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The Impact of School Facilities on Drop outs in Pakistan

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Preface

The Centre for Research in Economics and Business (CREB) was established in 2007 to conduct policy-oriented research with a rigorous academic perspective on key development issues facing Pakistan. In addition, CREB (i) facilitates and coordinates research by faculty at the Lahore School of Economics, (ii) hosts visiting international scholars undertaking research on Pakistan, and (iii) administers the Lahore School's postgraduate program leading to the MPhil and PhD degrees.

An important goal of CREB is to promote public debate on policy issues through conferences, seminars, and publications. In this connection, CREB organizes the Lahore School's Annual Conference on the Management of the Pakistan Economy, the proceedings of which are published in a special issue of the Lahore Journal of Economics.

The CREB Working Paper Series was initiated in 2008 to bring to a wider audience the research being carried out at the Centre. It is hoped that these papers will promote discussion on the subject and contribute to a better understanding of economic and business processes and development issues in Pakistan. Comments and feedback on these papers are welcome.

Since the second half of 2018 we have had issues with our regular editing services, as a result of which there has been a growing backlog of working papers that had been approved by the editorial committee. To avoid further delays in dissemination of the ongoing research, we decided to publish approved but unedited working papers online. Working paper No 03-18, December 2018 was the first such paper.

Abstract

Investment in human capital has the potential to promote economic growth and alleviate poverty. Unfortunately, Pakistan's performance on this front has been poor with 19% of the primary school age children being out of school and one out of every three children out-of-school having dropped out. This study aims to explore the impact of attributes of school facilities on primary school dropouts in Pakistan. I use the Annual Status of Education Report (ASER) data set from 2013, 2014 and 2015 to study the impact of school facilities (both public and private schools) on proportion of dropouts in a village. I also draw a statistical comparison of the impact of school facilities on primary and secondary level dropouts. Better school facilities, specifically the educational qualification of private schools teachers, significantly reduce the proportion of dropouts in a village. However, once the student proceeds to the secondary level, the effect of school and teacher quality indicators diminish. These results indicate the need for policy makers and educators to emphasize on better teacher quality to retain students in primary school.

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1. Introduction

Education plays a pivotal role in the economic growth of nations. A vast literature emphasizes the importance of education in different aspects of human development such as culture, social cohesion, science and a general enhancement of human personality (Quinn and Rubb, 2005; Saadi & Saeed, 2010). Human capital is associated with the skills present in human beings attained through experience and schooling that help in the production of goods, services and additional knowledge (Kumar, 2006). For a given level of technology, the existence of skilled workers enhances productivity. In their seminal paper, Mankiw, Romer and Weil (1992) argue for human capital being a major input in the production function of a country. Lucas (1988) says that human capital generates positive externalities that lead to endogenous growth. Similarly, Romer (1990) suggests that human capital accumulation can increase innovation and Research and Development (R&D) thereby leading to growth. Human capital accumulation can have a second order effect on growth by its impact on physical capital investment (Benhabib and Spiegel, 1994). Bils and Klenow (2000) have emphasized on the increase in returns, mainly in terms of higher wages from an additional year of schooling.

Investment in human capital through education can significantly help eradicate poverty from a country. Unfortunately, Pakistan's investment on human capital has historically been poor even though public expenditure on education as a percentage of GDP has increased from 1.5 to 2.1 % from 2001 to 2013 (Pakistan EFA report, 2015. See Appendix A, Figure 1). According to Pakistan Social and Living Standards Measurement (PSLM) Survey 2015, literacy rate is stagnant at 60% and gender gap in literacy is significant (Pakistan Economic Survey, 2015). According to the latest

Annual Status of Education Report, 19% of primary school children were reported to be out-of-school, of which around 6% dropped out of school and 13% were never enrolled (See Appendix A, Table 1). Gross enrollment rate in the age group 5-9 years in 2014 declined from the rate in the previous year mainly because of a reduction in enrollment in Punjab. The enrollment rates improved in all the other provinces (from Pakistan Economic Survey, 2015. See Appendix A, Table 2).

The government of Pakistan takes responsibility for providing easy access to education to the masses, as the deprived individuals cannot afford to send their children to expensive private schools. The government of Pakistan has undertaken several reforms under the National Plan of Action (2001-2015), including revision of national curricula, stipend grant to girls, provision of good quality text books and teachers, yet participation rates at the primary level remain well below 100% (Government of Pakistan, 2005). The role government can play is reflected provincial performance – for instance, drop out rate is the lowest in KP arguably due to the efforts of the provincial government[1] while it is the highest in Baluchistan (See Appendix A, Figure 2). At primary level in Punjab, drop out rate has been lowest in class four before moving to the secondary level (18.7%) and the highest in class one (29.4%) (Pakistan Education Statistics, 2007).

The quality of school facilities is very important in determining the wellbeing of the child along with enhancing learning and promoting school attendance. Andrabi et al. (2007) find that the value that school facilities add to the educational production function is significant. Learning cannot be efficient in the absence of functional classrooms, blackboards and high student teacher ratio,. Furthermore, lack of extra

[1] High level of financial donor support along with promising efforts by the government in the form of well trained teachers and better equipped schools (Pakistan EFA Report, 2015)

facilities such as boundary walls, fans, adequate toilets, libraries and sports equipment etc. can make environment less conducive for learning. Private schools, however, have better facilities compared to government schools and this may be partly responsible for the difference in private and public school performance. Andarabi et. al, (2008) emphasize that the state of infrastructure in public schools in contrast to private schools is poor even though government is the principal provider of education. Unavailability of basic facilities such as electricity, water, working toilets, classrooms, blackboards, unsafe school buildings and female schools are partly responsible for low enrollment.

The dropout rate in Pakistan is amongst the highest worldwide[2], resulting in low educational attainment. Bilquees and Saqib (2004) emphasize the significance of high levels of school dropouts at the primary level on the education provision in Pakistan. More than one-third of enrolled children dropout at the primary level because of socio-economic reasons (Pakistan EFA Report, 2015). The wastage of resources and lost human capital because of dropouts is a pressing issue for decision makers. The present study proposes to identify the impact of facilities in schools on high dropout at primary level in Pakistan. The results of the study may be valuable to bridge the gap in literature by examining the need to enhance school quality for policy makers, planners and educators by taking measures to control dropouts and increase enrollment or participation rate at primary level in Pakistan. In addition, while there have been studies determining the supply and demand factors impacting schooling in Pakistan, hardly any study considers the differential in the impact of factors on drop outs at the primary and secondary level within a household or village. The

[2] The persistence rate of children to last grade of primary is 80% in Pakistan as compared to countries such as India, Sri Lanka, China and Ghana where it is 82%, 98%, 98% and 84% respectively (United Nations Educational, Scientific, and Cultural Organization (UNESCO), 2012)

relationship between educational outcomes such as dropouts and school facilities is a pertinent one to investigate given the tendency of local policy makers (Memon and Naz, 2014) to focus on visible tangible investment in hard infrastructure over intangible assets such as the quality of its teaching staff.

Study sample consists of 40,861 dropouts with 30,448 leaving school at the primary level in Pakistan from the Annual Status of Education Report (ASER) data set for the year's 2013, 2014 and 2015. I employ an OLS model to study the determinants of dropout at the village level. The study estimates the impact of school facilities (both public and private schools) on proportion of dropouts in a village along with examining differences in primary and secondary level drop outs associated with school facilities quality in a village.[3]

The rest of this paper is structured as follows. Section 2 reviews literature on the main determinants of school dropouts; Section 3 explains the variables that are used and description of the data; Section 4 provides details of the model that will be employed while Section 5 presents results and robustness checks. The last section includes policy implications that can help reduce school dropouts in Pakistan.

[3] The data does not provide information on the test scores of students who have dropped out, therefore, I cannot control for quality of students in the sample. It also doesn't provide household level data on which school the child has dropped out from. As a result, this study largely focuses on the effect of school or village level facilities on dropout ratios at a village level, not at the household level. In addition, the analysis will control for district and time fixed effects. At the household level, I control for characteristics that are likely to be unrelated to student's *innate* ability.

2. Literature Review

The term ‘dropout’ refers to students who for numerous reasons stop attending school before completion of the education level they are enrolled in (Mahmood and Hussain, 1986). UNESCO Institute of Statistics (2005) has propositioned a term ‘‘early school-leaving,’’ that is, withdrawing the education system, leaving the cycle that was begun unfinished. Akyeampong et al. (2007) states that in the Ghanaian context, a dropout is characterized as a child enrolled in school but not attending school any longer even though he/she may enter the institution framework again at some point. Fundamental reasons for the interest in dropouts is the impact it has on labor demand and supply factors (Hunt, 2008).

In Pakistan, most research focuses on factors other than quality of school facilities that have an impact on school dropouts. I propose to explore the extent to which facilities present in the school can impact on children dropping out from school while also looking into existing literature on the other factors that determine schooling.

2.1 Dropout Rate and School facilities

Fuller and Clarke’s (1994) find a high level of positive impact of textbooks and learning resources, teacher attributes (particularly information regarding the subject), instructional time duration and work requirements on educational outcomes. In the 43 “high quality” studies carried out by Glewwe et al. (2011), effects of school facilities on educational outcomes are consistently positive.

Further, a positive and significant relationship has been found between school facilities and school attendance. Dropouts were more for schools that had broken buildings and short-staffed janitorial services (Branha, 2004). Children need a school

environment that is conducive to learning. Human resources and those present within the school link education facilities to quality. Accessibility of resources such as reading materials, desks and chalkboards has been found to impact dropout (Brock & Cammish, 1997; Molteno et al., 2000).

For the educational and economic development of a nation, school efficiency is likely to be reliant on factors that accelerate attendance and retention. In developing countries where dropouts are frequent during the primary years, measuring school quality using only test scores of enrolled students will leave out imperative aspects (Mensch and Clark, 2000). The relevance of this point is understood by the research conducted by Glewwe and Jacoby (1994) in Ghana that demonstrated that improvements in material resources such as making more textbooks available have a direct impact on learning environment and an indirect effect through its results on retention. Material inputs include instructional materials, teaching staff and facilities. Facilities also include adequate sanitation, provision of power and water. Toilets can help reduce student dropouts by 5.3% in upper-primary schools and by 12.2% in primary schools (Adukia, 2016). These factors are important for the comfort of students and to attract parents to send their children, ensuring attendance and student retention.

There is extensive literature on the impact that school quality variables have on students accomplishments in the ‘education production function” (EPF). Rather consistent with the findings from EPF studies, McKinsey (2010) conducted a study on enhancing educational systems and found that where systems are less established, shift ‘from poor to reasonable’ performance can be achieved through quantitative

extensions that ensure every school maintains at least a minimum level of infrastructure.

Ahmad and Sheikh (2014) use principal component analysis (PCA) to construct an index of school and teacher quality and identify parental preferences to private schooling over availability of free public schools in rural areas in Pakistan. Schools having boundary walls, serviceable toilets, water facility and electricity were more likely to be considered by parents while deciding where to send their children.

In a study on Canadian schools where effect of school learning environment on student outcomes was studied using a sample of 25,000 students and 1100 principals, researchers found that deteriorating facilities in school negative affect subjective wellbeing of school children and staff (Edgerton, Peter, Roberts, 2008).

Improved access to education as a consequence of Education for All (EFA) and Universal Primary Education (UPE) programs has emphasized the role quality of facilities plays as a prerequisite for guaranteeing access (Broack &Cammish, 1997; Ackers et al., 2001; Boyle et al., 2002). This has led to greater attention on looking at how the environment present within the school can play a role in experience of schooling outcomes be it in terms of dropping out or potential exam achievements.

Even though the exact definition of quality is unclear (UNESCO, 2004), proxy measures such as teacher qualifications have been used by several studies (Stephens, 1998 and Dunne et al., 2005). For Ghana in particular, research has linked access and retention to school quality (Pryor and Ampiah, 2003: Akyeampong et al., 2007). Moreover, in Pakistan teacher-related factors that measure school quality are thought to have a significant impact on retention. The lack of teacher attention due to large

class size can lead to many students to remain absent from school and eventually drop out. Chaurd and Mingat (1996) stated that extremely qualified and aged teachers seemed to smooth primary level dropouts. The behavior and practices of teachers can also influence an individual's decision to drop out. Smith (2003) found that in a few schools in Zimbabwe's Southern Province educators did not plan lessons, had no plans of work, and left students assignments unmarked. Such practices and lack of teacher training led to serious issues in term of retention.

2.2 Dropout Rate and Other Factors

Moving on to some other important factors that impact dropouts, gender discrimination has been established as a crucial determination and is seen through a range of social norms, practices and aspects of life (Ghosh, 2007). In Pakistan, females are at a disadvantage at receiving education - even if return from educating females may be greater[4], the return accruing to parents is comparatively less as compared to that from boys because of higher labor market outcomes and customary restrictions (Qureshi, 2012; Alderman and Paterno, 2001; Karlekar, 2000). Opportunity cost of sending girls to school is very high as they can replace their mothers in terms of carrying out household chores or looking after younger siblings (Case and Ardington, 2006; Kane, 2004; Hunter and May, 2002; Nekatibeb, 2002). Drop out rate is more for girls mainly because of their involvement in survival tasks such as collection of firewood, fetching water, managing livestock and so forth (Gosh, 2007; Case and Ardington, 2006; Kane, 2004). Females eventually become a part of their husbands family that actually reaps their return from education- therefore drop out rates are higher for girls (Emerson and Portela, 2001; Rosati and Rossi, 2001; Sathar and Lloyd, 1993).

[4] Rosenzweig and Schultz (1982); Aslam, Monazza, Kingdon and Gandhi(2008)

Parental education is said to be another major factor that is related to drop outs in schools (Chowdhury et al., 2002; Nath et al., 2008; Blick and Sahn, 2000; Brown and Park, 2002). Such children are likely to be a part of income generating activities unlike those who's parents have higher level of education (Duryea, 2003; Ersado, 2005). In a study on a rural village in Ghana, girls' drop out rate was influenced by both parental illiteracy and lower income of the household (Pryor and Ampiah, 2003). Parents' education has an impact on dropouts but there may be some gendered dimensions to this link with discrepancy in effects on boys and girls (Connelly and Zheng, 2003; Grant and Hallman, 2006; Lillard and Wills, 1994; Stone, 1956). Holmes' (2003) study shows that fathers' education increases the expected level of school survival by boys, and the education of the mother makes educational attainment for girls a more plausible phenomenon (Swada and Lokshin, 2001; Behrman et al., 1999)

The characteristics of a household act as a key determinant for survival of children in a school. The socio-economic status of a family unit is determined by the wage of the household and shows how affordable education is for that family (Hamid, 1993; Hadley, 2010; Quisumbing, 1995). Many studies have focused on income causing dropouts. According to the report on education by the UN taskforce, school completion is least for children from poor family units (Birdsall et al., 2005; Rosenzweig, 1982; Kane, 2004; Khan and Ali, 2005; Jacoby and Mansuri, 2014).

To conclude, existing literature has shed light on the demand side factors that have an impact on school dropouts and limited research has been done on measures of school quality. The purpose of this research is to fill in the gap and empirically test for a relationship between school facilities and school dropouts.

3. Research Questions

I will empirically investigate the following research questions:

3.1 Research Question 1

Do school facilities affect dropouts in a village?

Here the main aim is to see whether school facilities affect the proportion of dropouts within a village. I look at public and private school facilities separately because the facilities in the two types of schools are driven by different underlying demand and supply motivations. Parents of private schools are willing to pay school fees to send their children to school; providers of private schooling may be largely driven by a profit-maximizing motive. Correspondingly, the response of demand for private and public school, as reflected in the proportion of students who may drop out of schooling, will be different. I also include village level characteristics and amenities that can effect the decision to drop out. For instance, quality of life in a village, reflected in the basic facilities, could be reflective of average wealth and general wellbeing in the village. These factors could affect poverty and hence the ability to attend schools and must be controlled for in the village level estimation.

As a secondary analysis, I will also look at the impact of school facilities (public and private) at the household level - on whether a child at home drops out of school or not. This would be interesting as a household's decision to retain their children in a school is derived by many factors; some of which can be influenced by the conditions within the household such as the wealth or family size etc. or by school quality factors such as school classroom or teacher qualification.[5] We control for

[5] The dataset does not have information on test scores of students who dropped out; neither does it mention that the drop out student was a public or a private school going child. Therefore, I cannot test if the determinants of dropping out are different at the household level for public and private school going students. Neither can I control for the ability of the student through test scores. To eliminate a possible source of endogeneity due to ability, I only control for variables unrelated to *innate ability* as

these other factors when estimating the impact of school facilities on household dropout ratios.

3.2 Research Question 2

Is the effect of school facilities different at the primary level vs. secondary level in Pakistan?

Here the main aim is to see whether there is any difference in effect of facilities on the proportion of drop-outs at primary and secondary levels i.e. are people more likely to drop out at primary vs. secondary levels due to given school facilities. I look at the determinants at the village level. This question would be interesting as there are different motivations to go to either primary or secondary schools. Primary schooling is low cost, with a higher supply of teachers. Students at the secondary level are a selected sample out of the primary sample that qualifies for and opts to continue education beyond the primary level. It includes students who have passed the qualifying exams at the end of the primary level so the student quality is better and more uniform. Quality of the student is less of a confounding factor for dropouts at the secondary level than at the primary level. Therefore, an investigation of common factors behind the drop out in primary and secondary level will highlight the issues that impact the decision to remain in school consistently. A study of the factors that are different will highlight possible policy actions to effectively reduce dropouts at both stages.

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covariates in the household level estimation.

4. Methodology

This section of the research will provide a detailed explanation of the data that is being used along with a description of the important variables that will be used. Econometric specifications of the model will be studied alongside the empirical strategy that will be employed. Any limitations within the data or the technique employed will also be considered and extensive robustness checks will be conducted.

4.1 Data

The sample consists of primary school going children in Pakistan between the ages 5-11. Public education at the primary level if free of costs and so enrollment is higher. It is particularly interesting to investigate what motivations, other than costs, can affect the decision to drop out at the primary level.

I use the Annual Status of Education Report (ASER) data set for the years 2013, 2014 and 2015. Each year of the data comprises of 136 rural and 6 urban districts of Pakistan. From each of the 136 rural districts, 30 villages are selected and 20 households are further selected from each village. Moreover, one government and one private school (if available) are selected randomly from each village. Each year of the data also comprises of 6 urban districts from which 2328 households have been selected with one government and one private school (if available) in each block. There are a total of 1820 private schools and 4621 government schools in the data set. Out 609,933 children who were ever enrolled, 40,861 (6.7%) children dropped out with 30,448 (4.99%) leaving school at the primary level and 10,413 (1.71%) leaving at the secondary level. Unfortunately, the data set does not ask whether the dropouts are from a public or a private school and I cannot estimate the if determinants for private or public school-going children are different.

4.2 Empirical Specification

The study measures the factors that have an impact on the proportion of school dropouts in that village. A simple OLS model will be used, as the y variable is continuous proportion of total enrolled students in a village. The basic model will be as follows:

$$ProportionSchoolDropouts_j = \beta_0 + + \beta_1 School\ facilities\ 1_j + \beta_2 School\ facilities\ 2_j + \beta_3 School\ facilities\ 3_j + \beta_4 School\ facilities\ 4_j + \beta_5 District*time + \alpha_k Controls_j + \varepsilon \quad (1)$$

Where the dependent variable shows the proportion of children that are dropping out of a school in village *j* calculated by number of children dropping out divided by the total number of children enrolled in a village. The key independent variable used in the study is school facilities available in the village. We measure it through an index computed with the help of principal components analysis (PCA) of data on school facilities available such as drinking water, boundary walls, toilet, library, books, playground, science or computer laboratories and Internet. PCA reduces the number of variables explaining attributes of school facilities into further domains by making the total variance of these variables into a new set of components that explain the same degree of variance (Burki, 2011: Greene, 1997 and Sharma, 1996).[6] In literature, PCA is preferred over factor analysis when the research question requires an analysis of variance in the data (Tabachnick and Fidell, 2007). PCA includes unique error variances in trying to understand patterns in data, rather than excluding them and focusing on covariances (as is the case in factor analysis) (Brown, 2009). As such, PCA works well if the aim is to reduce dimensionality, while

[6] Furthermore, the weight of each component is explained by the eigenvectors of the correlation matrix that was assigned by STATA, keeping the extent of variation represented by that variable in view.

preserving data available in variances.

PCA generates two components where school facilities 1 includes facilities such as availability of library books, play ground, laboratory, computer or internet and school facilities 2 includes facilities such as availability of drinking water, boundary wall, toilet and electricity. School facilities 3 is also computed using PCA and are the class level indicators that include aspects such as whether there is a useable blackboard in the class, whether children have reading textbook or other supplementary materials. School facilities 4 is a measure of the teacher qualification and it represents the proportion of total number of teachers with at least graduate level of education divided by the total number of appointed teachers in that school. Controls included village level variables such as whether there is a carpeted road available or not, whether there are computer centers available in the village or not or if there are health facilities in the village or not along with number of government and private schools available in that village. Another control that is a key factor in determining drop outs is child labor. Children drop out of school when they have to work instead. However, due to unavailability of data, it cannot be included in the analysis. All errors are clustered at the village level and include time and districts fixed effects.

For the secondary analysis that measures the impact of school facilities on the probability of primary school dropouts at the household level, the dependent variable is school dropout that is measured by the education status of the child aged between 5-11 years. It is a dichotomous variable where it takes values of 1 or 0. I use a probit model to estimate the probability of students dropping out in a household as follows:

$$Dropouts_{ij} = \beta_0 + \beta_1 School\ facilities\ 1_j + \beta_2 School\ facilities\ 2_j + \beta_3 School\ facilities\ 3_j + \beta_4 School\ facilities\ 4_j + n_{dt}\ District_d * time_t + \beta_k Controls_{ij} + \varepsilon_{ij} \quad (2)$$

Where the dichotomous dependent variable shows whether the *ith* individual with *jth* school in the village is dropping out or not within a household. The key independent variable used in the study is school facilities available and their measurement has already been explained.[7] Controls include: Parents' education, which is measured by years of schooling; gender of the child which is a dichotomous where 1 is male and 0 is female; Asset index which is calculated using PCA and is a measure of household wealth and is made by including aspects such as whether the household is owned, whether the household has a television, electricity, mobile or smart phone. All errors are clustered at the household level and include time (t = 1,2,3), district and village effects.

Finally, to test the third research I estimate equation (1) separately for dropouts at the primary and secondary level using Seemingly Unrelated Estimates (SUEST) and check for the equivalence of coefficients across the two levels of education.

[7] I report coefficients and draw conclusions on the significance and direction of the relationship. Marginal effects, while interesting in their own right, are not the focus of this analysis.

4.3 Descriptive Statistics of Variables

At the primary level, more than 70% of the schools have boundary walls, drinking water and toilets; however, little over one-third have library books and one in five village has access to laboratories. An average village has a total of 9 teachers, 3 with a graduate degree. Average school facilities available in private schools are higher than the average facilities available in government schools. As far as teacher qualification is concerned, on average, total appointed teachers in private schools are more than the values in government schools. Teachers with graduate and masters level of education are more for private schools while those with post graduate degree are more for government schools[8]. Private schools have more blackboards, books and supplementary materials than government schools on average. These characteristics are significantly different between government and private schools on average (Appendix B, Table 3a shows the average values and p-value for a test of mean difference).

At the secondary level, average school facilities and teacher qualifications are very similar to what is seen at the primary levels. School facilities are more easily available in a private school than the average government school and are often of better quality. On average, there are more teachers with graduate and masters level of education in private schools while more teachers have post-graduate degrees in government schools. As far as class indicators are concerned, private schools on average have more blackboards, books and supplementary materials. These characteristics are significantly different between government and private schools on

[8] For a small proportion of entries, private and public teacher quality ratio was greater than one. This was most likely a result of data entry error and all such values have been replaced with 1 as this variable was created as a ratio and can't exceed 1. Moreover, data error seems to be correlated with x-variables, so I also check for robustness in two ways -i. by dropping these observations and ii. By dropping the problematic teacher quality variables. Results for both of these can be found in the Appendix B where the changed results are also discussed.

average (Appendix B, Table 3b shows the average values and p-value for a test of mean difference.)

The average values of all variables of those enrolled and those dropping out are significantly different at the primary level (See Appendix B, Table 4a). At the secondary level, the average values of all variables except government and private facilities, teacher qualification and class indicators are not significantly different for secondary education and are not expected to explain drop out variation for the secondary regression (See Appendix B, Table 4b). At the secondary level females are more likely to dropout even though the difference is less as compared to the primary level.[9]

[9] Village characteristics of students at the primary and secondary levels are available in Appendix B, table 5a & table 5b.

5. Results

5.1 Research Question 1- Village Level

Table 6 shows the impact of village level school facilities on the proportion of primary school dropouts in a village. I explore effects of both private and government school facilities. Government facilities 1 comprise of facilities such as availability of library books, playground, laboratory, computer or Internet. Though the coefficient is small in size - an increase in these facilities increases proportion of dropouts in a village by 0.081 percent, higher values of these facilities are related with a higher proportion of dropouts in a village (column 1).

The case for government school facilities 3 (class level indicators such as black boards) and government school facilities 4 (teacher qualifications) is similar – dropout proportions are higher in villages where these indicators are higher but the coefficients are economically small. Improvement in government facilities such as class blackboards, books and supplementary materials increase the proportion of dropouts in a village by 0.161 percent. Higher government facilities 4 (teacher qualifications) significantly increase the proportion of dropouts in a village (by 0.514 percent). Dropouts are lower in villages where the public school has basic amenities such as boundary walls, drinking water toilets, electricity (School facility 2) but this effect is statistically insignificant (column 1).

There can be three possible reasons for the dropouts being higher despite better facilities (1, 3, and 4). One, the positive coefficients reflects and underlying problem of low demand for public education or its failure to retain students; improvements in school facilities is not taken to be credible signal of education quality and/or are not valued by the school-going households. Specifically,

availability of computer and internet is not taken as a strong signal of school quality for public schools and dropout ratios are higher in these villages due to other underlying quality factors that impact enrolment in these villages. It is entirely possible that the proportion of dropouts in a village is high *despite* improving government facilities.

Second, it is also is also possible that demand for education is lower from richer households that do not look towards education as a source of labor income. For instance, demand for education has been found to be lower in rich agrarian rural households (Nerman and Owens, 2010). ASER data does not include values for land assets but I can proxy wealth using an index of household assets. I find that the results for public school facilities in Table 6 (column 1) are driven by villages where the median household is rich (i.e. has more than the median value of household asset index), whereas the effect of public school facilities on dropout proportions in villages where the median household is poor is insignificant (See Appendix B, Table 6a).

Third, recent literature shows that quality of a student's peers is a significant signal of school quality for parents (Abdulkadiroglu et al, 2017). For parents, quality may be reflected in the scores of enrolled children or in their social status (with parents preferring to send their children to schools where peers are of a similar social status). Further, if good quality students self-select into private schooling because of higher perceived quality of the school, then the relationship between dropout ratios and public school facilities will be positive due to a low demand for public education. I do not have access to social status data but I do find that the average mathematics, and English reading scores of enrolled children in the sample are significantly lower for public school going children than for students of private schools (See Appendix B,

Table 6b).

However, I find school facilities do matter in private schooling. Higher private facilities 4, that is the teacher qualifications in private schools, leads to a reduction in proportion of dropouts in a village by 1.14 percent. Notice that the size of this effect is larger than the combined effect of *government facility 1, 3 and 4.* This result, and the contrast for the result for public schools are not surprising. While public education is most free of cost, parents who send their children to private schools have already made the decision to bear higher costs to a perceived improvement in teacher quality and attention. The expected return from these costs will be realized in the long term, for instance, when the educated child is able to enter the labor force as an adult. Quality of the education is tied directly to these expected returns and hence, higher quality reduces the likelihood that the child will be taken out of school. When talking about the controls, presence of better health facilities significantly reduces the proportion of dropouts.

However it is possible for these results to be biased by villages that have no dropouts at all. I restrict the sample to where there are at least some dropouts and run the second regression to make sure outliers do not drive the results (Column 2). Except for the effect of government facilities 2, which is now significant, the results remain qualitatively the same for proportion of dropouts at primary level.

TABLE 6: VILLAGE LEVEL ANALYSIS

Variables	OLS- Primary (1)	OLS- Primary (After restricting to non- zero proportion drop outs) (2)
Government facilities 1	0.000814**	0.00105**
	(0.000398)	(0.000474)
Government facilities 2	-0.000604	-0.00181**
	(0.000679)	(0.000827)
Government facilities 3	0.00161*	0.00214**
	(0.000835)	(0.00103)
Government facilities 4	0.00514**	0.00445
	(0.00249)	(0.00281)
Privatedum*facilities 1	0.00068	0.00014
	(0.000618)	(0.000681)
Privatedum*facilities 2	0.000729	0.000891
	(0.000902)	(0.00102)
Privatedum*facilities 3	-0.000653	-0.000492
	(0.000831)	(0.00099)
Privatedum*facilities 4	-0.0114***	-0.0139***
	(0.00359)	(0.00399)
Constant	0.0510***	0.07148***
	(0.0055)	(0.0064)
Controls	Included	Included
Observations	193,393	133,023
R-squared	0.255	0.2661

Note: The first equation shows the impact of the given X variables on the proportion of dropouts in a village at the primary (1) level. Column 2 shows the impact of the X variables on the proportion of dropouts in a village after restricting the sample to those where there are at least some dropouts, at the primary level. Controls included are availability of health, computer and carpeted roads in the village along with number of government and private schools. P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. District and time fixed effects are catered for in this regression.

As a secondary analysis, I carry out an investigation at the household level analysis using a probit model. Table 7 shows that at the household level, private facilities 4, is a measure of teacher qualification if the quality available in a private school given a private school exits in that village, decreases the likelihood of a child in the household dropping out from primary school.

Results for other factors controlled in the regression are not shown in the tables above but are consistent with literature. Parent's education for example decreases the probability of an individual to drop out of school (Shahnaz 2001; Qureshi 2012). Given the data restrictions, as a supplementary analysis we also check for robustness of household level determinants by limiting the sample to similar villages using Propensity Score Matching (PSM). A discussion of this estimation and the results is provided in Appendix B, Table 7a.

TABLE 7: HOUSEHOLD LEVEL ANALYSIS

Variables	Probit- Primary
Government facilities 1	0.00319
	(0.00747)
Government facilities 2	-0.00665
	(0.016)
Government facilities 3	-0.0133
	(0.017)
Government facilities 4	-0.0164
	(0.0534)
Privatedum*facilities 1	0.000621
	(0.0132)
Privatedum*facilities 2	0.00496
	(0.0179)
Privatedum*facilities 3	-0.0087735
	(0.01997)
Privatedum*facilities 4	-0.134*
	(0.0764)
Constant	-1.880***
	(0.376)
Controls	Included
Observations	81,903
Pseudo R- squared	0.0899

Note: The table shows the household level analysis to see whether the impact of household level variables changes for whether a child drops out from a school or not. The controls included in the regression are gender, mother's education, father's education and asset index. Robust standard errors are in parentheses. P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1. Village, district and time fixed effects are catered for in this regression.

5.2 Research Question 2- Differences in Primary and Secondary Drop outs

The third research questions sets out to measure the difference in effects of school facilities on primary and secondary school dropouts. I explore these differences at both the household and the village level. I compare the statistical significance of these differences by comparing coefficients across Seeming Unrelated Estimations (SUEST)[10].

Table 8 shows the factors that impact proportion of dropouts in a village at the primary and secondary level. Column 2 shows that unlike the results from the proportion of primary school dropouts in a village; better government facilities 2 (walls, electricity, water, toilets) and 3 (class materials) reduce the proportion of dropouts in the village by 0.0258% and 0.0206% respectively. An improvement in government facilities 1 (libraries, internet, labs, etc.) and 4 (teacher qualification) increasing the proportion of dropouts in a village by 0.0255% and 0.102% respectively. Improved facilities 2 in private schools at the secondary level decreases the proportion of dropouts in that village by 0.0645 percent while private facilities 1 and 3 increase the proportion of drop outs by 0.032% and 0.0471% respectively. Note, that there is no statistical difference in the effect of private facilities 1 and 3 between the primary and secondary level. Notice also that the effect of these facilities is also comparatively small.

These results show that effects of government facilities 3 and private facilities 4 are significant different at the primary and secondary level. Specifically, where teacher qualifications are the dominant factor that can reduce dropouts at the primary level, quality of public school class facilities are much more important at the

[10] P-value from SUEST tests are from testing if the difference between primary and secondary coefficient is statistically different. So if it is significant difference, then we can say something about the difference between primary and secondary effects.

secondary level. These results provide a direction for policy – parents look for qualified teachers when it comes to primary schooling decisions and/or qualified teacher are better able to retain students at the primary level. On the other hand, at the secondary level, parents give greater value to the teaching tools available at the secondary level. [11] Once students graduate the primary level and opt to continue to the secondary level, teaching tools have a greater impact on decreasing dropout ratios. Further, while the quality of these facilities were unable

Within the control variables not shown in the table, we find that if there are computer facilities available in a village, the proportion of secondary level dropouts in that village will decrease by 0.204 percent, which is different from the insignificant effect at the primary level. As far as the control variables are concerned, I find that not only do the school facilities have an impact on whether a child drops out or not but also the facilities available in the village can influence dropouts. This result is not surprising given the while nature of schoolwork at the secondary level may require the use of a computer, at the primary level there is less of a need. Kaur (2013) found that in India, presence of facilities like computer centers and carpeted roads in a village helped reduce dropouts as students could use these facilities to enhance their learning outcomes.

Overall, a comparison of coefficient size at the two levels show greater elasticity at the primary level than at the secondary level. This is expected as the students in the secondary level are a selected sample of students who have indicated higher demand, and perhaps some satisfaction for available education facilities, by

[11] These results are robust to the restriction of sample to villages with a non-zero dropout proportions (See Appendix B, Table 8a).

opting to continue education. As a result, while this demand may still be responsive to school facilities, it is less so than the demand at the primary level.

TABLE 8: VILLAGE LEVEL ANALYSIS (SUEST)

Variables	OLS-Primary (1)	OLS-Secondary (2)	P-values (3)
Government facilities 1	0.000814**	0.000255***	0.188
	(0.000398)	(0.000022)	
Government facilities 2	-0.000604	-0.000258***	0.613
	(0.000679)	(0.0000354)	
Government facilities 3	0.00161*	-0.000206***	0.033**
	(0.000835)	(0.0000256)	
Government facilities 4	0.00514**	0.00102***	0.108
	(0.00249)	(0.00015)	
Privatedum*facilities 1	0.00068	0.000322***	0.582
	(0.000618)	(0.0000386)	
Privatedum*facilities 2	0.000729	-0.000645***	0.149
	(0.000902)	(0.0000502)	
Privatedum*facilities 3	-0.000653	0.000471***	0.256
	(0.000831)	(0.0000518)	
Privatedum*facilities 4	-0.0114***	-0.0000706	0.003***
	(0.00359)	(0.00021)	
Constant	0.0510***	0.0146***	
	(0.0055)	(0.00102)	
Controls	Included	Included	
Observations	193,393	187,795	
R- squared	0.255	0.12	

Note: Column 1 and 2 show the impact of the given X variables on the proportion of dropouts in a village at the primary (1) and secondary (2) level. . Controls included are availability of health, computer and carpeted roads in the village. Robust standard errors are in parentheses. All errors are clustered at the village level and regressions control for time and district fixed effects. . P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1. Here, p value is calculated using the SUEST command that compared the regressions at both primary and secondary level to show which variable was more significant at the primary or secondary level. If p value is significant, that means that the particular variable is more significant at the primary level as compared to the secondary level.

6. Conclusion and Policy recommendations

The paper is aimed at exploring the impact of attributes of school facilities on primary school dropouts out of a sample of 140,861 dropouts with 30,448 leaving school at the primary level in Pakistan. It uses Annual Status of Education Report (ASER) data set for the year's 2013- 2015 and uses OLS to study the effect of school facilities on village and household level dropouts. The study further looks into the impact of school facilities (both public and private schools) on proportion of dropouts in a village along with examining differences in determinants of dropouts at the primary and secondary.

Results show that contrary to conventional wisdom, government facilities such as libraries, labs, internet, class teaching tools and qualifications of teachers (government facilities 1, 3 and 4) are unable to reduce the proportion of primary level dropouts in a village. Second, qualifications of teachers in primary private schools, on the other hand, do reduce the proportion of dropouts at the primary level. Further, this effect seems to be larger than the combined effects of other facilities. Similar results hold at the primary level using dropouts at the household level. Third, when comparing the difference in primary and secondary school dropouts at the village level, factors such as class teaching tools and materials (government facilities 3) significantly reduce drop outs at the secondary level and this effect is statistically different from the effect at the primary level. Effect of the private teacher qualifications is also significantly different and higher at the primary level than at the secondary level.

There are various implications for policy and participation by the government and non-governmental organizations (NGO's) given the results that have been found.

It is evident that education is extremely important for the growth of an economy. The effect of one private sector factor, teacher quality and qualification, is stronger than the combined effect of government school facilities at the primary level. These results emphasize the need to invest in teacher quality over and above investment in infrastructure for public schools.

The role of quality of school facilities and teacher quality is well recognized by stakeholders. Some private NGOs are independently working to improve the quality of education, mostly at the private level. For instance, Kashf Foundation has already provided access to school credit, along with management and teacher development training sessions to private school owners under the Kashf School Finance Program[12] in recognition of the importance of the quality of teachers and school facilities.

[12] http://kashf.org/wp-content/uploads/2013/04/KF-Pronote-Vol1-Jun15.pdf

7. References

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8. Appendix

Appendix A

Figure 1: Education Expenditure as % of GDP							
2001/02	**2005/06**	**2007/08**	**2008/09**	**2009/10**	**2010/11**	**2011/12**	**2012/13**
1.5	1.9	1.8	1.9	1.7	1.8	1.9	2.1

Source: Ministry of Finance; Government of Pakistan (2001-13)

Figure 2: Survival Rate to Grade 5 from 2001-02 to 2012-13 by Province				
Province	**2001-02**	**2005-06**	**2009-10**	**2012-2013**
Balochistan	40.70%	39.60%	50.50%	48.90%
FATA	78.50%	28.20%	52.60%	46.30%
GB	79.20%	93.10%	52.40%	75.80%
ICT	92.00%	71.10%	68.30%	81.60%
KP	73.90%	49.60%	63.60%	79.60%
Punjab	60.30%	51.70%	57.00%	70.20%
Sindh	44.50%	31.50%	52.30%	51.10%
AJ&K	96.70%	93.00%	76.80%	68.60%
Pakistan	**59.00%**	**47.80%**	**57.00%**	**66.80%**

Source: NEMIS (2001-13)

Table 1:	**% Children in different types of schools**				**% Out-of-school**		
Age group	**Government**	**Non-state providers**			**Never enrolled**	**Drop- out**	**Total**
		Private	**Madrasah**	**Others**			
6-10	63.4	17.9	1.6	0.8	14.2	2.1	100
11-13	61.6	17.4	1.6	0.5	11.5	7.4	100
14 - 16	56.2	14.5	1.6	0.3	13.4	14.1	100
6-16	61.5	17.1	1.6	0.6	13.4	5.8	100
Total	**80.8**				**19.2**		**100**

Source: Annual Status of Education Report, 2015

Table 2: National and Provincial Gross Enrollment Rate						
Province/Area	**2013-2014**			**2014-2015**		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**
Pakistan	98%	81%	90%	97%	81%	89%
Punjab	106%	94%	100%	101%	92%	97%
Sindh	85%	67%	76%	87%	70%	79%
Khyber Pakhtunkhwa	102%	76%	89%	102%	77%	90%
Balochistan	83%	49%	67%	87%	51%	71%

Source: Pakistan Social and Living Standards Measurement Survey, 2014-15

Appendix B

TABLE 3a: PRIMARY LEVEL- SCHOOL VARIABLES (DESCRIPTIVE STATISTICS)

Variables	Overall	Government	Private	p-value
School Facilities				
Drinking water	0.7826807	0.6969954	0.9007236	0.000***
Boundary wall	0.7548107	0.6924981	0.8403781	0.000***
Toilet	0.7266509	0.6113598	0.8854288	0.000***
Library books	0.299937	0.2445758	0.3759206	0.000***
See library books	0.2957798	0.2450788	0.3655798	0.000***
Playground	0.4596971	0.4394022	0.4876272	0.000***
Electricity	0.7356338	0.65767	0.8580368	0.000***
Laboratory	0.2108352	0.1728895	0.2630619	0.000***
Computer	0.1885023	0.1234346	0.2779092	0.000***
Internet	0.1225226	0.075613	0.1870863	0.000***
Teacher Quality				
Total appointed teachers	9.460667	8.356077	10.9945	0.000***
Teachers education-graduate	3.172058	2.568078	4.004408	0.000***
Teachers education-masters	2.640793	2.755407	2.482842	0.000***
Teachers education-postgraduate	0.0920083	0.1014316	0.0790219	0.0037***
Class Indicators				
Class blackboard	0.8847106	0.8886664	0.8795382	0.0486**
Class books	0.8437993	0.7665533	0.944136	0.000***
Class supplementary material	0.7623392	0.6981532	0.845441	0.000***

Note: The table represents the individual variables that are used for creating the index for school facilities, teacher quality and class level indicators at the primary level. In order to see whether there is a significant difference between the average values of all school variables for government and private schools, t test is used. diff = mean(0) - mean(1) Ho: diff = 0 while Ha: diff != 0 i.e Pr (|T| > |t|). P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1 thereby implying that there is a significant difference between the average values of the school variables between government and private school.

TABLE 3b: SECONDARY LEVEL- SCHOOL VARIABLES (DESCRIPTIVE STATISTICS)

Variables	Overall	Government	Private	p-value
School Facilities				
Drinking water	0.759495	0.6969954	0.9042763	0.000***
Boundary wall	0.7365324	0.6924981	0.8382773	0.000***
Toilet	0.6952022	0.6113598	0.889485	0.000***
Library books	0.2857686	0.2445758	0.3809524	0.000***
See library books	0.2819965	0.2450788	0.3675695	0.000***
Playground	0.4555042	0.4394022	0.4927902	0.000***
Electricity	0.7168298	0.65767	0.8578019	0.000***
Laboratory	0.20171	0.1728895	0.2685219	0.000***
Computer	0.1705397	0.1234346	0.2797025	0.000***
Internet	0.1114664	0.075613	0.1947957	0.000***
Teacher Quality				
Total appointed teachers	9.132019	8.356077	10.93934	0.000***
Teachers education-graduate	2.993566	2.568078	3.978322	0.000***
Teachers education-masters	2.674093	2.755407	2.485901	0.0001***
Teachers education-postgraduate	0.0965649	0.1014316	0.0853014	0.0838*
Class Indicators				
Class blackboard	0.9121682	0.9293792	0.8870554	0.000***
Class books	0.8808148	0.837851	0.9430492	0.000***
Class supplementary material	0.8170077	0.7978437	0.8448399	0.000***

Note: The table represents the individual variables that are used for creating the index for school facilities, teacher quality and class level indicators at the secondary level. In order to see whether there is a significant difference between the average values of all school variables for government and private schools, t test is used. diff = mean(0) - mean(1) Ho: diff = 0 while Ha: diff != 0 i.e. Pr(|T| > |t|). P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1 thereby implying that there is a significant difference between the average values of the school variables between government and private school.

TABLE 4a: PRIMARY LEVEL- DESCRIPTIVE STATISTICS

Variables	Mean	Mean (Enrolled)	Mean (Drop outs)	p-value
Female	0.3730548	0.3683264	0.4624606	0.000***
Mothers years of education	8.307039	8.341393	6.146083	0.000***
Fathers years of education	9.631265	9.696718	7.660394	0.000***
Asset Index	0.0066496	-0.0429397	0.5746824	0.000***
Government facilities 1	-0.0232228	-0.0524026	0.3256889	0.000***
Government facilities 2	-0.0531387	-0.0923306	0.3994526	0.000***
Government class indicators	-0.0308508	-0.0532113	0.2167099	0.000***
Government teacher qualification	0.6672218	0.6756688	0.5584735	0.000***
Private facilities 1	0.0020428	-0.0060385	0.2297529	0.000***
Private facilities 2	-0.0024871	-0.0049733	0.0387495	0.0083***
Private class indicators	-0.0086826	-0.0067727	-0.0493229	0.0017***
Private teacher qualification	0.6891666	0.6902449	0.6477413	0.000***
Health facilities available in village	0.1587045	0.5034764	0.4036911	0.000***
Computer facilities available in village	0.1272662	0.1329831	0.0658085	0.000***
Carpeted roads available in a village	0.6812174	0.6914016	0.5897261	0.000***

Note: In order to see whether there is a significant difference between the average values of all variables for those who are enrolled and those who drop out, t test is used. diff = mean(0) - mean(1) Ho: diff = 0 while Ha: diff != 0 i.e Pr(|T| > |t|). P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1 thereby implying that there is a significant difference between the average values of the variables between those who are enrolled and those who drop out.

TABLE 4b: SECONDARY LEVEL- DESCRIPTIVE STATISTICS

Variables	Mean	Mean (Enrolled)	Mean (Drop outs)	p-value
Female	0.3687945	0.3683052	0.3958513	0.000***
Mothers years of education	8.425614	8.438068	6.881937	0.000***
Fathers years of education	9.726269	9.753098	8.477558	0.000***
Asset Index	-0.0177655	-0.0428404	0.0289626	0.000***
Government facilities 1	-0.0380896	-0.0438063	-0.0330236	0.5567
Government facilities 2	-0.0572324	-0.0674299	-0.0914552	0.1218
Government class indicators	0.0563791	0.0577478	0.0699378	0.3658
Government teacher qualification	0.6617166	0.6632959	0.6574923	0.0304**
Private facilities 1	-0.0415078	-0.0396955	0.0435329	0.0012
Private facilities 2	-0.0945013	-0.092728	-0.0791048	0.5259
Private class indicators	-0.0271905	-0.0264039	0.0066553	0.1092
Private teacher qualification	0.6999665	0.7007043	0.6942149	0.2068
Health facilities available in village	0.5059903	0.5093346	0.4974314	0.0240**
Computer facilities available in village	0.1175396	0.1193473	0.1032087	0.000***
Carpeted roads available in a village	0.6750637	0.6787704	0.6857956	0.154

Note: In order to see whether there is a significant difference between the average values of all variables for those who are enrolled and those who drop out, t test is used. diff = mean(0) - mean(1); Ho: diff = 0 while Ha: diff != 0 i.e Pr(|T| > |t|). P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1 thereby implying that there is a significant difference between the average values of the variables between those who are enrolled and those who drop out.

TABLE 5a: PRIMARY VILLAGE LEVEL (SUMMARY STATISTICS)

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Government facilities 1	601,069	-0.0232228	1.821897	-5.409605	1.318938
Government facilities 2	601,069	-0.0531387	1.544446	-1.993323	3.228237
Government class indicators	601,069	-0.0308508	1.204569	-0.8344622	4.246753
Government teacher qualification	596,118	0.5828057	0.3416519	0	1
Health facilities available in a village to household	545,750	0.493158	0.4999536	0	1
Computer facilities available in a village to household	540,607	0.1272662	0.3332712	0	1
Carpeted roads available in a village to household	543,662	0.6812174	0.466005	0	1
Private facilities 1[13]	274,108	0.0020428	1.655175	-3.643302	2.539287
Private facilities 2	274,108	-0.0024871	1.486838	-4.545801	5.795715
Private class indicators	274,108	-0.0086826	1.220535	-3.657558	6.468876
Private teacher qualification	271,486	0.6891666	0.3314177	0	1

Note: The table shows summary statistics for all the village variables that have an impact on the proportion of school dropouts at the primary level in a village.

[13] The total observations for the private schools is much lesser than the observations for the government schools because the data set comprises of one government school from each village while the private school selection was optional from each village mainly because there are fewer private schools as compared to government schools.

TABLE 5b: SECONDARY VILLAGE LEVEL (SUMMARY STATISTICS)

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Government facilities 1	577,214	-0.0380896	1.811193	-5.409605	1.318938
Government facilities 2	577,214	-0.0572324	1.54042	-1.993323	3.228237
Government class indicators	577,214	0.0563791	1.330003	-0.3886941	10.41069
Government teacher qualification	572,366	0.5886336	0.3386552	0	1
Health facilities available in a village to household	531,945	0.5059903	0.4999646	0	1
Computer facilities available in a village to household	526,580	0.1175396	0.3220625	0	1
Carpeted roads available in a village to household	530,227	0.6750637	0.4683515	0	1
Private facilities 1	262,205	-0.0415078	1.652305	-3.643302	2.539287
Private facilities 2	262,205	-0.0945013	1.376644	-4.545801	5.795715
Private class indicators	262,205	-0.0271905	1.321844	-1.419584	9.258732
Private teacher qualification	259,618	0.6999665	0.3273566	0	1

Note: The table shows summary statistics for all the village variables that have an impact on the proportion of school dropouts at the secondary level in a village.

TABLE 6a: VILLAGE LEVEL ANALYSIS (WEALTH)

Variables	Poor	Rich
Government facilities 1	0.000476	0.00164*
	(0.000429)	(0.000952)
Government facilities 2	0.000373	-0.00378**
	(0.000668)	(0.00154)
Government facilities 3	0.00128	0.00227
	(0.000916)	(0.00173)
Government facilities 4	0.0032	0.00388
	(0.00256)	(0.00577)
Privatedum*facilities 1	0.000793	0.00071
	(0.00058)	(0.00178)
Privatedum*facilities 2	-0.000368	0.00168
	(0.000788)	(0.00187)
Privatedum*facilities 3	-0.000002	-0.00112
	(0.000761)	(0.00202)
Privatedum*facilities 4	-0.00348	-0.0246***
	(0.00333)	(0.00829)
Constant	0.0453***	0.0548***
	(0.00587)	(0.0119)
Observations	129,157	64,236
R-squared	0.319	0.306

Note: Column 1 and 2 show the impact of variables on proportion of dropouts in a village for the poor and rich respectively. Poor can be defined as those villages where the average assets of the household are less than -0.298 – the median value of household assets in the sample. Controls included are availability of health, computer and carpeted roads in the village along with number of government and private schools. Robust standard errors are in parentheses. P value is a measure of significance. It is significant if: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

TABLE 6b: COMPARISON OF AVERAGE TEST SCORES

Variables	Mean (Government)	Mean (Private)	p value
2015			
English Reading Score	3.3654	3.8018	0.0000***
Math Score	3.4227	3.7067	0.0000***
2014			
English Reading Score	3.3872	3.5262	0.0000***
Math Score	3.4118	3.4362	0.0004***
2013			
English Reading Score	3.27824	3.7526	0.0000***
Math Score	3.3496	3.59	0.0000***

Note: The table shows comparison of average test score for English reading and math in both government and private schools for the years 2015, 2014 and 2013.In order to see whether there is a significant difference between the average values of all scores for government and private schools, t test is used. diff = mean(0) - mean(1) Ho: diff = 0 while Ha: diff != 0 i.e Pr(|T| > |t|). P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1 thereby implying that there is a significant difference between the average values of the scores between government and private school.

Robustness of household level regression

Children could drop out of school because of various reasons other than just school facilities that are not included in the regressions. As a robustness check, we re-run the regressions on a restricted sample of `similar' villages. Villages that are similar on observables are likely to be similar in unobserved techniques. We use nearest neighbor propensity score matching technique to match villages on a host of village level observables including government and private school and teacher characteristics and number of government and private schools available in a village. The results show that the impact of household variables on school dropouts remains the qualitatively similar even if when we re-run the regression on a restricted sample of matched villages.

TABLE 7a: HOUSEHOLD LEVEL ANALYSIS- ROBUSTNESS

Variables	Probit- Primary
Female	0.0478*
	(0.027)
Mothers years of education	-0.0489***
	(0.00536)
Fathers years of education	-0.0504***
	(0.00516)
Asset Index	0.0826***
	(0.0188)
Constant	-1.242***
	(0.413)
Observations	67,954
Pseudo R- squared	0.0887

Note: The table shows the robustness check using PSM. Similar villages are selected and the regression for household level variables that have an impact on whether a child drop outs from a school or not is carried out. Robust standard errors are in parentheses. All errors are clustered at the household level and regressions control for time and district fixed effects. P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1

TABLE 8a: VILLAGE LEVEL ANALYSIS (SUEST)

Variables	OLS- Primary (After restricting to non- zero proportion drop outs) (1)	OLS- Secondary (After restricting to non-zero proportion drop outs) (2)	P-values (3)
Government facilities 1	0.00105***	0.000458***	0.2529
	(0.0000699)	(0.0000216)	
Government facilities 2	-0.00181***	-0.000221***	0.0644*
	(0.000126)	(0.0000347)	
Government facilities 3	0.00214***	-0.000247***	0.0245**
	(0.000139)	(0.0000255)	
Government facilities 4	0.00445***	0.00129***	0.2812
	(0.000461)	(0.000147)	
Privatedum*facilities 1	0.00014	0.000476***	0.6783
	(0.000116)	(0.0000422)	
Privatedum*facilities 2	0.000891***	0.000628***	0.8169
	(0.000151)	(0.0000601)	
Privatedum*facilities 3	-0.000492***	0.000421***	0.4788
	(0.000161)	(0.0000612)	
Privatedum*facilities 4	-0.0139***	0.00271***	0.0004***
	(0.000629)	(0.000223)	
Constant	0.0715***	0.0113***	
	(0.00354)	(0.000927)	
Observations	133,023	159,506	
R-squared	0.266	0.24	

Note: Column 1 and 2 show the impact of the X variables on the proportion of dropouts in a village after restricting the sample to those where there are at least some dropouts, at the primary and secondary level respectively. Robust standard errors are in parentheses. P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1. Here, p value is calculated using the SUEST command that compared the regressions at both primary and secondary level to show which variable was more significant at the primary or secondary level. If p value is significant, that means that the particular variable is more significant at the primary level as compared to the secondary level.

Appendix C

i) After dropping observations where teacher quality is >1

VILLAGE LEVEL ANALYSIS

Variables	OLS-Primary (1)	OLS-Secondary (2)	p-value	OLS-Primary (After restricting proportion drop outs) (3)	OLS-Secondary (After restricting proportion drop outs) (4)	p-value
Government facilities 1	0.000673	0.000339	0.5617	0.000709	0.00119**	0.5060
	(0.000519)	(0.000363)		(0.000596)	(0.000464)	
Government facilities 2	0.000444	0.000117	0.7619	-0.000324	-0.000539	0.8853
	(0.00108)	(0.000618)		(0.00132)	(0.000854)	
Government facilities 3	0.00156	-0.000153	0.2346	0.00255*	0.000412	0.2284
	(0.00135)	(0.000512)		(0.00148)	(0.000905)	
Government facilities 4	0.00324	0.00178	0.7014	0.00212	0.00207	0.9910
	(0.00358)	(0.00224)		(0.00392)	(0.00281)	
Privatedum*facilities 1	0.000628	0.000371	0.7194	0.000498	0.000396	0.9120
	(0.000689)	(0.000436)		(0.00078)	(0.000583)	
Privatedum*facilities 2	0.000479	-0.000557	0.3113	0.000511	-0.0000168	0.6771
	(0.000972)	(0.000425)		(0.00116)	(0.000616)	
Privatedum*facilities 3	-0.000508	0.000784	0.2106	-0.000386	0.00053	0.5085
	(0.000864)	(0.000652)		(0.00106)	(0.000981)	
Privatedum*facilities 4	-0.0131***	0.000864	0.0010***	-0.0162***	0.00678**	0.0000****
	(0.00399)	(0.00235)		(0.00458)	(0.00319)	
Constant	0.0631***	0.0144***		0.0722***	0.0110***	
	(0.00685)	(0.0023)		(0.00732)	(0.00298)	
Observations	87,516	84,645		65,130	56,374	
R-squared	0.329	0.154		0.327	0.275	

Note: The first two equations show the impact of the given X variables on the proportion of dropouts in a village at the primary (1) and secondary (2) level. Column 3 and 4 show the impact of the X variables on the proportion of dropouts in a village after restricting the sample to those where there are at least some dropouts, at the primary and secondary level respectively. Controls included are availability of health, computer and carpeted roads in the village along with number of government and private schools. Robust standard errors are in parentheses. P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1. Here, p value is calculated using the SUEST command that compared the regressions at both primary and secondary level to show which variable was more significant at the primary or secondary level. If p value is significant, that means that the particular variable is more significant at the primary level as compared to the secondary level.

In the village level analysis, only private facilities 4 have a significant impact on proportion of dropouts at the village level (Column 1). No factor is significant at the secondary level (Column 2). The difference between coefficients across the two equations is significant for only private facilities 4. After restricting the sample in the regression to just where there are at least some dropouts, different results are computed for both primary and secondary level dropouts. At the primary level, only private facilities 4 is significant (Column 3) while at the secondary level, government facilities 1 and private facilities 4 are significant (Column 4). The difference between coefficients across the two equations is significant for only private facilities 4.

ii) After dropping the problematic teacher qualification variables.

VILLAGE LEVEL ANALYSIS

Variables	OLS-Primary (1)	OLS-Secondary (2)	p-value	OLS-Primary (After restricting proportion drop outs) (3)	OLS-Secondary (After restricting proportion drop outs) (4)	p-value
Government facilities 1	0.000813	0.00107**	0.3986	0.000893	0.00107**	0.8145
	(0.000524)	(0.000473)		(0.000606)	(0.000473)	
Government facilities 2	0.000549	-0.00059	0.6819	-0.000319	-0.00059	0.8572
	(0.00109)	(0.000859)		(0.00133)	(0.000859)	
Government facilities 3	0.00159	0.000216	0.2202	0.00253*	0.000216	0.1943
	(0.00135)	(0.000923)		(0.00148)	(0.000923)	
Government facilities 4	0.00248	0.00228	0.8650	0.00117	0.00228	0.8119
	(0.00364)	(0.00285)		(0.004)	(0.00285)	
Privatedum*facilities 1	0.000996	0.000245	0.3709	0.000991	0.000245	0.4164
	(0.000684)	(0.000593)		(0.000767)	(0.000593)	
Privatedum*facilities 2	0.000611	-0.0000441	0.2590	0.000652	-0.0000441	0.5895
	(0.000989)	(0.000616)		(0.00118)	(0.000616)	
Privatedum*facilities 3	-0.000494	0.000515	0.2244	-0.000365	0.000515	0.5342
	(0.00088)	(0.001)		(0.00108)	(0.001)	
Constant	0.0586***	0.0148***		0.0669***	0.0148***	
	(0.0062)	(0.00278)		-0.0072	(0.00278)	
Observations	87,516	56,374		65,130	56,374	
R-squared	0.325	0.272		0.321	0.272	

Note: The first two equations show the impact of the given X variables on the proportion of dropouts in a village at the primary (1) and secondary (2) level. Column 3 and 4 show the impact of the X variables on the proportion of dropouts in a village after restricting the sample to those where there are at least some dropouts, at the primary and secondary level respectively. Controls included are availability of health, computer and carpeted roads in the village along with number of government and private schools. Robust standard errors are in parentheses. Robust standard errors are in parentheses. P value is a measure of significance. It is significant if: *** p<0.01, ** p<0.05, * p<0.1. Here, p value is calculated using the suest command that compared the regressions at both primary and secondary level to show which variable was more significant at the primary or secondary level. If p value is significant, that means that the particular variable is more significant at the primary level as compared to the secondary level.

In the village level analysis, no factor has a significant impact on proportion of dropouts at the village level (Column 1). At the secondary level, only government facilities 1 is significant (Column 2). The difference between coefficients across the

two equations is insignificant for all factors. After restricting the sample in the regression to just where there are at least some dropouts, different results are computed for both primary and secondary level dropouts. At the primary level, only government facilities 3 is significant (Column 3) while at the secondary level, only government facilities 4 is significant (Column 4). The difference between coefficients across the two equations not significant for any factor.

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