such as consumption level, access to water/sanitation/electricity, ownership of durable goods, distance to school; community characteristics like transportation access, presence of schools in the community, natural shocks; and time and geographic controls.

In our study, we focus on the Mozambican population aged 6–17 years old at the time of IOF14. A summary description of all the variables used is presented in Table A1 in Appendix A. As described there, we find that 13 per cent of children of school age, while having enrolled in school at one time in their lives, no longer attend it. In particular, and again looking at children of the same cohort (6–17 years old), 5 per cent of them dropped out of school between 2014 and 2015.

Comparative analysis of the covariates suggested by literature already give some suggestions of linkages between the conditions of children and the likelihood of dropout. Tables A2 and A3 in Appendix A review pairwise comparisons. In the following, we summarize the differences in the shares of population that dropped out, against a relevant comparator.

The descriptive statistics shown in Table 3 already suggest that there are severe penalties of higher dropout prevalence among specific groups of children: those older than 14, child workers, late students,[3] and third and higher birth order children. A very special case must be noted on the extremely high penalty of being pregnant at the time of the IOF 2014/15 survey: 77 per cent when compared with non-pregnant children. It is important to signal here that this number aggregates two situations: those that dropped out in 2014/15 while pregnant and those that became pregnant after dropping out.[4]

[2] A big flood occurred during the first months of 2015 and affected the ability to reach and interview several households in the second quarter, especially in the centre-north of the country. This explains the lower number of households in quarter two.

[3] Late students are children that last attended a school grade two years lower that the one corresponding to their age. Interpretation of the penalty is not very obvious in this case as, at the moment children drop out of school, their school attainment freezes while their age increases every year. There are therefore potential confounding effects that are corrected in the regression.

[4] Again, these mutually confounding effects can be, at least partially, corrected in the regression, as factors like age are jointly correlated. One of the effects becomes clearly reflected in the second empirical model we use in our approach.

Table 3: Comparative mean group difference to relevant comparator: child characteristics

Child characteristics	Difference in…	
	Dropout prevalence (%)	Children that dropped out in 2014/15 (%)
Female (vs male)	0.7**	1.7***
Age (14–17 vs younger)	23.1***	5.8***
Birth order (third or more vs elders)	10.4***	3.7***
Orphan	5.9***	–0.4***
At least one parent not in the house	5.1***	–0.7*
Child works	19.9***	5.0***
Disability	6.6***	0.4^{ns}
Late	14.9***	3.8***
Married	2.3***	–3.4***
Pregnant	77.0***	4.6**

Note: difference is significant at: * 10 per cent; ** 5 per cent; *** 1 per cent; ns = not significant.

Source: authors' calculations based on IOF14.

When looking at the profile of the heads of household, in Table 4, another significant penalty is found. The group of children whose families rely mostly on farming as the main activity of their head of household appears to have a statistically significant higher likelihood of having dropped out at the time of IOF14 or while it was running. On the other hand, there is some suggestion that higher levels of education of the head of household coexist with lower risk of dropout. Finally, there are some mixed suggestions on the effects of the gender and age of the head of household.

Table 4: Comparative mean group difference to relevant comparator: head of household

Characteristics of the head of household (HH)	Difference in…	
	Dropout prevalence (%)	Children that dropped out in 2014/15 (%)
Age (in comparison with under 26-year-old)		
26–50	−12.9***	0.3 *ns*
51+	−7.7***	1.9***
Female HH (vs male HH)	1.4***	−1.1***
Education (in comparison with no education)		
1–5 years	−2.8***	−0.7**
6–7 years	−6.8***	−2.2***
8–10 years	−10.3***	−3.6***
11–12 years	−12.8***	−4.7***
12+ years	−14.3***	−5.6***
Farmer (vs other activities)	7.3***	3.4***

Note: difference is significant at: * 10 per cent; ** 5 per cent; *** 1 per cent; ns = not significant.

Source: authors' calculations based on IOF14.

The indicators shown in Table 5 suggest that, more than those children whose households experience consumption poverty, those that experience deprivation and those whose families report longer distances to school appear to experience higher penalties and are relatively more prone to dropout.

Table 5: Comparative mean group difference to relevant comparator: household poverty

Household poverty	Difference in…	
	Dropout prevalence (%)	Children that dropped out in 2014/15 (%)
Poor	2.0	1.0
Deprivation regarding		
Water source	6.5	2.5
Sanitation	8.0	2.8
Roof	7.9	3.7
Electricity	9.6	3.6
Durable goods	7.6	3.2
Access to transport	5.7	2.3
School (no school in community)	7.2	2.2
Distance to school in minutes (compared to less than 15 minutes)[a]		
16–30	1.8	0.3
31–60	7.5	2.4
60+	8.9	1.3

Note: [a] self-reporting; difference is significant at: * 10 per cent; ** 5 per cent; *** 1 per cent; ns = not significant.

Source: authors' calculations based on IOF14.

Notably, as Table 6 indicates, geographical differences appear very significant to the analysis of school dropout in Mozambique. Rural children appear, on average, to be much more prone to dropout than those living in urban areas. Children from Niassa, Tete, Nampula, Cabo Delgado, and Manica show distinctly higher prevalence of school dropout compared to those in Maputo City.

Table 6: Comparative mean group difference to relevant comparator: geography and climate change

Geography and climate change	Difference in…	
	Dropout prevalence (%)	Children that dropped out in 2014/15 (%)
Rural (vs urban household)	8.3***	2.9***
Province (compared to Maputo City)		
Niassa	11.1***	5.1***
Cabo Delgado	9.8***	3.1***
Nampula	9.8***	4.6***
Zambezia	6.6***	3.1***
Tete	15.2***	6.6***
Manica	8.8***	3.5***
Sofala	5.8***	2.6***
Inhambane	5.5***	1.2***
Gaza	7.7***	0.3
Maputo Province	2.5***	0.1
Affected by flood [a]	−1.7***	0.2

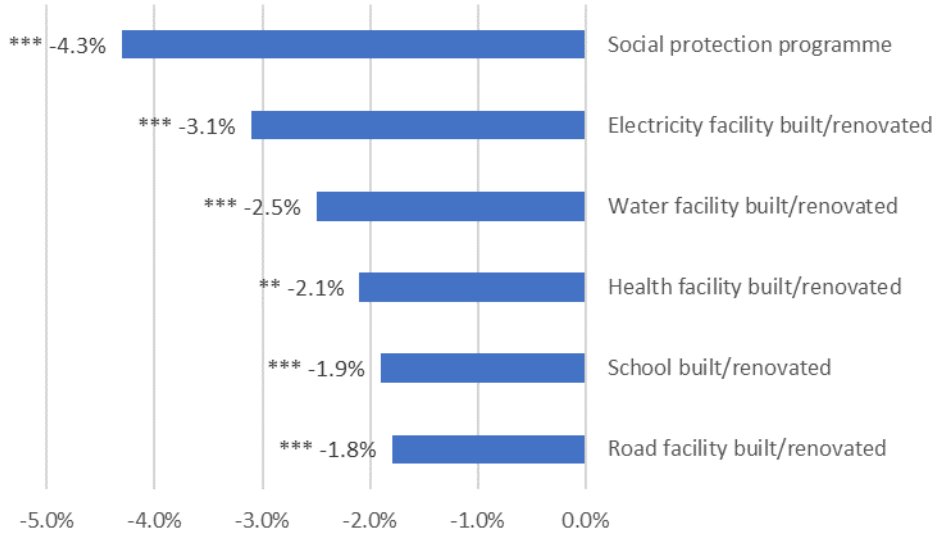
Note: [a] self-reporting; difference is significant at: * 10 per cent; ** 5 per cent; *** 1 per cent; ns = not significant.

Source: authors' calculations based on IOF14.

A final preliminary insight comes from what is suggested in the comparison of children in communities that reported receiving improvements in infrastructure, including the building of schools, and/or the support from a social protection programme, with those that live in communities that did not receive those benefits (Figure 3). There is a suggestion that some

initiatives may be more effective than others. Surprisingly, school construction or improvement in a community does not appear to be driving the larger differences.

Figure 3: Comparative mean group difference to relevant comparator: community-level improvements



Note: difference is significant at: ** 5 per cent; *** 1 per cent.

Source: authors' calculations using the 2014/15 Mozambican Household Budget Survey (IOF14).

All these preliminary indications are born from bivariate comparisons. While suggestive, they may be hiding the effects of other correlated dimensions. In the following sections, we will present the approach used to validate these suggestions and the results it leads to.

4 Methodology

Using the data described in Section 2, we first study the determinants of school dropout. In this case, we use a very simple probit model to analyse the child, household, and community characteristics that show a stronger association with the probability of having abandoned school at any point in time.

The model is simply described by Equation 1:

$$Y_i^* = \alpha_i + \beta_i X_i + \varepsilon_i \quad (1)$$

where for each child i, Y^* is a binary variable indicating whether the child has dropped out at some point in time, and X represents a set of child, household, and community characteristics.

In order to analyse the children who abandoned school between 2014 and 2015 in more detail, we also study the characteristics that are more associated with school dropout over the survey period, exploiting the panel structure of IOF14. Indeed, from IOF14 we know whether a child is at school during August–November 2014 (last school quarter in the Mozambican school system) and not at school in the first and third quarter of the subsequent school year (corresponding to the second and fourth survey quarters). In this case, we use a fixed-effect linear panel regression model that allows us to look more specifically into the time-varying variables affecting school dropout in the survey year.

The linear probability model estimated is:

$$Y_{it} = \alpha_{it} + \beta_{it} X_{it} + \delta_i + \varepsilon_{it} \quad (2)$$

where for each child i in quarter t, Y is a variable indicating whether the child has abandoned school over the survey year 2014/15, and X represents a set of child, household, and community characteristics. The model is estimated using the child fixed-effect.

Finally, we also present the results of a propensity score matching analysis using the community data for rural areas to check whether changes occurred at the community level that particularly influence school dropout. More specifically, we consider the impact of building or renovating a school, a water facility, an electricity facility, a road, or a health centre, and of the existence of a social protection programme. In this case, we use the nearest-neighbour propensity score matching method with five 'neighbours' selected from the control group for each treated observation.[5]

5 Results

As discussed in Section 3, we first study the determinants of school dropout using the sample of children who declare having enrolled in school at least once in the past. Column (1) in Table 7 shows the marginal effects obtained from the probit model estimation used to analyse the child, household, and community characteristics that show a stronger association with the probability of having abandoned school at any point in time.[6]

Regarding dropout determinants, we find that a higher age is linked to a higher probability of abandoning school. As expected, if one of the parents is not living in the household, this is also associated with a higher probability of abandoning school. The same is true if the child works or if he/she has a permanent illness/disability. If a child is more than two years older than the grade he or she is supposed to be in, this is associated with a higher probability of abandoning school. Early marriage and pregnancy are especially associated with increased probability of dropping out of school. On the other side, if the household head is a woman, this is linked to a lower probability of abandoning school. Further on, the level of education of the household head is also strongly and consistently associated with lower probabilities of dropping out, and the same applies to access to some basic services such as safe water, quality sanitation, a good-quality roof, or electricity. Greater distance to school also appears to be associated with higher probabilities of dropout.

In the estimation presented in column (1) of Table 7, we make use of temporal (quarter) and geographic (province/rural–urban) controls. It emerges that living in some of the northern and central provinces (especially Niassa and Tete) is significantly associated with higher probabilities of dropping out compared to living in the capital, Maputo. Additional analyses are carried out in Table B1 of Appendix B for girls and boys, for children aged 6–13 and 14–17, and for children in primary school (up to the fifth and up to the seventh grade) and secondary school. Among the most

[5] Both the *psmatch2* and the *teffects psmatch* Stata commands were used in the analysis, showing qualitatively similar results.

[6] Here we combine all the children who declare that they went to school but are not in school at the moment of the interview. Since the sample also includes teenagers aged above the mandatory school age for Mozambique, we also check if the reply to the question on the reason for not going to school is: 'I quit because I reached the desired level of education'. In this case, we do not consider these individuals as having abandoned school, due to them quitting school voluntarily. A linear probability model was also tested without obtaining qualitatively different results. Therefore, only the marginal effects from the probit model estimation are shown here.

noticeable differences, it can be seen that being an orphan seems to be linked to dropout only for boys, and that the coefficient associated with pregnancy almost doubles in size for the group of children between 14 and 17 years old; also, if the household head is a woman, this is linked to a lower probability of abandoning school, especially for younger children (6–13 years old) and children in primary school. When the distance to school is very high (more than 60 minutes walking), this especially affects girls and secondary-school aged children.

Table 7: Determinants of dropout at any point in time and dropout in the period 2014–15

Variables	(1) Dropout any time	(2) Dropout 2014–15	Variables	(1) Dropout any time	(2) Dropout 2014–15	Variables	(1) Dropout any time	(2) Dropout 2014–15
Sex	0.0106*		Head woman	−0.0324***	0.176*	Electricity	−0.0316***	
	(0.00565)			(0.00803)	(0.0899)		(0.00978)	
Age	0.0298***		Head 5y education	−0.0154**		Durable goods	−0.0125	
	(0.00127)			(0.00711)			(0.00780)	
Birth order	−0.00451*		Head 7y education	−0.0280***		Access to transport	0.00490	
	(0.00247)			(0.00993)			(0.0101)	
Orphan	0.00848	−0.00221	Head 10y education	−0.0510***		School	−0.0128	
	(0.00738)	(0.0108)		(0.0103)			(0.0129)	
Not in the HH	0.0387***	0.0384**	Head 12y education	−0.0729***		Flood	−0.00675	0.0105
	(0.00814)	(0.0155)		(0.0132)			(0.0105)	(0.0138)
Child works	0.0576***	0.0323***	Head +12y education	−0.0729***		Distance school 16–30	0.0172**	
	(0.00517)	(0.00743)		(0.0162)			(0.00770)	
Disability	0.0493***		Head in agriculture	−0.00547		Distance school 31–60	0.0351***	
	(0.0188)			(0.00753)			(0.0105)	
Late	0.0265***	−0.0512***	Poor	−0.00462	0.00600	Distance school 60+	0.0252*	
	(0.00793)	(0.00824)		(0.00580)	(0.00677)		(0.0133)	
Married	0.0592***	0.0254***	Water source	−0.0187**		Constant		0.0765***
	(0.00715)	(0.00594)		(0.00856)				(0.0264)
Pregnant	0.298***	0.291***	Sanitation	−0.0266***		Temporal controls	Yes	Yes
	(0.0319)	(0.0472)		(0.00885)		Geographic controls	Yes	No
Head age	−8.33e−05		Roof	−0.0194**		Observations	43,102	44,520
	(0.000247)			(0.00918)		Number of children		18,056

Note: there are about 18,000 children included in the analyses; not all of them were observed in all three survey quarters. Standard errors in parentheses . *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Source: authors' calculations based on IOF14.

In column (2) of Table 7 we analyse the characteristics that are especially associated with school dropout over the period 2014–15, exploiting the panel structure of IOF14. As introduced in the previous sections, IOF14 provides information on whether a child is in school during August–November 2014 (the last school quarter in the Mozambican school system) and not in school in the first and third quarter of the subsequent school year (corresponding to the second and fourth survey quarters). This estimation procedure allows us to provide a more precise indication about the causality mechanism at work. The main results from the child fixed-effect linear panel regression model implemented[7] are the following. If either the father or the mother or both stop living in the household, this is associated with a 3.8 percentage points higher probability of dropping out; a similar effect is found if the child starts working. If a child gets married he/she has about 2.5 percentage point higher probability of abandoning school. Perhaps the most impressive result in this analysis is the one for when a girl gets pregnant: in this case, the probability of dropout increases by 29 per cent.[8]

As in the previous case, we provide more detailed additional estimations in Table B2 of Appendix B for girls and boys, for children aged 6–13 and 14–17, and for children in primary school (up to the fifth and up to the seventh grade) and secondary school. In this case, the coefficient for the variable gender of the household head is positive and significant for children aged 6–13 and for those in primary school. This apparently contradictory result can be interpreted in the following way: in general, if the household head is a woman this is associated with a lower probability of school dropout for the whole population of aged 0–17; however, if the household head gender changes from man to woman from one quarter to another, which is what is measured in the panel regression presented in column (2) of Table B2, this increases the chances of younger children abandoning school. This makes sense, as the change in the household head gender from man to woman is frequently associated with the death, migration, or household abandonment of the (male) household head, which can lead to the decision to remove one or more children from school. We can also observe that if either the father or the mother, or both, stop living in the household from one quarter to another because of death, migration, or household abandonment of any of them, this mostly affects girls and younger children (aged 6–13 and/or enrolled in primary school). Regarding pregnancy, it is interesting to observe that the probability of dropping out from school increases immensely if the girl is less than 13 years old (about 82 per cent) and becomes 34 per cent for girls in secondary school.

5.1 Results at rural community level using propensity score matching

In this section, we present the results from the analyses of the relation between school participation/dropout and some specific characteristics of the communities where school-age children live. This is done by using propensity score matching methods to evaluate the relevance of changes occurred at the community level, like the building of new schools and/or improvement

[7] Here we implement a linear probability model because the Stata command *xtreg* allows the use of sampling weights in the estimation, whereas the panel version of the probit command does not. Our choice was also reinforced by the fact that the predicted probabilities never exceed the range [0,1].

[8] In the Mozambican school system, when a girl gets pregnant she is obliged to switch to attend night school courses. However, in many areas of the country—due to availability of transportation, personal security, and other issues—this entails that most of the time the girl has no other choice but to abandon school entirely. One possible objection to this finding could be that girls who become pregnant are much less likely to go to school in the immediate months after giving birth or during pregnancy, but that they could go back to school after some time. This is possible in theory, but given our data we cannot observe whether this happens or not for the girls in our sample. However, we can provide some evidence using the data in our hands that it is quite unlikely that girls with young babies go back to school. Among the girls in school age with young babies (0–1 years old), about 12 per cent go to school, significantly lower than the rate for the entire population of girls of school age (about 84 per cent).

of existing ones, the construction of new water/electricity/road/health facilities or the introduction of social protection programmes.

IOF14 includes a community questionnaire module, only for rural areas, in which a series of relevant questions with respect to the community are asked of key informants on topics such as demographics, economics, infrastructure, education, health, social protection, and agriculture. In this module, one of the most interesting questions for our purpose is the one about improvements in infrastructure that occurred in the last two years. It is particularly important in the case of education infrastructure to assess whether this influences school dropout, and further to evaluate whether other investments in infrastructure or other programmes show a positive statistical association as well.

Until now we have used data on all children and tried to control reasonably comprehensively across children based on a series of time-invariant factors or based on the panel structure of the survey. In this subsection, we limit the analysis to rural communities and compare reasonably similar children based on their observables using propensity score matching methods. Finally, we compute the average treatment effect on the treated (ATT) (Rosenbaum and Rubin 1983). In our case, the 'treatment' is given by the construction of new schools and/or improvement of existing ones, the construction of new water/electricity/road/health facilities or the introduction of social protection programmes. We designate the treatment group as the group of school-age children surveyed in rural communities where these changes occurred. However, given that the population was not actually 'treated' in the sense of a formal experiment, we prefer to define this group of observations as the 'exposed' group rather than 'treated'. The control group is thus the group of school-age children surveyed in rural communities where these changes did not take place. To compute the ATT, we assume that all relevant differences between school-age children in the exposed and non-exposed communities are captured by their observables. Further, we seek to select a control group from the non-exposed pool of observations for which the distribution of the observables is as similar as possible to the distribution of the observables in the treated group. Various matching methods exist, but in this paper we implement nearest-neighbour matching (Leuven and Sianesi 2003). Robustness checks are also performed using one-to-one matching, without obtaining qualitatively different results. They are shown in Table C1 of Appendix C. In this case, we use the nearest-neighbour propensity score matching method with five 'neighbours' being selected from the control group for each treated observation.[9] The observable characteristics selected as controls are the same as used in the analysis of school participation and school dropout presented in Section 3. The tests performed suggest that matching reduces differences in sample means and distributions between the control and treated group with respect to the observable characteristics. In Table C2 of Appendix C we show the kernel density plots displaying covariate balance obtained after the propensity score estimation for each of the six treatment variables presented. Following Leuven and Sianesi (2003), we do not use sample weights to implement the matching procedure.

The descriptive statistics for the treatment variables introduced in this section are shown in Table 8, whereas the results—ATT and statistical significance—are presented in Table 9. We find that building or renovating a school can lower the probability of dropping out by about 2 percentage points (panel a). The effect is slightly bigger (4.6 percentage points) for building or improving a

[9] Both the *psmatch2* and the *teffects psmatch* Stata commands were used in the analysis, showing qualitatively similar results, but only the results obtained using the *teffects psmatch* are shown in what follows. The main difference comes from the fact that *teffects psmatch* implements a method to estimate the standard errors of the estimator that matches on estimated treatment probabilities as derived by Abadie and Imbens (2012). The use of the nearest-neighbour matching method is motivated by the fact that we have a pool of controls that is relatively large when compared to the pool of treated observations and could thus obtain better matches compared to the one-to-one matching. Nonetheless, results obtained using the one-to-one matching with replacement are qualitatively not dissimilar from the ones presented.

water facility in the community (panel b), and slightly smaller (1.9 percentage points), but only significant at 10 per cent, for building or improving an electricity network facility (panel c). Building or improving a health facility in the community seems to have contributed to lowering the probability of dropout in 2014/15 by about 1.2 percentage points. A slightly bigger effect is found for the case in which a social protection programme has been implemented in the community (3 percentage points lower probability of dropout (panel d)); in this case the effect is also significant for the case of dropout in 2014/15 (about 2 percentage points). No effect is found in the case of building or improving a road (panel e).

Table 8. Descriptive statistics for the treatment variables used in the propensity score matching estimations

Variable	Obs.	Mean	Std dev.	Min.	Max.
School built/renovated	17,935	0.31	0.46	0	1
Water facility built/renovated	17,935	0.27	0.44	0	1
Electricity facility built/renovated	17,935	0.09	0.29	0	1
Social protection programme	17,935	0.22	0.41	0	1
Road facility built/renovated	17,935	0.12	0.32	0	1
Health facility built/renovated	17,736	0.48	0.50	0	1

Source: authors' calculations based on IOF14.

Table 9. ATT, nearest-neighbour propensity score matching

	Dropout any time	Dropout 2014–15
a School built/renovated	−0.023***	−0.004
	(0.006)	(0.004)
b Water facility built/renovated	−0.046***	−0.005
	(0.015)	(0.004)
c Electricity facility built/renovated	−0.019*	−0.004
	(0.010)	(0.005)
d Social protection programme	−0.032***	−0.019***
	(0.006)	(0.004)
e Road facility built/renovated	−0.004	0.001
	(0.007)	(0.005)
f Health facility built/renovated	−0.009	−0.012**
	(0.009)	(0.006)

Note: results obtained using the nearest-neighbour propensity score matching method with five neighbours.

Source: authors' calculations based on IOF14.

6 Conclusions

In this study we analysed the determinants of school dropout occurring at any point in time and in 2014/15 in Mozambique using the 2014/15 Household Budget Survey data, the most recent Household Budget Survey available. We also presented results for a propensity score matching analysis that used the rural community data available in the same survey.

As discussed in Section 1, education is one of Mozambique's most critical sectors. The sector receives significant investments from the GoM and development partners; the number of primary schools in the country more than doubled in recent years and the number of secondary schools quadrupled during the same period. At the same time, and following these investments, primary school enrolment has risen significantly, also thanks to the abolition of school fees and the provision of direct support to schools, as well as free textbooks. However, school dropout remains

a big challenge for the Mozambican education system, as highlighted for example by De Walque and Valente (2016), Fox et al. (2012), and by the Mozambican Minister of Education (APA-Maputo 2018). Aspects of quality of education services provided, such as lack of desks and chairs, infrastructure in very poor conditions, and lack of books, other school material, or even teachers, are often highlighted by the respondents of the 2014/15 Household Budget Survey. These factors can partly be behind the worrying levels of school dropout. However, it should also be stressed that when asked about the reasons for not attending school, a very high percentage of children or family members replied that school is useless/there is no interest. This study has tried to contribute to add further knowledge on the factors that lead to the outcomes described.

In the first set of analyses presented in this paper, we studied the child, household, and community characteristics. This showed a stronger association with the probability of having abandoned school at any point in time using the sample of children who declare having enrolled in school at least once in the past. We find that age, child labour, household head's education, and access to services are particularly associated with the probability of going to school and not abandoning it. Moreover, our results suggest that early marriage and especially pregnancy highly increase the chances of dropping out of school. As expected, greater distance to school also appears to be associated with higher probabilities of dropout. On the other side, if the household head is a woman, this seems to be linked to a lower probability of abandoning school.

Analysing in more detail the characteristics that are more associated with school dropout over the period 2014–15, we find that if either the father or the mother or both stop living in the household, this is associated with a higher probability of dropping out. A similar effect is found if the child starts working. Teen marriage also shows a relation with a higher probability of abandoning school, but the most impressive result is the one for early pregnancy, which seems to be associated with a ~29 percentage point increase in the probability of dropout.

When the propensity score matching analysis is performed for rural communities, we find that building a new school or renovating an existing one, and building or improving a water facility, can have the effect of reducing the probability of dropping out. A similar effect is found for communities in which a social protection programme has been put in place; in this case the effect is also significant for the case of dropout in the period 2014–15.

The analyses presented highlight the importance of studying the challenges faced by the education sector even more, especially regarding school dropout. The study uncovers the pull and push factors behind the high dropout rates that are still present in the country. At the same time, the results presented add further knowledge about the factors that lead to the outcomes described. It also provides some evidence directed to policy makers and development practitioners on some of the most worrying characteristics associated with school dropout and on some of the public and private investments that show an association with a decrease in the dropout rates in the country.

References

Abadie, A., and G.W. Imbens (2012). 'Matching on the Estimated Propensity Score'. . *Econometrica*, 84(2): 781–807.

APA-Maputo (2018). 'School Dropout Figure Worries Mozambique'. *APA-Maputo*, 28 April 2018. Available at: http://mobile.apanews.net/en/news/mozambique-alarmed-by-school-dropout-figure (accessed 27 September 2018).

De Walque, D., and C. Valente (2016). 'Preventing Excess Female School Drop Out in Mozambique: Conditional Transfers and the Respective Role of Parent and Child in Schooling Decisions'. IGC Working Paper. London: International Growth Centre.

DEEF (2016). *Pobreza e Bem-Estar em Moçambique: Quarta Avaliação Nacional*. Maputo: Ministry of Economics and Finance/DEEF.

Fox, L., L. Santibáñez, N. Vy, and P. André (2012). *Education Reform in Mozambique, Lessons and Challenges*. Washington, DC: World Bank.

GoM Ministry of Education (2018). *Education Management Information System*. Maputo: Ministry of Education.

Ibraimo, M., and V. Salvucci (2017). 'Os Determinantes da Pobreza em Moçambique, 2014/15'. Inclusive Growth in Mozambique Working Paper. Helsinki: UNU-WIDER.

INE (2015). *Relatório Final do Inquérito ao Orçamento Familiar: IOF-2014/15*. Maputo: Instituto Nacional de Estatística Available at: www.ine.gov.mz/operacoes-estatisticas/inqueritos/inquerito-sobre-orcamento-familiar/relatorio-final-do-inquerito-ao-orcamento-familiar-iof-2014-15/view (accessed 8 April 2019).

Leuven, E., and B. Sianesi (2003). 'PSMATCH2: Stata Module to Perform Full Mahalanobis and Propensity Score Matching, Common Support Graphing, and Covariate Imbalance Testing'. Version 4.0.11 [software]. Available at: http://ideas.repec.org/c/boc/bocode/s432001.html (accessed 22 October 2014).

Mambo, F. (2017). 'Procura por Educação Primária em Moçambique'. Inclusive Growth in Mozambique Working Paper. Available at http://igmozambique.wider.unu.edu/sites/default/files/Working-paper/Procura%20educacao-Felix%20Mambo.pdf (accessed 10 June 2019)

ROSC (2015), 'O Acesso a Educação Primária de Qualidade Como um Direito Fundamental da Criança'. Working Paper 4/2015. Maputo: Forúm da Sociedade Civil para os Direitos da Criança (ROSC).

Rosenbaum, P.R., and D.B. Rubin (1983). 'The Central Role of the Propensity Score in Observational Studies for Causal Effects'. *Biometrika*, 70(1): 41–55.

UNICEF (2010). *Child Poverty and Disparities in Mozambique 2010*. Maputo: UNICEF Mozambique.

UNICEF (2012). *All Children in School by 2015: Global Initiative on Out-of-School Children—Mozambique Country Case Study*. Maputo: UNICEF Mozambique.

UNICEF (2014). *Situation Analysis of Children in Mozambique 2014*. Maputo: UNICEF Mozambique.

World Bank (2019). *World Development Indicators*. Washington, DC: World Bank. Available at: https://databank.worldbank.org/data/source/world-development-indicators (accessed 25 January 2019).

Appendix A: descriptive statistics

Table A1: Summary statistics of variables used in the analysis

Variable	Description	Obs.	Mean	Std dev.	Min.	Max.
Dropout any time	Abandoned school at any point in time	44,983	0.13	0.34	0	1
Dropout 2014–15	Abandoned school between 2014 and 2015	44,983	0.05	0.22	0	1
Sex	Sex	44,983	0.51	0.50	0	1
Age	Age	44,983	11.17	3.26	6	17
Birth order	Birth order	44,983	2.12	1.25	1	16
Orphan	Orphan (either father and/or mother died)	44,983	0.16	0.37	0	1
Not in the HH	Not in household (either father and/or mother do not live in the household)	44,983	0.47	0.50	0	1
Child works	The child works	44,983	0.28	0.45	0	1
Disability	The child has some form of permanent disability or sickness	44,983	0.01	0.11	0	1
Late	The child is attending a school grade that is more than two years lower than the one corresponding to his/her age	44,791	0.68	0.47	0	1
Married	The child is married	44,983	0.11	0.31	0	1
Pregnant	The child is pregnant	44,983	0.00	0.07	0	1
Head age	Household head age	44,983	45.02	12.72	14	95
Head woman	Household head is a woman	44,711	0.27	0.44	0	1
Head no education	Household head has no education	44,983	0.27	0.45	0	1
Head 5y education	Household head has completed 5 years of education	44,983	0.40	0.49	0	1
Head 7y education	Household head has completed 7 years of education	44,983	0.16	0.37	0	1
Head 10y education	Household head has completed 10 years of education	44,983	0.10	0.29	0	1
Head 12y education	Household head has completed 12 years of education	44,983	0.05	0.21	0	1
Head +12y education	Household head has completed more than 12 years of education	44,983	0.03	0.16	0	1
Head in agriculture	Household head works in agriculture	44,750	0.60	0.49	0	1
Poor	The household is poor (monetary poverty)	44,983	0.47	0.50	0	1
Water source	The household has access to a safe water source	44,973	0.58	0.49	0	1
Sanitation	The household has access to improved sanitation	44,973	0.33	0.47	0	1
Roof	The household lives in a house with a good-quality roof	44,973	0.49	0.50	0	1
Electricity	The household has access to electricity	44,973	0.35	0.48	0	1
Durable goods	The household has access to at least three durable goods out of a list of ten basic items of common use	44,869	0.57	0.50	0	1
Access to transport	The community has access to transportation means	43,886	0.67	0.47	0	1
School	There is at least one school in the community	43,877	0.91	0.29	0	1
Flood	The household lives close to the area affected by the 2015 flood	44,983	0.29	0.45	0	1
Distance school 0–15	Distance to school is less than or equal to 15 minutes	44,983	0.48	0.50	0	1

Distance school 16–30	Distance to school is between 16 and 30 minutes	44,983	0.29	0.45	0	1
Distance school 31–60	Distance to school is between 31 and 60 minutes	44,983	0.17	0.38	0	1
Distance school 60+	Distance to school is more than 60 minutes	44,983	0.06	0.24	0	1

Note: the descriptive statistics presented consider the observations for each child in the various survey quarters as stacked. There are about 18,000 children included in the analysis; not all of them were observed in all three survey quarters. Statistics for temporal and geographic controls are not shown.

Source: authors' calculations based on IOF14.

Table A2: Prevalence of dropout according to categories analysed

Variable		Mean dropout any time	Mean dropout 2014–15
Sex	Male	0.130	0.043
	Female	0.137**	0.060***
Age	6−13	0.067	0.035
	14−17	0.298***	0.093***
Birth order	<3	0.102	0.040
	3+	0.206***	0.077***
Orphan	0	0.124	0.052
	1	0.183***	0.048*
Not in the HH	0	0.110	0.055
	1	0.161***	0.048***
Child works	0	0.079	0.038
	1	0.278***	0.088***
Disability	0	0.133	0.052
	1	0.199***	0.056
Late	0	0.029	0.026
	1	0.178***	0.064***
Married	0	0.131	0.055
	1	0.154***	0.021***
Pregnant	0	0.130	0.052
	1	0.900***	0.098**
Head age	<26	0.243	0.044
	26−50	0.114***	0.047
	51+	0.166***	0.063***
Head woman	0	0.130	0.055
	1	0.144***	0.044***
Head education	No education	0.175	0.065
	1−5 years	0.147***	0.058**
	6−7 years	0.107***	0.043***
	8−10 years	0.072***	0.029***
	11−12 years	0.047***	0.018***
	12+ years	0.032***	0.009***
Head in agriculture	0	0.090	0.031
	1	0.163***	0.065***
Poor	0	0.124	0.047
	1	0.144***	0.057***
Water source	0	0.171	0.066
	1	0.106***	0.041***
Sanitation	0	0.160	0.061
	1	0.080***	0.033***
Roof	0	0.173	0.070
	1	0.094***	0.033***
Electricity	0	0.167	0.064
	1	0.071***	0.028***
Durable goods	0	0.177	0.070
	1	0.101***	0.038***
Access to transport	0	0.169	0.066
	1	0.112***	0.043***
School	0	0.197	0.071

	1	0.125***	0.049***
Flood	0	0.139	0.051
	1	0.122***	0.053
Distance school 0−15	0−15	0.110	0.046
Distance school 16−30	16−30	0.128***	0.049
Distance school 31−60	31−60	0.185***	0.070***
Distance school 60+	60+	0.199***	0.059**
Rural	0	0.079	0.033
	1	0.162***	0.062***
Province	Niassa	0.166***	0.072***
	Cabo Delgado	0.153***	0.052***
	Nampula	0.153***	0.067***
	Zambezia	0.121***	0.052***
	Tete	0.207***	0.087***
	Manica	0.143***	0.056***
	Sofala	0.113***	0.047***
	Inhambane	0.110***	0.033***
	Gaza	0.132***	0.024
	Maputo Province	0.080***	0.022
	Maputo City	0.055	0.021

Source: authors' calculations based on IOF14.

Table A3: Prevalence of dropout according to categories analysed: community-level effects

Variable		Mean
School built/renovated	0	0.166***
	1	0.147
Water facility built/renovated	0	0.167***
	1	0.142
Electricity facility built/renovated	0	0.163***
	1	0.132
Road facility built/renovated	0	0.164***
	1	0.146
Health facility built/renovated	0	0.163**
	1	0.142
Social protection programme	0	0.181***
	1	0.138

Source: authors' calculations based on IOF14.

Appendix B: additional analyses on the determinants of dropout for various subpopulations

Table B1: Determinants of dropout at any point in time, various subpopulations

Variables	(1) Dropout any time Entire population of children aged 6−17	(2) Dropout any time Boys	(3) Dropout any time Girls	(4) Dropout any time Children aged 6−13	(5) Dropout any time Children aged 14−17	(6) Dropout any time Children in primary school (up to fifth grade)	(7) Dropout any time Children in primary school (up to seventh grade)	(8) Dropout any time Children in secondary school
Sex	0.0106*	−	−	0.0138***	−0.0170	0.00195	0.00574	0.0229
	(0.00565)			(0.00504)	(0.0142)	(0.00627)	(0.00600)	(0.0150)
Age	0.0298***	0.0275***	0.0322***	0.0123***	0.0659***	0.0300***	0.0320***	0.0476***
	(0.00127)	(0.00178)	(0.00158)	(0.00153)	(0.00594)	(0.00156)	(0.00142)	(0.00906)
Birth order	−0.00451*	−0.00308	−0.00401	−0.00114	−0.00907*	−0.00453	−0.00575**	0.00628
	(0.00247)	(0.00369)	(0.00297)	(0.00302)	(0.00533)	(0.00297)	(0.00277)	(0.00599)
Orphan	0.00848	0.0214**	−0.00487	0.0135*	0.00423	0.0129	0.00985	0.00639
	(0.00738)	(0.00995)	(0.00950)	(0.00799)	(0.0161)	(0.00894)	(0.00802)	(0.0162)
Not in the HH	0.0387***	0.0341***	0.0409***	0.0270***	0.0393**	0.0298***	0.0321***	0.0599***
	(0.00814)	(0.0115)	(0.00935)	(0.00735)	(0.0180)	(0.00907)	(0.00881)	(0.0202)
Child works	0.0576***	0.0488***	0.0652***	0.0318***	0.113***	0.0456***	0.0511***	0.0679***
	(0.00517)	(0.00697)	(0.00658)	(0.00483)	(0.0116)	(0.00565)	(0.00543)	(0.0125)
Disability	0.0493***	0.0308	0.0611***	0.0313*	0.0853*	0.0530***	0.0487**	−0.0350
	(0.0188)	(0.0280)	(0.0235)	(0.0174)	(0.0471)	(0.0204)	(0.0199)	(0.0656)
Late	0.0265***	0.0113	0.0472***	0.0178***	0.124***	−0.00444	0.00282	−0.0385**
	(0.00793)	(0.0109)	(0.0107)	(0.00594)	(0.0250)	(0.00907)	(0.00887)	(0.0184)
Married	0.0592***	−	0.0676***	−0.00200	0.273***	0.0243***	0.0430***	0.239***
	(0.00715)		(0.00738)	(0.00549)	(0.0328)	(0.00748)	(0.00755)	(0.0304)
Pregnant	0.298***	−	0.249***	0.235***	0.445***	0.445***	0.292***	0.262***
	(0.0319)		(0.0297)	(0.0500)	(0.0595)	(0.0562)	(0.0445)	(0.0370)
Head age	−8.33e−05	0.000200	−0.000296	−6.43e−05	1.53e−05	−6.12e−05	−1.27e−05	−7.38e−05
	(0.000247)	(0.000333)	(0.000313)	(0.000208)	(0.000560)	(0.000282)	(0.000268)	(0.000555)
Head woman	−0.0324***	−0.0307***	−0.0317***	−0.0274***	−0.0260	−0.0295***	−0.0304***	−0.0263
	(0.00803)	(0.0115)	(0.00971)	(0.00741)	(0.0182)	(0.00915)	(0.00880)	(0.0165)
Head 5y education	−0.0154**	−0.0102	−0.0199**	−0.0132**	−0.0260	−0.0121	−0.0145*	−0.0181

	(0.00711)	(0.00872)	(0.00824)	(0.00621)	(0.0167)	(0.00739)	(0.00742)	(0.0207)
Head 7y education	−0.0280***	−0.0194	−0.0359***	−0.0196**	−0.0553**	−0.0253**	−0.0290***	−0.0183
	(0.00993)	(0.0135)	(0.0109)	(0.00888)	(0.0216)	(0.0111)	(0.0108)	(0.0227)
Head 10y education	−0.0510***	−0.0689***	−0.0405***	−0.0362***	−0.0859***	−0.0436***	−0.0448***	−0.0427
	(0.0103)	(0.0159)	(0.0135)	(0.00830)	(0.0249)	(0.0117)	(0.0113)	(0.0260)
Head 12y education	−0.0729***	−0.0746***	−0.0850***	−0.0415***	−0.131***	−0.0387**	−0.0615***	−0.0651**
	(0.0132)	(0.0222)	(0.0282)	(0.0128)	(0.0321)	(0.0181)	(0.0151)	(0.0272)
Head +12y education	−0.0729***	−0.0723**	−0.0916***	−0.0253	−0.150***	−0.00504	−0.0393*	−0.0952***
	(0.0162)	(0.0340)	(0.0274)	(0.0168)	(0.0376)	(0.0253)	(0.0214)	(0.0264)
Head in agriculture	−0.00547	−0.0106	0.000264	−0.00575	−0.00783	−0.0107	−0.00670	0.0265*
	(0.00753)	(0.0100)	(0.00971)	(0.00662)	(0.0160)	(0.00775)	(0.00768)	(0.0157)
Poor	−0.00462	−0.00851	0.000580	−0.0108**	0.0150	−0.00662	−0.00572	0.0147
	(0.00580)	(0.00795)	(0.00671)	(0.00521)	(0.0131)	(0.00624)	(0.00593)	(0.0153)
Water source	−0.0187**	−0.0234**	−0.0149	−0.00499	−0.0548***	−0.0132	−0.0191**	−0.0104
	(0.00856)	(0.0111)	(0.0101)	(0.00674)	(0.0192)	(0.00915)	(0.00908)	(0.0235)
Sanitation	−0.0266***	−0.0338***	−0.0171	−0.0118	−0.0501**	−0.0261***	−0.0233**	−0.0128
	(0.00885)	(0.0116)	(0.0115)	(0.00770)	(0.0204)	(0.0101)	(0.00939)	(0.0166)
Roof	−0.0194**	−0.0136	−0.0265**	−0.0139*	−0.0282	−0.0207**	−0.0172*	−0.0275
	(0.00918)	(0.0120)	(0.0109)	(0.00816)	(0.0199)	(0.00992)	(0.00965)	(0.0253)
Electricity	−0.0316***	−0.0305**	−0.0323***	−0.0190**	−0.0514**	−0.0188*	−0.0262***	−0.0311
	(0.00978)	(0.0139)	(0.0124)	(0.00935)	(0.0232)	(0.0104)	(0.00989)	(0.0210)
Durable goods	−0.0125	−0.0180	−0.00794	−0.0130*	−0.0152	−0.00931	−0.00852	−0.0179
	(0.00780)	(0.0113)	(0.00964)	(0.00692)	(0.0182)	(0.00830)	(0.00823)	(0.0215)
Access to transport	0.00490	0.00553	0.00672	0.0105	−0.0137	0.00244	−0.00107	0.0263
	(0.0101)	(0.0126)	(0.0118)	(0.00829)	(0.0225)	(0.0105)	(0.0103)	(0.0345)
School	−0.0128	−0.0222	0.000354	−0.0164	0.0128	−0.0206*	−0.0120	−0.0113
	(0.0129)	(0.0155)	(0.0170)	(0.0100)	(0.0318)	(0.0119)	(0.0128)	(0.0457)
Flood	−0.00675	−0.0173	0.00302	0.00350	−0.0365	−0.00478	−0.00637	−0.0208
	(0.0105)	(0.0140)	(0.0118)	(0.00879)	(0.0243)	(0.0107)	(0.0106)	(0.0311)
Distance school 16−30	0.0172**	0.0214*	0.0111	0.00958	0.0326*	0.0127	0.0172**	0.00228
	(0.00770)	(0.0109)	(0.00915)	(0.00673)	(0.0170)	(0.00847)	(0.00810)	(0.0165)
Distance school 31−60	0.0351***	0.0481***	0.0141	0.0273***	0.0498**	0.0350***	0.0344***	0.00676
	(0.0105)	(0.0134)	(0.0113)	(0.00945)	(0.0230)	(0.0116)	(0.0110)	(0.0261)
Distance school 60+	0.0252*	0.0106	0.0385**	0.00709	0.0772**	0.0189	0.0161	0.217**
	(0.0133)	(0.0188)	(0.0157)	(0.0109)	(0.0339)	(0.0139)	(0.0142)	(0.107)
Temporal controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	43,102	21,672	21,430	29,757	13,345	29,788	36,612	4,374

Note: there are about 18,000 children included in the analyses; not all of them were observed in all three survey quarters. Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Source: authors' calculations based on IOF14.

Table B2: Determinants of dropout in the period 2014-15, various subpopulations

Variables	(1) Dropout 2014–15 Entire population of children aged 6−17	(2) Dropout 2014–15 Boys	(3) Dropout 2014–15 Girls	(4) Dropout 2014–15 Children aged 6−13	(5) Dropout 2014–15 Children aged 14−17	(6) Dropout 2014–15 Children in primary school (up to fifth grade)	(7) Dropout 2014–15 Children in primary school (up to seventh grade)	(8) Dropout 2014–15 Children in secondary school
Orphan	−0.00221	0.00681	−0.0136	−0.00470	0.00610	−0.00584	−0.00296	0.00516
	(0.0108)	(0.0147)	(0.0156)	(0.0118)	(0.0203)	(0.0119)	(0.0115)	(0.0245)
Not in the HH	0.0384**	0.0279	0.0476**	0.0488***	5.48e−05	0.0413**	0.0406**	0.0140
	(0.0155)	(0.0208)	(0.0208)	(0.0171)	(0.0324)	(0.0172)	(0.0159)	(0.0474)
Child works	0.0323***	0.0417***	0.0210**	0.0202**	0.0542***	0.0300***	0.0317***	0.0364
	(0.00743)	(0.00955)	(0.0102)	(0.00813)	(0.0128)	(0.00819)	(0.00766)	(0.0252)
Late	−0.0512***	−0.0561***	−0.0493***	−0.0612***	−0.0269*	−0.0520***	−0.0519***	−0.0432**
	(0.00824)	(0.0117)	(0.0105)	(0.00902)	(0.0157)	(0.00865)	(0.00876)	(0.0183)
Married	0.0254***	−	0.0277***	0.0147**	−0.0439***	0.0223***	0.0261***	0.00730
	(0.00594)		(0.00790)	(0.00649)	(0.00899)	(0.00656)	(0.00617)	(0.0550)
Pregnant	0.291***	−	0.291***	0.822***	0.258***	0.137**	0.270***	0.341***
	(0.0472)		(0.0473)	(0.136)	(0.0482)	(0.0605)	(0.0577)	(0.0919)
Head woman	0.176*	0.271	−0.0108	0.251**	−0.0570	0.212**	0.189**	0.0288
	(0.0899)	(0.179)	(0.0426)	(0.107)	(0.132)	(0.104)	(0.0957)	(0.0479)
Poor	0.00600	0.00629	0.00488	0.00218	0.0158	0.00553	0.00717	−0.0198
	(0.00677)	(0.00891)	(0.00876)	(0.00733)	(0.0128)	(0.00740)	(0.00700)	(0.0174)
Flood	0.0105	0.0160	0.00483	0.0126	0.00245	0.0128	0.0112	−0.00371
	(0.0138)	(0.0162)	(0.0149)	(0.0147)	(0.0192)	(0.0153)	(0.0145)	(0.0208)
Constant	0.0765***	0.0590	0.121***	0.0102	0.273***	0.0680**	0.0745***	0.104***
	(0.0264)	(0.0502)	(0.0187)	(0.0301)	(0.0429)	(0.0293)	(0.0279)	(0.0211)
Temporal controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic controls	No	No	No	No	No	No	No	No
Observations	44,520	22,414	22,115	30,811	13,718	32,848	39,809	4,443
Number of children	18,056	9,057	9,037	12,584	5,515	13,527	16,153	1,666

Note: there are about 18,000 children included in the analyses; not all of them were observed in all three survey quarters. Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Source: authors' calculations based on IOF14.

Appendix C: Robustness checks and balance tests for the propensity score matching analysis presented

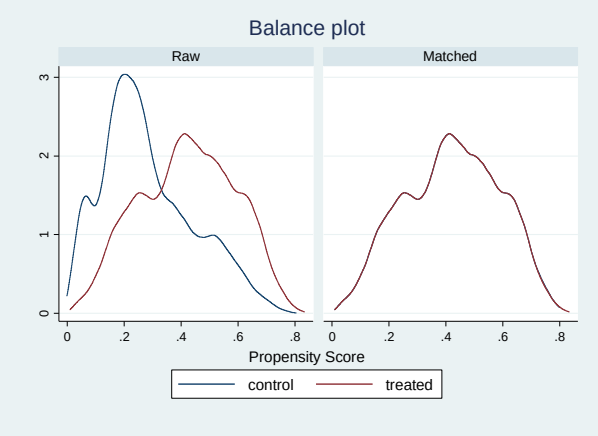
Table C1: Average treatment on the treated (ATT), one-to-one propensity score matching

		Dropout any time	Dropout 2014–15
a	School built/renovated	−0.025***	−0.002
		(0.009)	(0.006)
b	Water facility built/renovated	−0.072**	−0.012**
		(0.028)	(0.006)
c	Electricity facility built/renovated	−0.011	−0.009
		(0.013)	(0.007)
d	Social protection programme	−0.043***	−0.028***
		(0.009)	(0.005)
e	Road facility built/renovated	−0.007	0.002
		(0.009)	(0.006)
f	Health facility built/renovated	−0.002	−0.013*
		(0.012)	(0.007)

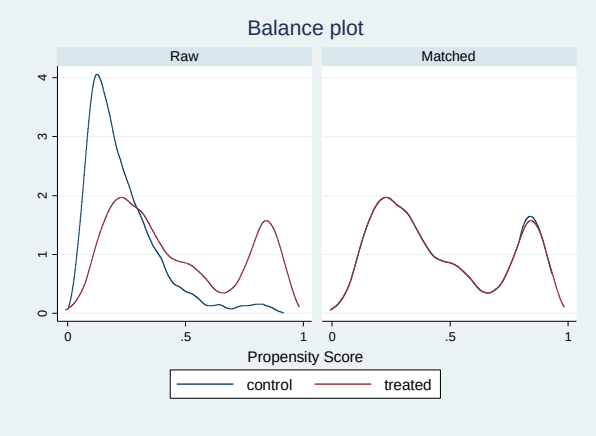
Source: authors' calculations based on IOF14.

Figure C1: Kernel density plots showing covariate balance

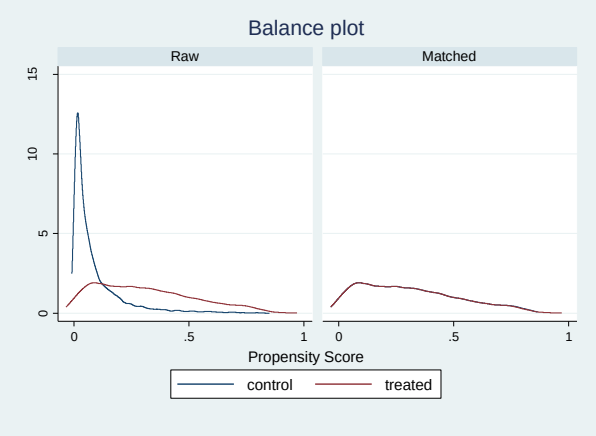
School built/renovated



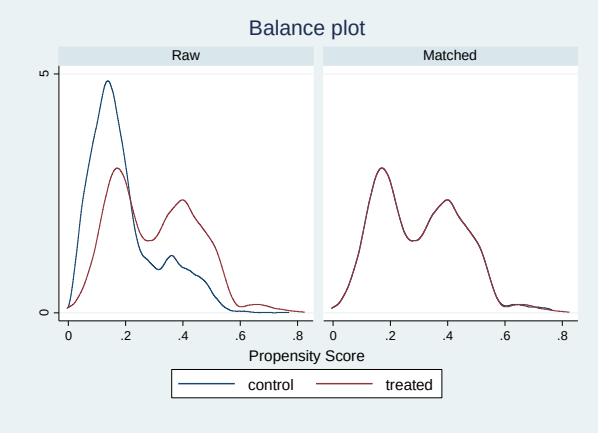
Water facility built/renovated



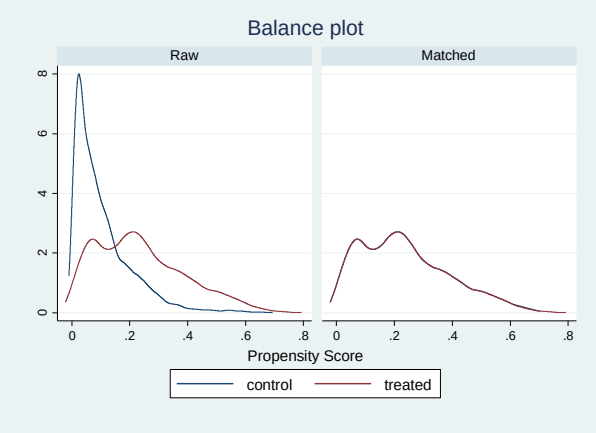
Electricity facility built/renovated



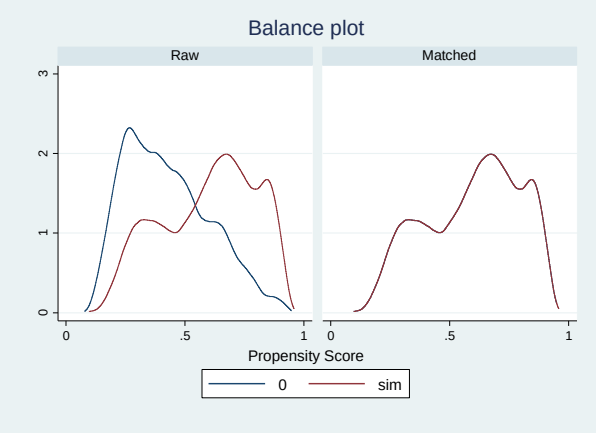
Road facility built/renovated



Health facility built/renovated



Social protection programme



Note: kernel density plots for covariate balance, showing the raw distribution and the one obtained after the propensity score estimation for each of the six treatment variables presented. In all cases, matching greatly reduces differences between the control and treated group with respect to the observable characteristics.

Source: authors' calculations based on the IOF14.