MEASURING GENDER DISPARITY IN ENROLLMENT RATES, TYPE OF SCHOOL AND YEARS OF EDUCATION OF CHILDREN IN PAKISTAN

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ABSTRACT

Gender bias in developing countries like Pakistan restricts educational opportunities for girls in comparison to boys. This thesis attempts to determine the role of gender disparity in enrollments of children falling in the age bracket of 5 years-18 years across Pakistan. Using the data from PSLM 2010-2011, the study utilizes the Oaxaca decomposition along with Probit estimation method to measure gender gap through explained and unexplained variation in overall school enrollments across Pakistan and enrollments in public vs. private schools for three levels of education: primary, middle/secondary and higher secondary. Moreover, data on maximum years of education achieved is used to further justify presence of gender bias through Oaxaca-OLS combination for individuals between ages 18 years to 30 years. The results interestingly show that strong pro-male bias exists only in overall enrollment rates however, disaggregation of enrollments at private/public school choice and across three levels of educations indicate strong pro-female preference in the study.

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LIST OF ABBREVIATIONS

GAP	Gender gap
GPI	Gender Parity Index
HDI	Human Development Index
MDG	Millennium Development Goals
OLS	Ordinary Least Squares
UNDP	United Nations Development Program

INTRODUCTION

Education is an important medium for enhancing socio-economic growth and human capital development of a country. More importantly, education further instigates employment opportunities, appropriate skill learning and chances of better standard of living. Since human capital is defined as a component of development process, as a result education is incorporated into the Human Development Index to gauge development progress of countries.

The Human Development Index (HDI) takes into account three basic measures of human development, mainly being a healthy life, access to knowledge and a reasonable standard of living. Since human capital is defined as a component of development process, education is incorporated into the Human Development Index to gauge development progress of countries. In the year 2011, Pakistan had a Human Development Index value of 0.504 and so was ranked 145 out of 187 countries (United Nations Development Program, 2011).

According to the Economic Survey of Pakistan (2011) Pakistan's literacy rate is 57.7%. In comparison to neighboring countries, Pakistan has one of the lowest literacy rates. According to the United Nations Development Program Report 2011, China has a literacy rate of 96%, India's literacy rate is 74.04% and Iran has a literacy rate of 91% whereas Afghanistan has a literacy rate of 28%. In the case of Pakistan, from the overall literacy rate, male literacy is 69.5% and female literacy is 45.2%. On the other hand, literacy in the urban areas is 73.2% and in the rural areas it is 49.2%. Province wise literacy is another important aspect to analyze as it too shows the regional disparities in education of Pakistan. For instance, Punjab has the highest literacy rate, that of 59.6%, followed by Sindh, 58.2%, then Balochistan (51.5%) and lastly, Khyber Pakhtunkhwa (50.9%). Moreover, it is important to note that education expenditure has a minimal contribution to Pakistan's total expenditure. The

education expenditure as a proportion of GDP was reported to be 2.7% for year 2009 (CIA-The World Factbook).

Due to the low and stagnant literacy rate in Pakistan, it is imperative to focus on education. As per UN Statistics Division, the net enrollment rate for primary education in Pakistan shows that enrollment at the primary level remains significantly low and fairly stagnant. In addition Pakistan's female to male ratio of enrollment for primary education is 0.84 and so it is ranked 131 out of 135 countries (UNICEF, Global Gender Report 2011). As far as enrollment rates at secondary level are concerned in Pakistan, they have increased by a small margin from 27% in 2003 to 33% in 2010. However, even with this increase the female to male ratio of enrollment at secondary level of education is 0.79 and accordingly Pakistan is ranked at 121 out of 132 countries (UNICEF, Global Gender Report 2011). Moreover, the statistics regarding enrollment of higher level (grade 9-12) of education have increased only by 3% (from 23% in 2003 to 26% 2011). Although in 2011, female to male enrollment ratio for higher education was 0.85 but Pakistan was still ranked 99 out 134 countries (Appendix A). As far as gross enrollment is concerned, primary school enrollment in Pakistan has increased vaguely from 91% to 92% from years 2008-2009 and 2010-2011 respectively. The secondary level schools in Pakistan register almost a constant enrollment rate of 54% for year 2010-2011. On the contrary, higher education (Matric level) education has increased from 54% in year 2008-2009 to 57% in year 2010-2011. Considering enrollment rates in different types of institutions (public versus private), PSLM signifies that government schools have faced a fall in primary enrollment rates. Likewise, overall enrollment rates of public schools have also decreased from 70% in year 2008-1009 up to 68% in year 2010-2011 (PSLM Survey, 2010-2011).

As far as specific statistics are concerned, more than 18 million children are between the ages 5 to 9 years out of which only 11.8 million attend school and over 6 million have never been to school. Furthermore of these 11.8 million children, half drop-out before completion of five years of schooling and more than half of the drop-outs are girls (UN Report, 2000). In case of Pakistan with an approximate population growth rate of 2.1% per year, it has been anticipated that influx of around 3.4 million children are added to the population cohort, of whom only half are fortunate enough to benefit from education while the rest contribute to the ever increasing dropout rate in Pakistan with females registering a figure of 66% out of school children.

Internationally in UNDP'S gender based development index, Pakistan was ranked 144 out of 175 countries back in 2002. Moreover the Gender Parity Index has depreciated from where Pakistan was ranked in 1999 at 116 out of 174 countries and for year 2008 at 127 out of 130 countries, indicating the threatening level of gender imbalances that exist in the country. As far as specific sub division of gender gap index in terms of education attainment is concerned it was categorized as 123 out of 130 countries in 2008. Furthermore, a cross-country study on the impact of missing the MDG target on gender equality by (Abu-Ghaida, Klasen, 2004) estimated that countries like Pakistan, which have not achieved the target of equal education by 2005, are at risk of losing an average of 0.4% in annual economic growth between 2005 and 2015 if they fail to catch up.

The critical focus of my study is to measure equitable access to education which acts as a basic source of development for sustaining economic growth and progress in any country. Since gender differences in household educational outcomes regarding enrollment into public or private institutions, highest level of education attainment and children's level of understanding would be the main focus of the study, it is important to establish that gender inequality is a core determinant of education. Due to gender bias in developing countries like Pakistan, females

experience marginalized access to education as parents expect lower future economic returns from their education compared to education of male members present in the household.

The aim of this thesis is to explore how gender differences within a household impact decisions that determine children's access to education. This would help in establishing that whether gender bias exists in promoting equitable access to education in a developing country like Pakistan, or is it that lack of resources in form of proper educational systems and effective allocation of public expenditures have stagnated growth of such sectors.

The paper is organized as follows: the introduction section is followed by the literature review. Section 2 covers the theoretical framework of the relationship between socio-economic factors that determine schooling levels. Section 3 describes data and the methodology that will be employed for my study.

LITERATURE REVIEW

This chapter reviews literature on access to education and gender differentials in enrollment rates of children. The first category of the section describes various articles that explain different socio-economic determinants of education. Secondly, evidence of gender bias in enrollment rates and gender differentials across levels of education completed is discussed. Lastly, literature on gender bias in levels of understanding and preference for public vs. private school is examined.

Determinants of access to education in households:

The role of education especially for a developing country like Pakistan, is an important channel for boosting development process, economic growth and eradicating menaces like poverty and unemployment in the country. However, due to cultural and social constraints creation of gender differentials across social sectors like education and health can greatly hamper economic progress by reducing quality of human capital.

According to Sackey (2007), the impact of parents' educational capabilities is determined by the degree of intergenerational transmission of human capital and economic welfare across households. The paper incorporates a probit model technique for measuring determinants of school attendance in Ghana with household, regional and children related characteristics as explanatory variables. The data used for the study is taken from Ghana Living Standards Surveys for years 1991-1992 and 1998-1999 and the sample is restricted to children between ages 6 years to 20 years. As far as income hypothesis is concerned, it is essential to relate that not only current income but also wealth status in terms of possession of durable assets of a household significantly determines probability of education and health related expenditures. This variable along with household per capita expenditure, age of children and school quantity and quality significantly explained high levels of female and male attendance of

children in Ghana. Haveman and Wolfe (1995) propose that household assets apportioned to residents and the timing of their allotment play a key role in deciding educational expenditure issues of households.

Other studies have also examined the effect of socio-economic factors play in determining whether households when allocate expenditure to education. For instance, Donkoh and Amikuzuno (2011) analyzed the role of education in forming the basis for socio-economic development of any country. The study at hand uses a logit model to assess the socio-economic determinants of education expenditure by taking probability of spending on education in a household as the dependant variable. Two particular categories of households are examined, firstly the ones consisting of heads with formal education, lands and other forms of durable assets. The second category focused upon female headed households with higher number of school going children and rural based households. The analysis demonstrated that willingness of a household to allocate expenditure towards education of children was primarily affected by head's educational attainment. Moreover, Huisman, Rani and Smit (2010) also tested the role of socio-economic and cultural factors and the characteristics of educational infrastructure on the enrollment rate of primary schooling in India. The explanatory variables like mothers education, father's employment (whether salaried or business owner), mothers work status, school quality and household wealth, all had an impact of almost 70% on enrollment rates of children.

Many authors previously have studied impact of number of siblings and their respective genders on educational attainment of children within households. According to Parish and Willis' (1993) research on Taiwan, households that have fewer resources benefit from older female siblings as they either get married or can be a source of financial help that eases pressure of monetary tensions. On the other hand, studies of Kuo (1998) and Bauer and Gang

(1999) point out that for countries like Germany and USA, number of siblings and their genders do not affect educational status of school going children in a given household[1].

Another determinant of educational attainment, as studied by Kessler (1991) is birth-order of children which can impact both genders differently. Similarly, Lindert (1977)[2] suggests that children who are born earlier are able to get higher share of household resources along with greater attention of the mother, due to which they are more likely to enroll into schools as compared to children who are born late.

Evidence of gender bias regarding enrollment of children into schools:

The research that will be carried forward for this thesis proposes to analyze the effect of gender differences on intra-household access to education in terms of type of institution, maximum level of education attained and level of understanding in children. Several economists have tried to trace the effects of gender bias in such household decisions.

In order to assess the factors that determine the education expenditure in a household, Aslam (2003) estimated an OLS regression with the dependent variable as education expenditure as a percentage of total expenditure for the every individual. The independent variables include household size, for household head's education, marital status, occupation, gender, region, and the provinces in Pakistan. All the variables incorporated are in form of dummy variables except household size. The data for year 2003 reveals that most of the differential occurs due to the difference in regions, that is, whether the individual lives in an urban or rural area in Pakistan. However, the Engel curve technique employed in the paper fails to detect gender discrimination whereas, the hurdle model incorporated reveals that a strong pro-male bias

[1& 2]Rammohan, A. & Dancer, D. (2008). 'Gender differences in intra-household schooling outcomes: the role of sibling characteristics and birth-order effects', *Education Economics*, Vol.16 (2), pp.111-126

exists as far as allocation of educational expenditure is concerned especially for age groups 10-14 and 15-19 in contrast with children from ages 5-9.

Merlo and Echevarria (1999) study determines gender differences in education through a two-sex (male and female) overlapping generations model. The paper further incorporates a bargaining model where households take collective decisions regarding consumption, expenditure decisions related to education of children based on their gender and number of children as oppose to the model of unitary household decision making model as proposed by Becker (1965, 1991). The results based on the model show that gender differences in education occur due to the main differences in both the genders which are further transmitted into the household and the labour market. The model signifies that as number of children increase in a given household women experience increasing time cost of producing children. This increase initiates gender gap in educational status as fertility rates of women rise.

Kingdon (2005) tested two possible reasons for failure to detect existing gender biases in intra-household allocation of resources. Firstly, gender bias can exist in expenditure when household expenditure is allocated positively for sons and remains zero for daughters, Secondly, even if positive expenditure is allocated both to sons and daughters, a lower amount is assigned to females as oppose to males. In the paper, Kingdon illustrates the results with a hurdle model which separately accounts for a variable impacting the decision whether to incur an expenditure or not ($s= 0$ or $s >0$) and in case the expenditure is incurred then how much allocated ($s|s>0$). The data source used for the research is collected by National council of Applied Economic Research for New Delhi in year 1994. The dependant variable is the total household expenditure share of education and amongst the explanatory variables are household head's schooling, parents' education, household size, age cohorts (5-9, 10-14 and 15-19) and gender of children. The results from the hurdle model clearly show that in rural

India gender bias exists, which entails that household expenditure for schooling is not in favor of girls. A possible reason for this result could be 'son preference' dilemma, due to which education expenditure allocations for eligible females in a household are likely to fall as more children are produced in hope of a son being born.

Another plausible technique has been used in the literature in recent years to gauge existent gender gaps in school enrollment rates. The technique most commonly known as Blinder-Oaxaca decomposition, measures variation in school enrollment rates and returns to education. Pal (2004) in the paper titled as "How much of the gender difference in child school enrollment can be explained? Evidence from rural India" takes into account the opportunity cost of schooling in India, by signifying existing gender gaps in children's school enrollment and participation in market jobs. The paper first utilizes a bivariate probit model and then decomposes the result attained to find the extent of "discrimination" in school attendance. The data is based upon six villages of West Bengal and ranges from years 1987-1989. The age cohort used for children and their respective school and household related characteristics is five to fifteen years. The dependant variable for the probit model is taken as a dummy variable which equals one if the child is enrolled into a school and zero otherwise. Similarly, another probit model is also run for the work equation with the dependant variable equaling one if the child is participating in any form of job. The independent variables mainly used include factors like household head literacy, village-level adult male and female participation, age of children and older siblings.

The critical point in the methodology applied is that the Probit model is run separately for males and females in the sample. Furthermore, to carry out the gender decomposition of enrollment rates, firstly the probabilities of enrollment and non-enrollment are calculated from the probit model estimates. After the predicted probabilities are measured, the male-

female differential in school performance is decomposed. The decomposition process results in two components, explained and unexplained variation where the former is based on differences occurring due male/female characteristics also called the endowment gap (Cameron and Heckman, 2001[3]) and the latter refers to discrimination factor. The results of the paper indicate that important indicators of school enrollment across both genders mainly include parental preferences, household expenditure, and opportunity cost of participating in household related work as measured by ratio of siblings. Moreover, results based on econometric models illustrate that approximately 30% of disparity in school enrollment is due to differences in characteristics of male and female children whereas 70% of difference is unexplained due to discriminatory reasons.

Evidence of gender bias in levels of education attained:

Asadullah and Chauhdry (2008) in their recent paper on "Reverse gender gap in schooling in Bangladesh: Insights from urban and rural households, examine how variation in enrollment rates of males and females occur for secondary level schooling. The study utilizes Household Expenditure Survey (HIES) of Bangladesh for years 1995, 2000 and 2005. The main aim of the research was to justify that gender difference does exist in schooling outcomes and within household resource allocations, partly because of the female secondary stipend program initiated in year 1994 in Bangladesh. Since more than one regression was run, variables like grade completion, currently in school, child labour and education expenditure were used as dependant variables. On the other hand variables like parental education, age, sex of the children and household head, household's per capita expenditure and the landholdings were incorporated as explanatory variables. Since the study was based only on the secondary schooling outcomes, the sample was restricted to children between ages of 11-17 years. The

[3] Pal, S. (2004). 'How much of the gender difference in child school enrollment can be explained? Evidence from rural India', *Bulletin of Economic Research*, 56:2

authors used a household fixed-effects approach to estimate the gender gaps in schooling firstly with both genders and then separately for both males and females. The results indicate that pooled gender based regressions did not show any evidence of gender differences for any of the four dependant variables. However, regressions based separately on males and females illustrated that girls in contrast to boys in urban non-metropolitan areas registered higher rate of school enrollment and completion. Therefore, the study concludes that gender-bias exists in Bangladesh, which favors girls more than boys for both rural and urban areas.

A recent study by Lancaster, Maitra and Ray (2008) conducted a similar research on some selected Indian states in which they analyzed gender biases within the allocation of household expenditure. The study follows Basu (2006) and determines the bargaining position of both adult male and female earners through their respective household expenditure effects. The empirical analysis is carried out by employing a three-stage least square technique (3SLS) based on Uttar Pradesh and Bihar "Survey of Living Conditions" for years 1997 to 98 along with National Sample Survey as the second data source which covers more states of India for years 1993-1994. The dependant variable is the budget share of individual goods; tobacco, food, alcohol, energy/fuel, and education. The results demonstrate that wide gender preferences are found for boys, specifically for middle and higher levels of education. There are possible interpretations given in the paper for the existent gender bias in Indian states; parents prefer spending more on education of boys as higher economic returns are associated with male education in a developing country like India. Thus, it is more likely that parents invest more in male education and as a result boys are able to complete their education at least till secondary or even higher levels. Secondly, social constraints of not sending girls to far off schools may also explain the pro-male bias that exists as far allocation of household expenditure towards education is concerned.

Moreover, a study by Rammohan and Dancer (2008) observed impact of household characteristics like birth-order, sibling composition and gender bias in Egypt on education attainment. According to the authors, in most of the developing countries when number of school-age children increase in a household, parents have to make decisions regarding efficient allocation of limited resources amongst all members of the household. The dataset used for the study is Egypt Integrated Household Survey (1997) and the sample is restricted to children in the age bracket of seven to seventeen years. In order to carry out an empirical analysis, a multivariate logistic regression model with a discrete ordered variable (ORD) which takes values of 0, 1 and 2 based on whether a child has attended school or not as the dependant variable is used. In addition, all standard household and individual indicators and variables like gender of first born child, birth-order dummy (from first to tenth born) are added as independent variables. The results point out wide gender and region disparity as far as schooling outcomes in Egypt are concerned. Interestingly, as far as birth order of females is concerned in rural areas girls born late are more likely to attain more levels of education than those born early. Also, first born males do not show any benefit in terms of years of schooling, especially in rural areas where they mostly work to help parents financially rather than studying. In contrast if the first child is a female, then there are better chances that she will complete the schooling years as per her age. Apart from these factors, other variables like parents' education, urban residence, and household expenditure all lead to an increase in children's schooling years.

Likewise, the paper by Baluch and Shahid (2009) titled as "Measuring gender disparity at primary school level in Pakistan", examines gender inequality in enrollment rates at primary school level for Pakistan. The dataset used for the study is Pakistan Social and Living Standard Measurement Survey (PSLM) for years 2004-2005 covering 76, 520 households. They used a Probit model combined with Oaxaca decomposition for data on primary level

enrollment rates. The Probit model uses a dependant variable as a dummy variable equaling 1 if a child is enrolled in primary school and 0 otherwise. On the other hand the independent variables include household assets' value, education and age of household head, school distance, per-capita income, region and provincial dummies and male and female working in every household. The Probit model is run separately for both genders, after which the gender gap (GAP) in enrollment is calculated by differencing predicted probabilities of males and females respectively. The decomposition results in an explained and unexplained variation. The results of the research show that for primary level education in Pakistan the gender gap is around 11.3%, whereas explained variation due to difference in characteristics between male and female students was negative around -2.84% and the unexplained variation was 98.4% resulting from discrimination and treatment of boys and girls in households. The variations in the gender gap generated signify that males are prioritized over females in education. Following the same domain, another paper by Rahji (2006) also focuses on enrollment rates of primary schools in rural areas of South western Nigeria. The author utilizes the same combination of Probit and Oaxaca decomposition technique to calculate the gender differentials. By using the same set of dependant variable and explanatory variables, the results of the paper also show gender preference of boys against girls. The gender gap 12.58 whereas the explained gap is 20% and the unexplained gap is around 74.96% of the total gap.

Therefore, most of the literature signifies that based on household and individual indicators a strong pro-male bias exists in education attainment with females lagging behind in terms of enrollment and level of education achieved.

Evidence of gender bias in level of understanding and between types of institutions (public vs. private):

Aslam (2009) also examines the impact of existing gender bias on two components of education; school choice and grade completion. The basic reason behind carrying out this study is that a large number of children in Pakistan, especially girls in contrast to boys are not enrolled into schools and as a result the face strong pro-male bias in intra-household allocation of resources. The data is collected from a specific school based survey carried out by the author in Lahore, Pakistan in year 2002 till 2003. The author firstly, tests likelihood of boys to attend private schools through a linear probability model (LPM) against independent variables that include all children and household related characteristics. The dependant variable takes a binary form which equals one if a child is enrolled in a private school and zero otherwise. The results for this particular model show that huge pro-male biases exist in Punjab whereas Sindh exhibits a pro-female bias. The study undertaken by Aslam (2009) further distinguishes schooling outcomes by testifying achievement levels of children across public and private schools. For this purpose, education production function is used to create a model that uses achievement scores of children on standardized tests (Raven's Standard progressive Matrices test) as the dependant variable against educational variables as explanatory variables.

The results show that on average, students from private schools score higher on tests of literacy and numeracy than students enrolled in public institutions. A possible reason for this difference could be that children studying in private schools have better learning environment both at home and at school, along with educated parents and a better social status. From a gender perspective, results show that in both types of schools male students scored higher in the math section whereas female students performed better in the reading section. As a result,

in private schools there was more pro-male bias coming from high performance in mathematics scores and pro-female bias in reading remained insignificant, however, in government schools there was pro-male bias in math scores and pro-female bias in reading scores as well.

Furthermore, Alderman and Orazem (2001)[4] used their research on low-income people living in urban areas of Lahore to show that children even in poor households are enrolled into private schools. A possible reason cited for this pattern is that parents even in low income households are insightful about quality of school their children are enrolled into, which is obviously higher in private schools.

Similarly Kim, Alderman and Orazem (1999)[5] examined impact of subsidies in private school enrollment in Quetta, Pakistan. The subsidies were channeled towards ten randomly selected areas which did not have any single-sex public school for girls. The results for the study showed that enrollment rates specifically of girls increased for private schools and continued to rise even after the subsidies were decreased.

On the other hand, another group of researchers focused on how gender differences impact decision of parents regarding enrollment of children in primary schools based on access, type and quality of schools of rural Pakistan. Lloyd, Mete and Sathar (2005) based their research on rural side of Pakistan since most villages provide different schooling options for girls and boys in form of accessibility, distance, type and quality of schools. Also in Pakistan, most of the public schools are single sex whereas private schools can be single sex or mixed for that matter. The data was collected through Living Standard Measurement Survey on twelve rural parts in Pakistan; six each from NWFP and Punjab. In the paper, enrollment patterns of the

[4 & 5] Lloyd,C. , Mete, C. , Sathar, Z. (2005). 'The effect of gender differences in primary school access, type, quality on the decision to enroll in rural Pakistan', *University of Chicago*.

sample villages showed that education of mothers had a positive impact on schooling of boys whereas girls who had uneducated mothers or mothers with only initial year or so of schooling were never enrolled in schools. In addition, girls who had fathers in the agriculture sector were also not admitted into schools in comparisons to those who had fathers in the non-agriculture society. Interestingly, apart from parents' education and father's employment status, household consumption also directly impacts school enrollment rates of children. With an intermediate increase in the household consumption, results showed that more girls were enrolled into public primary schools, whereas if the shift was large enough enrollment rates of boys into private schools increased greatly. The authors utilize a multinomial logit model for empirical analysis, which is based on two stages; first one being the decision whether to enroll or not and the second one being whether to enroll in a public or a private school. Apart from this, variables like parents' education, father's occupation, age and gender of children, share of teachers living inside the village and presence of a school are taken as independent variables for both public and private schools. The results conclude that as far as rural areas of Pakistan are concerned, girls' enrollment depends on presence of single sex schools inside the village along with quality of school.

Andrabi, Das and Khwaja (2002)[6] also advocate their findings regarding Pakistan's pattern of gender specific enrollment into schools, which signifies that private institutions accommodate admission of girls at the same rate as they do for boys. Specifically, it is reported that almost for all age groups of primary and secondary levels of education, female enrollment is higher in private schools as compared to boys' enrollment. However, the same pattern does not exist for females in age group of 20-24 years, which is appropriate for tertiary education.

[6] Aslam, M. (2009). 'The relative effectiveness of government and private schools in Pakistan: are girls worse off?', *Education Economics*, Vol. 17 (3), pp. 329-354

Long and Cogner (2011) in their paper on "Gender sorting across public high schools and its possible effects" discuss that female students are more likely to perform better than boys in grade, course and college enrollments, achievement tests and degree completion. On the contrary male students are more likely to achieve better grades in math based tests as also put forward by Fryer and Levitt (2010). The methodology of the paper is based on a dependant variable that has one of four outcomes namely high school math and reading score, high school completion and four year college admission of students in Florida. On the other hand independent variables include age, race, demographic (X_i) and achievement based student characteristics along with high-school indicators (H_i). These variables are used to carry out logit regression for dummy dependant variables and ordinary least squares for continuous dependant variables. After the logit regression is run separately for male and female students, Oaxaca decomposition is carried out by estimating change in mean of outcome variables between both genders from first regressions against mean of students' characteristics $\left(\overline{\boldsymbol{X}_f} - \overline{\boldsymbol{X}_m}\right)$ and high-school related indicators $\left(\overline{\boldsymbol{H}_f} - \overline{\boldsymbol{H}_m}\right)$. To further measure gender based differentiation, high school fixed effects are replaced by district fixed effects to verify the results. The results show that there is significant sorting of boys and girls in public schools. The main reason behind the gender gap may be attributed to preferences of parents which may impact students' enrollment into high schools. Also, there is a high probability that if separate private schools for boys and girls are present nearby, then students may start enrolling into private schools rather than public schools. As far as college enrollment is concerned, gender gaps in high schools can also impact college admissions for both genders as girls are more likely to enter college as they have stronger peer effects than boys.

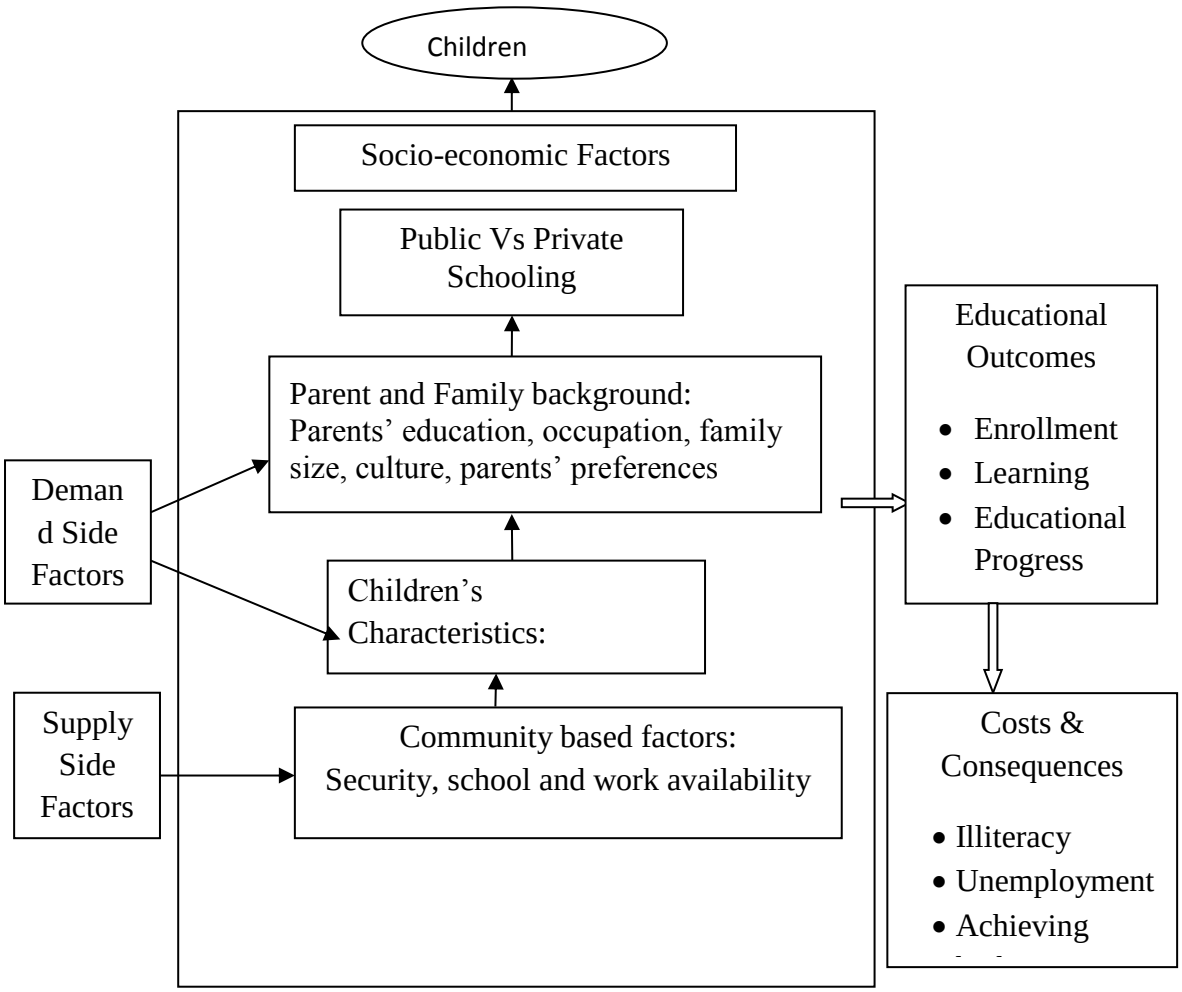
Further literature on developing countries, shows that first initial years of primary schooling are beneficial for women from a non-market perspective however, even greater benefits are attached with secondary level of education (Ainsworth, Beegle and Nyamete, 1996).

Nevertheless, unfortunately in most developing countries like Pakistan, after primary and in very few cases after secondary level of education girls are not enrolled for further education due to social norms attached to them as they either reach the age of puberty or are married off. Therefore, in most of the countries even if girls are enrolled into schools in comparison to boys they are only able to gain only first few years of schooling, thus further strengthening existence of gender bias in education.

CONCEPTUAL FRAMEWORK

This study uses the conceptual framework used by Mike, Nakkajo and Isoke (2008) in their paper "Socio-economic determinants of primary school dropout: the logistic model analysis". According to the framework, societal along with household and personal characteristics all termed as socio-economic factors determine school enrollments and educational outcomes. Similarly, in my study a combination of household and children related characteristics like household size, parental education, occupational status of household members and age of children will be used to measure the extent of gender gaps in education of Pakistan.

Figure 1 Conceptual framework for determinants of gender disparity in education of Pakistan



Source: Mike, Nakkajo and Isoke (2008)

DATA

The data used for the research is taken from the Pakistan Social and Living Standards Measurement Survey (PSLM) 2010-2011. The survey is carried out at district level and includes data on 76,546 households from all over Pakistan, with main focus on social indicators. In context of Millennium Development Goals (MDGs), social indicators like Education, Health, household possessions and household expenditures are included in the survey. Furthermore, all the required indicators are disaggregated on basis of provinces, districts, gender and region.

For the purpose of the study, the relevant sample comprises of households that have children enrolled into schools between the ages five to eighteen years since the scope of the study incorporates three levels of education: primary, secondary and higher. Given this criterion, my sample comprises of 53,414 households. However, the analysis will be carried out on an individual level so based on data availability 193,051 individuals fall in the required sample age group. Further division of the sample shows that out of the total sample 115,964 individuals are enrolled and 13,612 are not enrolled into schools whereas the remaining are not included due to data unavailability.

The questions related to access to children's education, type of institutions children are enrolled into, parents' education and employment history and overall status of every household together with the standard set of explanatory variables have been used from the survey.

To begin with the sample, data signifies that around 85.5% children are enrolled whereas as remaining 17.05% are not enrolled into schools. However, since the scope of the study focuses on gender differentials of children in schools, the gender indicator of the sample demonstrates that amongst children enrolled into schools 59.8% are male children, whereas only 39.96% are

females (Appendix C-Table 1). Since gender differentials in choice of public vs. private schools is also another core focus of the study apart from enrollment rates, the descriptive statistics imply that amongst the sample 72% of the children are enrolled into public schools and 25.7% go to private institutions (Appendix C-Table 2). The remaining 2.25% of the children are enrolled into other types of schools (like masjid, religious and other types) available, but are not incorporated as part of the research. Furthermore, division of the statistics shows that 61.1% male children are enrolled into public schools whereas only 38.8% females are enrolled into public schools. As far as private schools are concerned, 57% male children are enrolled into private schools and on the contrary only 43% female children attend private schools.

In addition, household based statistics illustrate that from a sample of 53,414 households the average household size is of eight members. From a regional perspective, rural households due to more family members have an average of eight members in comparison to urban areas where the average family size is seven members (Appendix C-Table 3). The mean age of household heads for both genders signifies a lower age for males (24.3 years) as compared to that of female heads (30.2 years) (Appendix C-Table 4).

The data based on the sample also demonstrates that the average years of schooling for children between ages five to eighteen years is around 4.7 years of schooling which mainly constitutes of the primary education. The gender classification shows that for male children average years of schooling are 4.8 years whereas, female students from the sample showed approximately 4.7 years of education. Likewise, region categorization also signifies that urban areas show an average of 5.4 years of education and rural areas in the study sample register only an average of 4.4 years of schooling (Appendix C-Table 5).

As far as enrollment rates across different levels of education are concerned, there appears to be a sharp decline in enrollment from primary education to secondary education. The

enrollment rates can be classified as gross and net enrollment rates. Gross enrollment rate (GER) is defined as number of individuals who are actually enrolled in schools divided by the number of children who are of the corresponding school enrollment age. Whereas net enrollment rate (NER), incorporates number of enrolled children aged for particular level of education divided by number of children in the age group for that level of education. In my sample, the net and gross enrollment rate in primary education is 56% and 71.7% respectively; however, the enrollment rate in secondary school falls to 44.7% as far as GER is concerned and NER is around 34.3%. Lastly, the enrollment rates in higher education for Pakistan are lower when compared with primary and secondary levels, standing at GER of only 41.5% and NER of 29.6% (Appendix C-Table 6 and Table 7).

Also, since the analysis is based on Pakistan it is imperative to look at enrollment differences across all four provinces. In the sample, Punjab shares the highest level of enrolled children with a figure of 42.6%, whereas Sindh has 23.6% enrolled children followed by KPK which has 20.1% enrolled children and Balochistan shows only 13.6% enrolled children (Appendix C-Table 8). Further disaggregating data on provinces, signifies that almost 36.6% children in Punjab are enrolled into government schools. As far as private institutions are concerned, Punjab with almost 58.5% mainly accounts for more than half of the enrollments (Appendix C-Table 9). On the other hand, Sindh exhibits enrollment trends standing at 24.7% for public schools whereas in the case of private schools Sindh has an enrollment rate of 19.02% (Appendix C-Table 10). Likewise, KPK more or less follows enrollment trends in Sindh with 20.5% children enrolled in government schools. Interestingly, the private school enrollment rate in KPK is 18.13% whereas in the sample, Baluchistan has the lowest proportion of children (17.7%) going to government based schools. Additionally in Baluchistan, due to low literacy rates and less preference for private only 2.69% of the children are enrolled into private schools (Appendix C-Table 11 and 12).

Furthermore, another interesting result is seen in regional division of enrollment rates from the sample. The statistics show that rural areas have higher enrollment rates of 61.1% as compared to urban areas which contribute only 38.9% to school enrollments of children between ages five to eighteen years (Appendix C-Table 13). A possible explanation for this result is that since the domain of this study focuses on enrollment rates of the entire family living in every household included the sample, this comprises of households that have joint family systems as well. As a result, since in rural areas there are more families living together in a household there are more children going to school in contrast to urban areas where only immediate family members are more likely to live together. Likewise, more than half of the children (69.2%) in rural areas go to public schools in comparison to only 30.6% children from urban areas enrolled into private schools (Appendix C-Table 14). However, the situation is different for urban areas as private schooling is existent and preferred more in urban than in rural areas. Therefore in the sample, urban areas attribute around 63% enrollment into private schools as compared to government schools which only contribute 38.6% to the proportion of public school going children (Appendix C-Table 15).

As far as regional analysis is concerned, gender decomposition of data shows that in urban areas 54.2% male children between ages five years to eighteen years are enrolled into schools whereas 45.8% girls are enrolled into schools (Appendix C-Table 16). As far as rural areas are concerned, 63.6% males are enrolled into schools; on the other hand only 36.4% female children attend schools in rural areas (Appendix C-Table 17).

The overall trend demonstrates that the enrollment patterns point out high gender differentials with boys enrolling in schools more than girls for both school types. As far as three levels of education are concerned, there has been a fall in enrollment rates across primary, secondary and higher level of education.

METHODOLOGY

In order to derive econometric models for the study, Probit and OLS models are combined with Oaxaca Decomposition technique to measure gender differentials in terms of access to education in Pakistan: public/private school enrollment rates and years of education attained.

Although in most of the literature for example Blinder (1973), Oaxaca (1973, Neumark (1988) and Oaxaca and Ransom (1988, 1994), Oaxaca decomposition has been applied to gender gap estimations based on linear regression models. However in recent times, the application of Oaxaca decomposition has been extended towards binary dependant variable based Logit and Probit models (Yun 2004; Fairlie 1999, 2005; Even & Machpherson 1999).

However, following the Probit-Oaxaca decompostion model as proposed by Rahji (2006) and Handa (1996) to measure gender differences in primary level enrollment rates in South Western Nigeria and to gauge gender gaps in primary school enrollments of rural areas respectively, my study also utilizes a similar Probit model. The model combined with Oaxaca technique will decompose gender gaps into two parts: firstly, differences explained by observable characteristics of female and male children and secondly, differences due to coefficients estimated from the model.

To begin with, the simplified equation of the appropriate Probit model will be:

$$\Pr(E = 1/X_i) = \Phi\,(X_i\,B_i) \qquad (1)$$

Where E_i refers to the school enrollment of every child varying across three levels of education (primary, middle/ secondary and higher secondary) and $_i$ gender category. On the other hand, X_i refers to children's characteristics and household factors like education of parents and occupation status of household members, household size, wealth index, ages of all enrolled children and

region (rural/urban). The B_i in the equation represents coefficients of every variable $_i$ and Φ is the sign for the cumulative density function with standard normal distribution.

The above mentioned observable characteristics will be part of a generalized Probit regression models:

Model 1:

$$Z_{male} = \beta_0 + \beta_1 Father's\ education + \beta_2 Mother's\ education + \beta_3 \quad Working\ Male/All\ Working\ members + \beta_4 Working\ Female/All\ Working\ members + \beta_5 Household\ size + \beta_6 Wealth\ Index + \beta_7 Age\ of\ child\ (5\text{-}18years) + \beta_8 Own\ home + \beta_9 Dummy\ of\ Distance\ to\ nearest\ water\ facility + \beta_{10} Total\ number\ of\ children + \beta_{11} Region\ Dummy + \beta_{12} First\text{-}born + + \beta_{13}\ Incomepercapita + \beta_{14} DistrictDummies + \epsilon \qquad (2)$$

$$Z_{female} = \beta_0 + \beta_1 Father's\ education + \beta_2 Mother's\ education + \beta_3 \quad Working\ Male/All\ Working\ members + \beta_4 Working\ Female/All\ Working\ members + \beta_5 Household\ size + \beta_6 Wealth\ Index + \beta_7 Age\ of\ child\ (5\text{-}18years) + \beta_8 Own\ home + \beta_9 Dummy\ of\ Distance\ to\ nearest\ water\ facility + \beta_{10} Total\ number\ of\ children + \beta_{11} Region\ Dummy + \beta_{12} First\text{-}born + \beta_{13}\ Income\ per\ capita + \beta_{14} DistrictDummies + \epsilon \qquad (3)$$

The above equations show that two different Probit equations will be estimated for male and female children enrolled into primary, middle/secondary and higher secondary schools. The first model will measure impact of child and household characteristics on enrollment rates of all the children falling in the age group of 5 years-18 years where, Z_{male} and Z_{female} are the binary dependant variables in equations 2 and 3 respectively. Both will equal 1 if a child is enrolled and 0 otherwise for primary, secondary and higher level of education.

Moreover, the independent variables contain both continuous and dummy variables. The variables include children's age cohort (Aslam, 2003; Iram and Hussain, 2008), parents' educational attainment, household employment status (Lloyd, Sathar and Mete, 2005; Deolalikar, 1997; Iram and Hussain, 2008; Rahman, 2009), the gender of the child (Aslam,

2003), the region the family resides in, that is either urban or rural Donkoh; 2011), district dummy variables (Baluch and Shahid, 2009) and wealth index (Donkoh, 2011; Huisman, Rani and Smits, 2010).

Since the main hypothesis of the study examines factors determining gender differentials across enrollment rates into public/private institutions, understanding levels achieved, the analysis will be carried out at an individual level. The analysis will be carried out to gauge gender gap on an individual scale for the three levels of education level. This scale of analysis will provide a wide variety of characteristics and data for in depth analysis of socio-economic determinants of education gender gap at primary, middle/secondary and higher secondary school. Therefore all the independent variables have been selected on the basis of literature available at an individual level.

For further explanation of some of the independent variables, the mother/father characteristics are variables that include their education. The more educated the parents are, the higher will be the probability that parents enroll their children into schools. Therefore the expected sign of the variable will be positive as these education increase parents' awareness and resources available for education. Moreover, if both parents along with other members of the family are employed, they will incur more education expenditure than a household which has more unemployed member. Therefore, the expected sign of employment will be positive as the variables measuring the female/male above eighteen years of age working proportions against all members of a household falling in the above eighteen years age bracket will demonstrate the employment trend of a household and that how many people in a given household work.

The variable for household size may show that as the household size increases, households will incur more education expenditure. This is primarily because there will be more children to education. Additionally, in countries like Pakistan where concept of joint family is very

common, increase in household size would mean more members contributing resources to share of public services like electricity and gas, thus leaving behind greater proportion of resources to be allocated towards education (Aslam, 2003). Therefore, the expected sign is positive. However, certain studies show that as household size increases, the economic burden on the household head rises and therefore education expenditure becomes less of a priority and so, less expenditure is allocated to education. This suggests that the sign for this variable could be positive or negative.

Moreover, the expected signs of wealth and income per capita are expected to be positive as the more wealth households possess, the higher will be their expenditure on education. It is expected that the sign for the parents' educational attainment will be positive as more educated parents would be more likely to educate their children as well.

The variables on districts will be added as dummy variables, with Islamabad district being the base case. Since, PSLM data is collected on a district level as a result district fixed effects will be incorporated to capture the variation in education across all regions of Pakistan.

The expected sign for 'region' is positive as households in urban areas spend more on education than households in rural areas. In a developing country like Pakistan urban areas are more developed in terms of education and infrastructure facilities, thus increasing incidence of educational expenditure incurred on education by parents as compared to rural areas. Also, the variable for distance to nearest drinking water source is used to measure impact of availability of clean water on health and school attendance of children. Also, this variable will help in gauging the general health standard of every household.

Moreover, the variable measuring impact of a first born in a household will determine whether birth order has a significant impact on schooling outcomes of children. As per Lindert (1977) findings, children who are born earlier (first born) compete with less siblings

so they are more likely to get education as they have greater access to household resources and get more of parents' time. On the other hand, according to Anderson (1996) birth-order may not be an important determinant as parents may associate higher returns with boys' education and as a result direct more resources towards their education regardless the fact they are born earlier or later.

The variable measuring total number of children in a household as per Merlo and Echevarria (1999) can have a negative relationship with enrollment rates. If there are more children in the house, constraints on access to education may increase. On the other hand fewer children may mean it is easier for parents to send all the children to school.

Model 2:

$$Y_{male} = \beta_0 + \beta_1 \textit{Father's education} + \beta_2 \textit{Mother's education} + \beta_3 \textit{ Working Male/All Working members} + \beta_4 \textit{Working Female/All Working members} + \beta_5 \textit{Household size} + \beta_6 \textit{Wealth Index} + \beta_7 \textit{Own home} + \beta_8 \textit{Dummy of Distance to nearest water facility} + \beta_9 \textit{Region Dummy} + \beta_{10} \textit{Total number of children} + \beta_{11} \textit{First-born} + \beta_{12} \textit{District Dummies} + \beta_{13} \textit{ Distance to nearest primary/middle secondary/higher secondary school} + \beta_{14} \textit{ Income per capita} + \epsilon \quad (4)$$

$$Y_{female} = \beta_0 + \beta_1 \textit{Father's education} + \beta_2 \textit{Mother's education} + \beta_3 \textit{ Working Male/All Working members} + \beta_4 \textit{Working Female/All Working members} + \beta_5 \textit{Household size} + \beta_6 \textit{Wealth Index} + \beta_7 \textit{Own home} + \beta_8 \textit{ Dummy of Distance to nearest water facility} + \beta_9 \textit{Region Dummy} + \beta_{10} \textit{Total number of children} + \beta_{11} \textit{First-born} + \beta_{12} \textit{District Dummies} + \beta_{13} \textit{ Distance to nearest primary/middle secondary/higher school} + \beta_{14} \textit{ Income per capita} + \epsilon \quad (5)$$

The second model will be based on specific enrollment rates of public and private institutions where, Y_{male} and Y_{female} are the two binary dependant variables for each gender specification based regression. Both the dependant variables will equal 1 if a child is enrolled in a private school and 0 if he/she is in a public school. The above model will be run separately for three levels of education: primary, middle secondary and higher secondary.

Model 3:

$$U_{male} = \beta_0 + \beta_1 Father's\ education + \beta_2 Mother's\ education + \beta_3 \quad Working\ Male/All\ Working\ members + \beta_4 Working\ Female/All\ Working\ members + \beta_5 Household\ size + \beta_6 Wealth\ Index + \beta_7 Own\ home + \beta_8 Income\ per\ capita + \beta_9 Region\ Dummy + \beta_{10} Total\ number\ of\ children + \beta_{11} First\text{-}born + \beta_{12} District\ Dummies + \beta_{13}\ Age + Income\ per\ capita + \epsilon \qquad (6)$$

$$U_{female} = \beta_0 + \beta_1 Father's\ education + \beta_2 Mother's\ education + \beta_3 \quad Working\ Male/All\ Working\ members + \beta_4 Working\ Female/All\ Working\ members + \beta_5 Household\ size + \beta_6 Wealth\ Index + \beta_7 Own\ home + \beta_8\ Income\ per\ capita + \beta_9 Region\ Dummy + \beta_{10} Total\ number\ of\ children + \beta_{11} First\text{-}born + \beta_{12} District\ Dummies + \beta_{13}\ Age + Income\ per\ capita + \epsilon \qquad (7)$$

The third model will gauge gender differentials occurring across children's levels of educational attainment where, U_{male} and U_{female} will be continuous dependant variables.

Moreover, the additional independent variables that will be used in model 2 and 3 are; children's age cohorts and school distance variables for each level of education. The school distance variable will be used as a dummy variable for each category of education taking value of 1 for every nearest school distance option available in minutes and 0 if the distance time is greater than sixty minutes. However, since in model 1 enrollment rates irrespective of educational levels are to be measured, distance and age cohort variables are not required for that model.

As the Probit models are run for both gender specifications separately, the estimated coefficients from the first two models and ordinary least squares model as the third model above will be further decomposed to assess gender gaps between male and female children enrollment levels and years of education.

The predicted probability of enrollment rates, enrollment into public/private schools and level of understanding for boys in each model respectively will be:

$$P(Xb, \hat{\beta}b) = \frac{1}{Nb} \sum_{i=1}^{Nb} \varphi(Xb, \hat{\beta}b) \quad (4)$$

Where m = every enrolled male child in the sample

$$P(Xg, \hat{\beta}g) = \frac{1}{Ng} \sum_{i=1}^{Ng} \varphi(Xg, \hat{\beta}g) \quad (5)$$

Where g = every enrolled female child in the sample

Following the decomposition, the gender gap for every dependant variable (whether enrolled or not, private/public school enrollments and years of education attained) will be estimated by measuring the gender wise difference in predicted probabilities calculated above. The equation for calculating gender differential will be:

$$\text{Gender Gap (GAP)} = P(Xb, \hat{\beta}b) - P(Xg, \hat{\beta}g) \quad (6)$$

$$\text{Explained Variation} = P(Xg, \hat{\beta}b) - P(Xb, \hat{\beta}b) \quad (7)$$

$$\text{Unexplained Variation} = P(Xb, \hat{\beta}g) - P(Xb, \hat{\beta}b) \quad (8)$$

$$\text{Residual Gap} = \text{Gender Gap} - \text{Explained Variation} - \text{Unexplained Variation} \quad (9)$$

Based on the equations above, the entire process of decomposition will be carried out with male students as the reference group, with further disaggregation in form of differences due to observed factors also termed as explained variation as shown in equation (7). The unexplained variation (equation 8) would be defined as the difference that would occur if probability of male enrollments and years of education achieved are a result of coefficients

used for female children. Lastly, the residual gap (equation 9) will be calculated by reversing the reference group (being boys in this case).

All the components of Oaxaca decomposition will remain same for the OLS model as well, however instead of predicted probabilities the third model will generate expected value of years of education attained by individuals and their resulting gender differentials as shown below

Gender Gap (GAP) = $E(Xb, \hat{\beta}b) - E(Xg, \hat{\beta}g)$

$$\text{Explained Variation} = E(Xg, \hat{\beta}b) - E(Xb, \hat{\beta}b)$$

$$\text{Unexplained Variation} = E(Xb, \hat{\beta}g) - E(Xb, \hat{\beta}b)$$

All the estimations would be based on the above specifications regarding measurement of gender differentials across overall enrollments, enrollments into public/private institutions for three levels of education primary, middle/secondary and higher secondary and years of education attained.

SPECIFICATION ISSUES

Firstly, since the analysis is carried out at an individual level, there would be a number of unobserved variables in the analysis. Basically factors like individual ability and motivation levels of children going to school and income shocks of all the households may not be measured as they are unobservable, resulting in omitted variable bias. Due to this, a biased and inconsistent estimate of enrollment rates and education levels will be achieved, thus making identification of a true causal impact difficult. As data being used for the research is from (PSLM), separate IQ or ability based tests cannot be carried out for analysis domain of the study. In order to cater to this possible specification issue, variables like parents' education in form of highest level of education achieved. To measure the impact of parents' education on children's education variables indicating highest level of education achieved by parents will be generated. Therefore, these variables would act as proxies of every child's ability to enroll into schools.

Secondly, comparison of households enrolling their children into schools to households not enrolling children obviously points towards difference in income and expenditure levels between the two groups. Due to this variation, the households enrolling their children into schools do not act as a random sample. To rectify this problem, the variable income can be added into the regression equation along with a wealth index. The index will be based on household possessions and other characteristics (Monazza, 2003; Baluch and Shahid, 2009). This way a long term view of every household's social and economic condition can be assessed, since the wealth measure will incorporate historical along with recent information.

Thirdly, since the data being used in the research is a cross-sectional data, chances of hetroskedasticity may exist due to changes in the variance of error terms with magnitude of independent variables. To correct this particular problem, heteroskedasticity corrected standard errors will be applied in all the regression models.

RESULTS

This chapter is divided into three sections. The first section (A) reports the Oaxaca-probit gender gap in enrollment status of children between ages five to eighteen years. The second section (B) states gender gap estimation of enrollments into public vs. private schools across three levels of schooling: primary, secondary and higher. Lastly, the third section (C) reports the gender gap in levels of education achieved by children from the study sample. All the regression estimations have been carried out by the Oaxaca- Blinder technique (1973) combined with Probit and OLS regressions are provided separately for both girls and boys.

Model 1: Measuring the Overall Gender Gap in enrollment rates, Pakistan (Appendix D-Table 1A and 1B)

The Oaxaca decomposition of gender differences suggests that a gender gap of -0.0295 exists in overall enrollment rates of girls and boys all between ages five to eighteen years. This pro-male gender differential can be further substantiated by the lower enrollment probability of girls (group1: 0.835) as compared to a higher figure for boys (group 2: 0.865). From the overall gender gap, the significant positive explained gap due to differences in enrollment rates of boys if they had girls' characteristics is 0.0201. On the other hand, the negative yet significant unexplained gap due to differences in estimated coefficients is -0.0706. The unexplained components of this gap as suggested in literature include factors like child abilities and motivation levels, parental preferences, social and cultural barriers and bias against active participation of women in education. Lastly, the gap due to significant interaction effect that accounts for possibility that variation in endowments and coefficients exist simultaneously is 0.0211.

The results of the probit model show that as far as girls in the sample are concerned, the variables for parents' academic achievements show significant positive increases in enrollment rates of both male and female children in the sample. As suggested by Ibrahim, Alex and Doreen (2008) educated parents are more aware of the value of education. Also, they are more capable of helping and training their children to attain appropriate returns to education. However, the results show that educated mothers are likely to increase enrollment of female children by 4.86% as compared to only 1.81% increase in enrollment rates of boys. Also, fathers' education significantly impact boys' enrollment rates by 3.73% in contrast to a low increase of only 2.32% in girls' enrollment rates.

Moreover, the variables measuring working proportions of male and females greater than 18 years against all members in a household show significant, yet a negative relationship with enrollment rates of both girls and boys in the study sample. A possible reason for this result could be that school going children between ages five to eighteen years instead of being enrolled into schools are put to work by their parents due to financial constraints. However, interestingly the female working proportion shows a positive relationship with overall school enrollments of boys. This specifies that as more number of women in a given household start to work probability of boys attaining education increases. Also, the results indicate that household size has a positive and significant affect on the allocation of the budget to education expenditure. This is so as there are more children in the school age bracket; families will spend more on education. Besides, there is a positive and significant correlation between the wealth a household possess and its education expenditure (Donkoh & Amikuzuno, 2011). Deaton and Paxton (1998) put forward a possible explanation for this, that large households obtain economies of scale with increasing members. Therefore, with same share of per capita resources, households with more members end up sharing public goods like housing. As a result, this makes it easier for such households to allocate larger

proportion of the total expenditure towards education conditional on the fact that education is not substituted for other forms of cheaper public goods. Furthermore, a household's wealth (measured by the wealth index) has a positive and significant correlation with the enrollment levels of both boys and girls. The results indicate that parents are more likely to enroll their children into schools as their wealth status increases but the increase is higher for boys at 15.5% as compared to girls sharing only 11.8% probability of enrollments. This is also true in the case of Ghana (Danker, 2011). Similarly, the variable measuring income per capita also shows significant positive relationship with enrollment rates of both boys and girls.

Interestingly, as far as the region variable is concerned the urban areas demonstrate a negative relationship with enrollment rates of boys as compared to rural areas being the base case. A possible reason for this relationship can be mainly attributed to the fact that the study sample incorporates enrollment rates of all the children living in a household between ages five to eighteen years. The reason behind this is the existence of 'joint family' system in Pakistan, especially in rural areas where usually more than one family is living together in a household. As a result, due to larger household sizes in rural areas, the variable shows a negative relationship of urban areas. The region variable is found to be significant for enrollment rates of girls as well. Unlike in the case of boys, the region variable signifies a positive relationship with enrollment rates of girls. This means that in urban areas due to better socio-economic conditions, girls are more likely to enroll into schools as compared to rural areas.

Additionally, the variable measuring impact of a first-born child demonstrates a negative relationship for both male and female first born children in households. Interestingly, if the first born-child in a household is a male his enrollment into school is likely to fall by 7.52% as oppose to insignificant results if the first born is a female. This means that in comparison to a first-born male, male children born later are more likely to attain education. Therefore, as

also suggested by Rammohan and Dancer (2008) being male may not be the only preferable condition for children's enrollment into schools. Also, the difference in magnitude between first-born male and female enrollment rates signify that elder male children may not attain suitable levels of schooling as they may be working to support the family instead of studying.

The variable measuring impact of other children in a household indicates a significant negative impact on the enrollment rates of both girls and boys. According to Merlo and Echevarria (1999), a potential reason for this negative relationship may be that increase in number of children can increase time spent by parents' on children's upbringing thus, limiting allocation of resources and increasing financial burden on parents. Also, more children means that limited resources are to be divided between more people even in a join family.

Model 2A: Measuring the Overall Gender Gap in primary level schools, Pakistan (Appendix D-Table 2A and 2B)

The first model measures gender differentials in primary level of education across two types of schools, where the dependant variable equals 1 if the school is private and 0 if public. The gender decomposition for primary level education shows a gender gap of 0.0172. This positive gender differential indicates a pro-female gap that can be further substantiated by the higher enrollment probability of girls (group1: 0.304) as compared to a lower figure for boys (group 2: 0.287). From the overall gender gap, the significant positive endowment gap due to explainable differences in enrollment rates of boys if they had girls' characteristics is 0.0488. On the other hand, the negative significant unexplained gap due to differences in estimated coefficients is -0.0272. The unexplained components of this gap as suggested in literature include factors like child abilities and motivation levels, parental preferences, social and cultural barriers and bias against active participation of women in education. Also, the unexplained gap shows the discrimination effect that measures change in primary level enrollments occurring if probability

of boys' enrollments is established by girls' coefficients. The negative unexplained variation shows that although the overall gender gap is in favor of girls' enrollments into private schools the difference in coefficients shows that boys based on their gender differential treatment should be going to private schools instead of girls. Lastly, the gap due to significant interaction effect of both endowment and coefficient gaps is –0.00436.

The variables measuring parents' educational status depict significant positive impact on enrollment rates of children into primary level based private schools in contrast to public institutions. However, along with significant impact of fathers' education on children's enrollment into primary schools the results also report that mother's education increases boys' enrollment into private schools more by 2.20% as compared to even a higher figure of 2.36% for girls. On the other hand, educated fathers positively impact boys' enrollment into private schools by 2.02% as oppose to 2.09% for girls. Therefore, mothers' and fathers' education in both cases does not favor enrollment of children into primary level public schools, rather there is a preference for private schools. Another plausible reason for this result can be that since educated parents are more aware of school quality in terms of student-teacher ratio, infrastructure and education quality that tends to be higher in private institutions, they prefer sending their children to private schools instead of enrolling them into public schools.

As far as variables measuring occupational status of working members in households are concerned, they indicate insignificant results for primary school enrollments of both male and female children in the sample. The household size variable, in contrast to earlier results shows a positive relationship at primary level enrollments into private schools as oppose to public schools. As mentioned in certain studies a negative relationship may mean that as household size increases, the economic burden on the household rises and therefore education expenditure

becomes less of a priority and so, fewer children are enrolled into schools. However, the magnitude of the coefficients show that as household members increase enrollment of girls into private schools increases by 7.23% in contrast to a rise of only 5.92% for boys. Therefore, with increase in household size parents may prefer sending their children to private rather than public schools. Another interesting result in the model is of the variable wealth index. As wealth increases, the private school enrollments for primary level increase by 20.1% for girls and 20.8% for boys. The result indicates that as wealth status of households improve, more boys are likely to enroll into private institutions as compared to girls whose enrollments into private schools also increase but by a smaller degree. Thus, household size and wealth index variables show a pro-female and pro-male preference in primary level enrollments respectively as oppose to public institutions being the base category.

Interestingly, the income per capita variable remains insignificant for primary level of education of both girls and boys. The age cohort variable for primary level education indicates a negative result, showing that as age increases more children are likely to enroll into public primary schools.

The negative coefficient of the region dummy which equals one if a particular household is in urban area and zero if in rural area signifies that urban areas have an inverse relationship with primary education enrollments into private schools. This implies that, in urban areas more enrollments occur in public institutions as oppose to private institutions. As far as gender classification is concerned, girls' enrollment into urban private schools remains insignificant whereas in urban regions boys' enrollment into private schools is likely to fall by 9.77% as compared to public schools. This indicates that due to a larger data sampling unit of rural areas, these areas show higher enrollment rates as compared to urban areas.

The social status of a household measured by the dummy variable which equals one of the household is self-owned and zero if rented demonstrates a positive relationship with primary education enrollments. This relationship means that if a house is self-owned by the members of the house, they are more likely to enroll their children into better private schools in comparison to public schools. Basically, owing a particular house rather than paying rent for it indicates better social standing of the household members which enables them to incur more education expenditure on private schools in comparison to public schools. Interestingly, the results show a pro-male favor in enrollment rates as girls' enrollment into private schools in contrast to public schools increases by 18.5% as compared to 23.4% for boys if households are owned.

The distance to the nearest primary school variable is insignificant in impacting primary school enrollment of both boys and girls into private schools. The variable measuring supply side of public schools available indicates that as fraction of individuals enrolled in public schools at PSU level increases by 1% then the probability of a single child being enrolled in private school falls by 1.9% for girls and 1.7% for boys. On the other hand, the private school proportion indicates that as fraction of children being enrolled into primary level private schools increases by 1% then the probability of a single child being enrolled in private school increases by 2.79% for girls and 3.19% for boys. Therefore, the supply side variables indicate that presence of both public and private schools favor enrollments of boys as compared to that of girls. Moreover, Long and Cogner (2011) in their paper on gender sorting in schools in Florida also indicate that if more private schools are available nearby then more students will enroll into private as compared public schools.

Moving on, the first born variable impacts significantly the enrollment of both girls and boys. The outcome is positive meaning that presence of a first born in the household means that he/she is more likely to be enrolled into primary schools as compared to other school going

children. This result is in contrast to findings of Rammohan and Dancer (2008) who observed that both late born male and female children are likely to complete additional years of schooling as compared to children born earlier.

On the contrary, the variable measuring presence of other children in a household shows a negative relationship with enrollment rates into private schools. As suggested by Parish and Willis' (1993), presence of siblings or other children in a household can be beneficial regardless of their gender, as the elder children may work to help financially or move out of the house as a result, reducing resource constraints. However, further disaggregation of the results shows that with more number of children in a household, enrollment rates of girls in primary based private schools falls by 11% as oppose to only 8.24% fall for boys. So if more children in a household are of a particular school going age, there is more likelihood that parents prefer sending sons instead of daughters to public as oppose to private schools due to financial constraints.

Model 3: Measuring the Overall Gender Gap in secondary/middle level schools, Pakistan- (Appendix D-Table 3A and 3B)

The second division regarding type of school model incorporates the secondary level of education and enrollment of children between ages eleven to fourteen years into public vs. private institutions. The gender analysis for secondary level education shows a positive gender gap of 0.0363. This gender differential can be further substantiated by the higher average probability of girls' enrollment (group1: 0.266) as compared to a lower rate for boys (group 2: 0.229). From the overall gender gap, the significant positive explained gap due to differences in enrollment rates of boys if they had girls' characteristics is 0.0738. On the other hand, the negative yet significant unexplained gap due to differences in estimated coefficients is -0.0258. The unexplained gap again indicates that although over all gender gap

demonstrates pro-female enrollments however, based on the difference due to estimated coefficients boys are more likely to enroll into secondary/middle level private schools but they are not. Lastly, the gap due to significant interaction effect is -0.0117.

In the Probit results, parents' education as previously noted, significantly and positively impacts private school enrollment rates at secondary level education. However, gender decomposition shows that mothers' education increases boys' enrollment into private schools by 1.73% as compared to only 1.2% for girls. This means that unlike for primary level schooling as far as secondary level of education is concerned educated mothers prefer sending boys to private institutions more as compared to public schools. Also, fathers' education more significantly impacts boys' enrollment into secondary level schools. Overall, both parents' education in secondary level enrollments illustrate that there is pro-male favor in private school enrollments.

The working proportion of female members in a household is significant for girls' enrollment and insignificant for boys' enrollment into private schools as oppose to public schools. On the other hand, working proportion of male members is only significant for boys' enrollments into secondary level schools. As proportion of male working members above eighteen years of age increases, enrollment of boys into secondary level private schools is likely to fall by 6.96%. As a result, with increase in number of male working members in a household there is more likelihood that boys in secondary school going age bracket will be enrolled into public schools as compared to private schools. The age cohort variable for primary level education indicates a negative result, showing that as age increases more children are likely to enroll into public primary schools as compared to private schools.

The region variable is significant for secondary level enrollment rates of both boys and girls. The variable indicates that enrollments of girls and boys into private schools are likely to

decrease in urban areas in comparison to public schools. Moreover, the residential status variable demonstrates a positive and significant impact only on girls' enrollment into private schools. As a result, if a household has a better social status as defined by self owing the residence then there is more likelihood that parents even prefer sending their daughters to secondary level private schools.

The distance to the nearest school for secondary level education shows significance only in case of girls' enrollment rates. Interestingly, enrollment of girls into secondary level public instead of private schools will increase if the nearest school within 0-14 minutes distance as compared to the base case distance of an hour or more. Therefore, the distance variable indicates that more girls will enroll into nearby public schools available in contrast to private school. The variable measuring proportion children enrolled into secondary/middle public schools indicates that as fraction of individuals enrolled in public schools at PSU level increases by 1% then the probability of a single child being enrolled in private school falls by 2.58% for girls and 1.72% for boys. On the other hand, as fraction of children enrolled into secondary level private schools increases the probability of a single child being enrolled in private school increases by 2.08% for girls and 2.43% for boys. Thus, presence of public schools shows that chances of girls being enrolled into secondary level private schools fall by a greater degree as compared to boys. However, the private schools favor enrollments of boys more as compared to that of girls.

Lastly, as mentioned in the primary level education results variables like household size first-born child, per-capita income and wealth index positively impact secondary level enrollments of both boys and girls. In addition, presence of other children in a household negatively impacts enrollment of both boys and girls into secondary level based private schools.

Model 4: Measuring the Overall Gender Gap in higher secondary education schools, Pakistan-(Appendix D-Table 4A and 4B)

The third division regarding type of school model incorporates the higher secondary level of education and enrollment of children between ages fifteen to eighteen years into public vs. private institutions. The higher education indicates a pro-female positive gender gap of 0.0559. This gender differential can be further seen in average probability of higher education enrollment for girls (group1: 0.263) as compared to a lower rate for boys (group 2: 0.207). From the overall gender gap, the significant positive gap explained through differences in boys' enrollment rates if they had girls' characteristics is 0.0775. On the other hand, the unexplained gap due to differences in estimated coefficients is insignificant. This insignificance implies that most of the gender gap in this model is explained through the pro-female explained gap. Lastly, the gap due to significant interaction effect is only -0.0183.

For higher secondary level of education, as far as parents' education is concerned unlike in case of primary and secondary level education mothers' and fathers' education status only significantly impact boys' enrollment into higher education based private schools. Nevertheless, if fathers are more educated they are more likely to enroll boys into private schools for higher secondary education and increase enrollments of boys by 1.3% as compared to only 0.98% increase if mothers are more educated. As also established by Aslam (2009), within a household boys are more likely to be sent to private schools in comparison to girls. Therefore choice of school type can act as an essential medium of biased treatment of enrollment of girls into school.

As predicted earlier the wealth index and income per capita also demonstrates a significant positive relationship with the enrollment rates in higher level public schools for both girls and girls.

The region dummy variables shows that for higher secondary education in urban areas, enrollment rates of girls and boys in public schools are more likely to increase as oppose to private school enrollments due to larger sample size of rural areas. In addition, variables measuring effect of residential status and first-born child on higher secondary school enrollment rates show results similar to previous levels of education.

In addition, variables measuring impact of school distance signify that girls and even are more likely to be enrolled into nearby public schools instead of private schools even if the distance is of less than hour. For higher secondary level schools, the variable measuring proportion children enrolled into secondary/middle public schools indicates that probability of a single child being enrolled in private school falls more for girls and less for boys. On the other hand, as fraction of children enrolled into secondary level private schools increases enrollments of boys more in comparison to girls.

The total number of children in households remains insignificant for higher education enrollment rates of girls and effects boys' enrollment into private schools negatively.

Model 5: Measuring the Overall Gender Gap in years of education achieved by children, Pakistan-(Appendix D-Table 5A and 5B)

The third model shows variation in years of education achieved by male and female falling in the age bracket eighteen to thirty years. The continuous dependant variable will capture years of education achieved by individuals between ages 18 to 30 years. The Oaxaca decomposition analysis for years of education shows a positive gender gap of 0.150. The gender difference can also be seen in the average years of education achieved by girls (group1: 9.264) as compared to an interestingly lower figure for boys (group 2: 9.172). From the overall gender gap, the significant positive explained gap due to differences in enrollment rates of boys if they had girls' characteristics is 0.667. On the other hand, the negative yet

significant unexplained gap due to differences in estimated coefficients is -1.044. Lastly, the gap due to significant interaction effect is 0.469. Interestingly, the individual components of the total gender gap indicate that both explained and unexplained along with interaction portion of the gap contribute significantly to the gender gap. Although, the overall gender gap shows that female individuals are more likely to attain additional years of education, however the unexplained component of the total gap indicates that estimated coefficients show boys should be attaining more years of education when in actuality they are not.

The educational status of mother and father proves to be significant in impacting years of education of both female and male individuals. This result indicates that educated fathers are more likely to concentrate on schooling of boys and help them attain higher levels of education whereas more educated mother favor girls' additional years of schooling.

The variables measuring female and male working proportions all demonstrate a negative relationship with additional education of individuals except mother's education in case of female individuals. Therefore, more educated mothers are likely to concentrate on schooling of female individuals as compared to educated fathers.

The wealth index and per capita income variables are significant in increasing years of education of both boys and girls attaining education. However, the wealth status significantly increases girls' levels of education more as oppose to a smaller increase in boys' education years. The main reason behind this result may be that as wealth status of a household increases, parents may enroll more female children into schools in comparison to boys who may already be going to school in normal financial conditions as well. As a result, with more chances of being enrolled into schools girls may attain additional years of education by a greater degree. On the other hand, per-capita income significantly impacts boys' education more as compared to education of girls.

As far as first-born variable is concerned, it remains significant for both girls and boys. As established before by Lindert (1977), children born earlier have fewer children with them in a household so they are expected to attain more education and perform better in school. The results indicate that if a first-born is a boy, he is more likely to attain additional education when compared to a first-born male child. The variable for total number of children indicates that with increase in number of children, both male and female children are less likely to complete additional years of schooling. Interestingly, the fall in years of education is higher for female individuals as compared to males. As put forward by Pal (2004), children born earlier may have to support the family in financial terms rather than going to schools thus making it easier for children born later to attain education.

Furthermore, variables like region significantly impact both boys' and girls' years of education. Interestingly, for girls urban areas demonstrate higher years of education whereas boys show higher educational years in rural areas. A possible explanation for this result can be that in urban areas due to more awareness female education is given more recognition as compared to rural areas which show pro-male education in countries like Pakistan.

Also variables like household size and residential status positively impact years of education achieved by both boys and girls, however the magnitude of change is in favor of boys as oppose to girls' attainment of additional education. Interestingly, the age variable demonstrates that as female age increases they are less likely to attain education, whereas the variable is insignificant for boys.

CONCLUSION

The objective of this study was to identify the factors that determine existence of gender differentials in different levels of education in Pakistan. As a result, given the literature consulted and findings from the Oaxaca-Probit and OLS regressions it can be concluded that factors like region which a particular family resides in, household size, parents' education, proportion of working members, wealth status, presence of other children and residential status all impact access to education.

As far as specific gender differentials are concerned, the results of the study as also confirmed by Baluch and Shahid (2009) show that gender discrimination in favor of boys exists in overall enrollments of children between ages 5 years- 18 years. Lancaster, Maitra and Ray (2008), also suggest in their paper on India that preference of enrolling boys into schools is very common as better future economic returns are associated with boys' education whereas girls are mostly not enrolled into schools especially if schools are far off and due social and security barriers.

However, results disaggregated on basis of school choice (private vs. public) based on three levels of education indicate that pro-female preferences for enrollments into private school exist at the youngest age cohort (5-10) for primary education, at the middle/secondary and higher secondary level of education for ages 11-14 years and 15-18 years respectively. Asadullah and Chauhdry (2008) in line with the above results also suggest that in Bangladesh gender-bias exists, which favors girls more than boys for both rural and urban areas.

On the other hand, gender differences in public vs. private schools across three levels of education indicate that overall public institutions show higher enrollment rates as compared to the private schools (Appendix C-Table 2). Interestingly based on Oaxaca decompositions,

further disaggregation shows that if under certain conditions private schools enrollments increase; although they imply higher enrollment rates of girls nevertheless estimated coefficients indicate that boys are mostly still preferred to be enrolled into private schools. Hence, the results show that in all the districts rented households and nearest schools for respective levels of education account for more public school enrollments. Therefore, households on rent and those with schools nearby are more likely to enroll their children into public schools as public schools are less expensive than private schools. However, the results also indicate that factors like educated parents, high wealth index, urban regions and self owned residence explain higher enrollment rates into private institutions. Thus, as situation of a household improves in terms of educated household heads, residence in better facilitated urban regions, self-ownership of the house and improved social status children are likely to be enrolled into better quality private schools as oppose to public schools.

Lastly, the Oaxaca-probit technique employed in the paper further decomposes the gender gap estimations into explained and unexplained portions. The analysis quantifies all the estimated gender gaps with significant gaps seen in overall enrollment levels of children and specific enrollments into primary, middle/secondary and higher secondary levels of education. Moreover, the model on years of education gauges significant overall gender gap in performance levels of both male and female students. Therefore, all models in the study demonstrate that pro-female preference dominates the results.

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APPENDIX A

Pakistan Trend in Net Primary Enrollment Rates (%)							
Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Total	57.5	62.8	64.7	62	66.2	66.1	66.4
Male	66.4	72.5	73.3	69.5	72.6	72.2	72.1
Female	48	52.6	55.7	54.2	59.4	59.7	60.2

Pakistan Trend in Net Secondary Enrollment Rates (%)								
Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total	27.39238	30.44374	29.14656	30.40492	32.76995	33.11421	33.22703	33.84638
Male	30.83715	34.4476	32.98293	34.3806	37.41367	37.83629	37.3206	38.4433
Female	23.79633	26.2649	25.14313	26.25675	27.92906	28.19479	28.96389	29.05916

Pakistan Trend in Net Higher Enrollment Rates (%)								
Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total	23.06554	26.16792	22.5969	22.21749	23.96238	25.04855	25.51809	26.28389
Male	24.36971	28.39236	24.74188	24.8061	27.21207	28.75896	28.41122	30.13248
female	21.70489	23.84789	20.36013	19.51811	20.57648	21.18476	22.50629	22.27744

Source: UN Statistics Division

Appendix B

Table 1: Child Characteristics

Variables	Description	Explanation	Reference	Expected Signs
Parents Education (Representative of Child's Ability)	What was the highest level of education received?	Education of parents is likely to them better informed about the future opportunities and wages their child can get with higher level of education. Also education of both mother and father will have different impact of children's education based on their genders, thus signifying gender differences in access to education.	Donkoh,S. A (2011) Aslam (2003) Huisman, J., Rani, U., & Smits, J. (2010); Deolalikar,A. (1997); Iram, N. & Hussain, Z. (2008); Rahman, A. (2009)	Positive
Gender of Child	Dummy is= 1 if child is female	Parents would invest more in boys' education, as they are expected to stay with their parents and bring their earnings home even after marriage.	M. Ibrahim, Alex and Doreen (2008)	Negative
Child of Age	Age cohorts will be generated for years 5-18 for three levels of education;	To generate age cohorts for three levels of education	M. Ibrahim, Alex and Doreen (2008)	Positive

Variables	Description	Explanation	Reference	Expected Signs
Total number of children in the house	Continuous Variable	If there are more children in the house, constraints on access to education may increase. On the other hand fewer children may mean it is easier for parents to send all the children to school.		Positive Or Negative
Proportion of children going to public schools	Fraction of children going to private schools generated at PSU level	This variable will be generated to cater to supply side factors of school availability at the minimum locality effect		Uncertain
Proportion of children going to private schools	Fraction of children going to private schools generated at PSU level	This variable will be generated to cater to supply side factors of school availability at the minimum locality effect		Uncertain

Table 2: Household Characteristics

Variables	Description	Explanation	References	Expected Relationship
Residential Status	Dummy =1 if own house, 0 otherwise	Tells about the social status of households	Rahji (2006)	Positive
Wealth Index	Generated through combining various components of wealth status	Tells about the social status of households	Baluch and Shahid (2009) Rahji (2006)	Positive
Owns home	Dummy =1 if yes, o otherwise	Tells about the social status of households	Rahji (2006)	Positive
Wealth Index		Tells about the social status of households	Baluch and Shahid (2009) Rahji (2006)	Positive
Male working proportion	Male working in household above 18 years/ total male members in household above 18 years)	The proportion shows the male employment trend of a household and that how many people in a given household work.	Baluch and Shahid (2009)	Positive
Female working proportion	Female working in household above 18 years / total male members in household above 18 years)	The proportion shows the female employment trend of a household and that how many people in a given household work.	Baluch and Shahid (2009)	Positive

Variables	Description	Explanation	References	Expected Relationship
Household Size	Continuous Variable	As the household size increases, households will incur more education expenditure. This is primarily because there will be more children to education. If household size increases, the economic burden on the household head rises and therefore education expenditure becomes less of a priority and so, less expenditure is allocated to education.	Donkoh,S. A (2011); Deolalikar , A. (1997); Iram, N. & Hussain, Z. (2008) ; Tilak (2009)	Positive Or Negative
First Born	Rank=1 if a child in a household is first born	If born earlier more likely to attain education	Lindert (1977) Anderson (1966)	Positive/ Negative

Table 3: Regional Characteristics

Variables	Description	Explanation	References	Expected Relationship
Rural / Urban Dummy	=1 if HH is located in rural area and 0 otherwise	Households in urban areas spend more on education than households in rural areas. Urban areas are more developed in terms of education and infrastructure facilities, thus increasing incidence of educational expenditure incurred on education by parents as compared to rural areas. If HH is located in rural area and the distant from the school, then the cost of going to school would increase and probability of HH's child going to school would decrease.	Donkoh, S.A (2011) Baluch and Shahid (2009) M. Ibrahim, Alex and Doreen (2008)	Uncertain
Districts	N-1 Dummy variables will be generated for all the districts with Islamabad being the base case.	District fixed effects will be used to capture variation across all regions.		Negative/ Positive
Total number of minutes spent in reaching nearest drinking water facility	Continuous variable	Representative of the geographical conditions of household that impact the household decisions.	Baluch and Shahid (2009)	Positive

Variables	Description	Explanation	References	Expected Relationship
Total number of minutes spent in reaching nearest primary school	Dummy Variable N-1 dummy variables generated for every distance option in minutes	Representative of the geographical conditions of household which impacts parents' decision regarding enrolling students in primary school. This variable is important for measuring gender differences as parents' may not prefer sending girls to schools far away from home due to cultural and social constraints.	Baluch and Shahid (2009)	Positive/ Negative
Total number of minutes spent in reaching nearest middle/ secondary school	Dummy Variable N-1 dummy variables generated for every distance option in minutes	Representative of the geographical conditions of household which impacts parents' decision regarding enrolling students in middle secondary school. This variable is important for measuring gender differences as parents' may not prefer sending girls to schools far away from home due to cultural and social constraints.	Baluch and Shahid (2009)	Positive/ Negative
Total number of minutes spent in reaching nearest higher secondary school	Dummy Variable N-1 dummy variables generated for every distance option in minutes	Representative of the geographical conditions of household which impacts parents' decision regarding enrolling students in higher secondary school. This variable is important for measuring gender differences as parents' may not prefer sending girls to schools far away from home due to cultural and social constraints.	Baluch and Shahid (2009)	Positive/ Negative

Appendix C

Table 1 Percentage of children between ages 5-18 years attending school

Gender	Percentage of children between ages 5-18 years attending school (%)
Male	59.8
Female	39.9

Table 2 Percentage of children between ages 5-8 years attending public vs. private school

Type of School	Percentage of children between ages 5-8 years attending public vs. private school (%)	Percentage of children between ages 5-8 years attending public vs. private school Male (%)	Percentage of children between ages 5-8 years attending public vs. private school Female (%)
Public	72%	61.1%	57%
Private	25.7%	38.8%	43%

Table 3 Average household size

Region	Average household size (number of members)
Entire Sample Average	8
Rural	8
Urban	7

Table 4 Mean age of household head

Type of School	Mean age of household head (years)
Male	24.7
Female	31.3

Table 5) Average years of schooling for children aged 5 to 18 years

Type	Average years of schooling for children aged 5 to 18 years (years)
Entire Sample	4.7
Male	4.8
Female	4.7
Rural	4.4
Urban	5.2

Table 6 Gross Enrollment Rates

Level of Education	Enrollment Rate (%)
Primary	71.7
Secondary	44.7
Higher	41.5

Table 7 Net Enrollment Rates

Level of Education	Enrollment Rate (%)
Primary	56
Secondary	34.3
Higher	29.6

Table 8 Percentage of Children Attending School in Provinces

Province	Percentage of Children Attending School across provinces (%)
Punjab	42.6
Sindh	23.6
KPK	20.1
Baluchistan	13.6

Table 9 Percentage of Children Attending Type of School in Punjab

Type of School	Percentage of Children Attending Public vs. Private School in Punjab (%)
Public	36.6
Private	58.5

Table 10 Percentage of Children Attending School in Sindh

Type of School	Percentage of Children Attending Public vs. Private School in Sindh (%)
Public	24.7
Private	19.02

Table 11 Percentage of Children Attending Type of School in KPK

Type of School	Percentage of Children Attending Public vs. Private School in KPK (%)
Public	20.5
Private	18.13

Table 12) Percentage of Children Attending Type of School in Baluchistan

Type of School	Percentage of Children Attending Public vs. Private School in Baluchistan (%)
Public	17.7
Private	2.69

Table 13) Region wise Percentage of Children Attending School

Type of School	Percentage of Children Attending school (%)
Urban	45
Rural	55

Table 14) Percentage of Children Attending School in Rural Areas

Type of School	Percentage of Children Attending Public vs. Private School in Rural areas (%)
Public	69.2
Private	30.6

Table 15) Region wise Percentage of Children Attending School in Urban Areas

Type of School	Percentage of Children Attending Public vs. Private School in Urban Areas (%)
Public	38.6
Private	63

Table 16) Gender-wise enrollment rates for urban areas

Gender	Enrollment Rates (Urban)
Male	54.2
Female	45.8

Table 17) Gender-wise enrollment rates for rural areas

Gender	Enrollment Rates (Rural)
Male	63.6
Female	36.4

Appendix D

Oaxaca Decomposition:

Table 1A *Overall Gender Gap in enrollment rates, Pakistan*

Dependant Variable	Enrollment Status
Main	
group_1 (Girls)	0.835***
	(0.00154)
group_2 (Boys)	0.865***
	(0.00118)
Gender Gap	-0.0295***
	(0.00194)
Endowments	
(Explained Difference)	0.0201***
	(0.00102)
Coefficients (Unexplained Difference)	-0.0706***
	(0.00198)
Interaction	0.0211***
	(0.00111)

PROBIT MODEL:

Table 1B *Overall Gender Gap in enrollment rates, Pakistan*

Dependant variable 1=Enrolled 0= Not enrolled	Girls	Boys
Mother's education	0.0486***	0.0181***
	(0.00285)	(0.00287)
Fathers education	0.0232***	0.0373***
	(0.00197)	(0.00182)
Female working Proportion	-0.0668***	0.0379**
	(0.0176)	(0.0160)
Male working proportion	-0.130***	-0.249***
	(0.0104)	(0.00876)
Household size	0.0443***	0.0926***
	(0.00761)	(0.00715)
Wealth Index	0.118***	0.155***
	(0.00637)	(0.00562)
Region dummy	0.183***	-0.213***
	(0.0228)	(0.0210)
Residential status	0.0545**	0.0969***
	(0.0229)	(0.0203)
Nearest Water Facility Distance	-0.0139	0.115***
	(0.0422)	(0.0304)
Age	-0.305***	-0.293***
	(0.00322)	(0.00291)
Income per capita	0.0000218***	0.00000605
	(0.00000493)	(0.00000394)
First Born	-0.0408	-0.0752***
	(0.0219)	(0.0182)
Total Number of children	-0.0604***	-0.100***
	(0.00964)	(0.00881)
_cons	5.151***	4.976***
	(0.137)	(0.128)
All results *with district effects*		
N= 129576	52778	76798
Standard errors in parentheses		
="* p<0.10	** p<0.05	*** p<0.001"

Oaxaca Decomposition:

Table 2 A

Model1: Overall Gender Gap in primary level schools, Pakistan

Dependant Variable	1= Enrolled in Private 0= Enrolled in Public
Main	
group_1 (Girls)	0.304***
	(0.00274)
group_2 (Boys)	0.287***
	(0.00225)
Gender Gap	0.0172***
	(0.00355)
Endowments (Explained Difference)	0.0488***
	(0.00235)
Coefficients (Unexplained Difference)	-0.0272***
	(0.00267)
Interaction	-0.00436***
	(0.000825)

Probit Results:

Table 2 B

Model1: Overall Gender Gap in primary level schools, Pakistan

Dependant Variable 1 = Enrolled in Private school 0 = Enrolled in public school	Girls	Boys
Mother's Education	0.0236***	0.0220***
	(0.00306)	(0.00284)
Father's Education	0.0209***	0.0202***
	(0.00264)	(0.00230)
Female working proportion	0.0315	-0.0357
	(0.0267)	(0.0229)
Male working proportion	-0.0138	-0.0226
	(0.0157)	(0.0136)
Household Size	0.0723***	0.0592***
	(0.00879)	(0.00778)
Wealth Index	0.201***	0.208***
	(0.00890)	(0.00753)
Region dummy	-0.0492	-0.0977***
	(0.0298)	(0.0266)
Residential Status	0.185***	0.234***
	(0.0301)	(0.0268)
Nearest Water Facility distance	0.0340	0.0336
	(0.0702)	(0.0537)
Age	-0.0833***	-0.0740***
	(0.00696)	(0.00603)
Income per capita	0.0000119**	-0.00000463
	(0.00000595)	(0.00000346)
Primary school distance dummy 1	0.202	-0.0976
	(0.427)	(0.215)
Primary school distance dummy 2	0.326	-0.0115
	(0.429)	(0.216)
Primary school distance dummy3	0.280	-0.0222
	(0.438)	(0.225)
Primary school distance dummy 4	0.266	-0.0364
	(0.471)	(0.268)
Proportion of children going to Public school	-0.0190***	-0.0176***
	(0.000915)	(0.000765)
Proportion of children going to private school	0.0279***	0.0315***
	(0.000961)	(0.000860)
First born	0.171***	0.217***
	(0.0350)	(0.0309)
Total number of children	-0.111***	-0.0824***
	(0.0117)	(0.0103)
_cons	-0.685	-0.167
	(0.453)	(0.254)
All results with district effects N=55592	23416	32176
Standard errors in parentheses ="* p<0.01	** p<0.05	*** p<0.001"

Oaxaca Decomposition:

Table 3 A

Overall Gender Gap in secondary/middle level schools, Pakistan

Dependant Variable	1= Enrolled in Private 0= Enrolled in Public
Main	
group_1 (Girls)	0.266***
	(0.00385)
group_2 (Boys)	0.229***
	(0.00284)
Gender Gap	0.0363***
	(0.00479)
Endowments (Explained Difference)	0.0738***
	(0.00310)
Coefficients (Unexplained Difference)	-0.0258***
	(0.00394)
Interaction	-0.0117***
	(0.00221)

Probit Results:

Table 3 B

Overall Gender Gap in secondary/middle level schools, Pakistan

Dependant Variable 1= Enrolled in Private school 0= Enrolled in public school	Girls	Boys
Mother's Education	0.0120***	0.0173***
	(0.00413)	(0.00370)
Father's education	0.0187***	0.0222***
	(0.00372)	(0.00299)
Female working proportion	0.0642*	0.00180
	(0.0372)	(0.0305)
Male working proportion	-0.0321	-0.0696***
	(0.0218)	(0.0174)
Household size	0.0545***	0.0770***
	(0.0137)	(0.0112)
Wealth Index	0.168***	0.190***
	(0.0132)	(0.0101)
Region dummy	-0.325***	-0.160***
	(0.0438)	(0.0360)
Residential Status	0.138***	0.0661
	(0.0417)	(0.0348)
Nearest Water facility distance	0.0364	0.110
	(0.0980)	(0.0771)
Age	-0.0798***	-0.0817***
	(0.0148)	(0.0123)
Income per capita	0.0000105	0.000000426
	(0.00000741)	(0.00000303)
Secondary school distance dummy 1	-0.325*	-0.0319
	(0.141)	(0.0984)
Secondary school distance dummy 2	-0.226	0.00141
	(0.142)	(0.0994)
Secondary school distance dummy 3	-0.260*	0.0652
	(0.154)	(0.104)
Secondary school distance dummy 4	-0.495**	-0.0461
	(0.199)	(0.135)
Proportion of children going to Public school	-0.0258***	-0.0172***
	(0.00139)	(0.00104)
Proportion of children going to Public school	0.0208***	0.0243***
	(0.00131)	(0.00108)
First Born	0.143***	0.110**
	(0.0423)	(0.0348)
Total number of children	-0.0954***	-0.104***
	(0.0185)	(0.0149)
_cons	0.0730	-0.135
	(0.326)	(0.245)
All results with district effects N= 29317	11259	18058
Standard errors in parentheses ="* p<0.01	** p<0.05	*** p<0.001"

Oaxaca Decomposition:

Table 4A

Overall Gender Gap in higher secondary education schools, Pakistan

Dependant Variable	1= Enrolled in Private 0= Enrolled in Public
Main	
group_1 (Girls)	0.263***
	(0.00517)
group_2 (Boys)	0.207***
	(0.00356)
Gender gap	0.0559***
	(0.00628)
Endowments (Explained Difference)	0.0775***
	(0.00382)
Coefficients (Unexplained Difference)	-0.00337
	(0.00612)
Interaction	-0.0183***
	(0.00426)

Probit Results:

Table 4B

Overall Gender Gap in higher secondary education schools, Pakistan

Dependant Variable 1= Enrolled in Private school 0= Enrolled in public school	Girls	Boys
Mother's education	0.00856*	0.00988**
	(0.00453)	(0.00426)
Father's Education	0.00696	0.0130***
	(0.00442)	(0.00360)
Female Working Proportion	0.0590	-0.0141
	(0.0477)	(0.0379)
Male Working Proportion	0.0204	-0.0562**
	(0.0237)	(0.0200)
Household Size	0.00214	0.0417**
	(0.0165)	(0.0133)
Wealth Index	0.0970***	0.169***
	(0.0163)	(0.0123)
Region dummy	-0.480***	-0.268***
	(0.0534)	(0.0447)
Residential Status	0.100**	0.0984**
	(0.0482)	(0.0414)
Nearest water facility distance	0.167	0.0420
	(0.127)	(0.0921)
Age	-0.0915***	-0.0993***
	(0.0171)	(0.0142)
Income per capita	0.00000487	0.000000813
	(0.00000572)	(0.00000502)
Higher school distance dummy 1	-0.473***	-0.190*
	(0.164)	(0.108)
Higher school distance dummy 2	-0.375**	-0.0790
	(0.165)	(0.108)
Higher school distance dummy 3	-0.345**	-0.0974
	(0.172)	(0.113)
Higher school distance dummy 4	-0.491**	-0.236*
	(0.235)	(0.139)
Proportion of children going to Public school	-0.0218***	-0.0179***
	(0.00170)	(0.00129)
Proportion of children going to Private school	0.0126***	0.0154***
	(0.00154)	(0.00125)
First Born	0.121***	0.169***
	(0.0448)	(0.0370)
Total number of children	0.00264	-0.0353*
	(0.0219)	(0.0174)
_cons	1.198**	0.906**
	(0.398)	(0.313)
All results with district effects		
N=18435	6857	11578
Standard errors in parentheses		
="* p<0.01	** p<0.05	*** p<0.001"

Oaxaca Decomposition:

Table 5A

Overall Gender Gap in years of education achieved by children, Pakistan

Dependant Variable	Years of education
Main	
group_1 (Girls)	9.264***
	(0.0238)
group_2 (Boys)	9.172***
	(0.0180)
Gender gap	0.0919***
	(0.0299)
Endowments (Explained Difference)	0.667***
	(0.0189)
Coefficients (Unexplained Difference)	-1.044***
	(0.0334)
Interaction	0.469***
	(0.0258)

OLS Results:

Table 5B

Overall Gender Gap in years of education achieved by children, Pakistan

Dependant Variable Maximum Years of education achieved	Girls	Boys
Mother's Education	0.104***	0.0435***
	(0.00488)	(0.00447)
Father's Education	0.102***	0.188***
	(0.00465)	(0.00348)
Female working proportion	0.339***	-0.0655**
	(0.0411)	(0.0336)
Male working proportion	-0.272***	-0.390***
	(0.0211)	(0.0138)
Age	-0.0899***	-0.00305
	(0.00659)	(0.00487)
Household Size	0.200***	0.207***
	(0.0136)	(0.0109)
Wealth Index	0.604***	0.491***
	(0.0149)	(0.0106)
Region dummy	0.500***	-0.365***
	(0.0519)	(0.0410)
Income per capita	0.0000218***	0.0000243***
	(0.00000391)	(0.00000269)
First Born	0.127***	0.154***
	(0.0422)	(0.0326)
Total number of children	-0.280***	-0.226***
	(0.0173)	(0.0136)
Distance to nearest water facility	-0.362***	-0.00974
_cons	8.892***	6.959***
	(0.231)	(0.190)
All results with district effects		
N= 59574	23178	36396
Standard errors in parentheses		
="* p<0.01	** p<0.05	*** p<0.001"