Gender Differences in Education:

Are girls neglected in Pakistani Society?

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Abstract

Female education is prerequisite for the rapid growth in the developing countries, however, its influential role has undermined due to outdated social norms, cultural barriers and gender preferences. The primary objective of this study is to examine the factors determining gender differences in education with individual and socioeconomic characteristics of the households by using Pakistan Social and Living Standards Measurements (PSLM) survey data from 2005 to 2016. It also investigates the extent of household income that can affect relative position of females in Pakistani society with acquisition of education. This study uses two empirical specifications according to the measurements for education attainment. I use ordered logit model for categorical variable of education achievement that consist of primary, secondary, tertiary and no level of education, and logit model regression for binary variable of current enrolment. In addition, the study deals causal relationship between education attainment and income per capita of the household by using Two Stage Residual Inclusion (2SRI) method. The household's per capita income provides significant and positive effect on education investment. Findings reveals that education returns are higher with the transition of primary to secondary level in comparison of secondary to tertiary level of education for boys and girls both. Meanwhile, marginal effects indicate that education completion rate is lower for girls as compared to boys and results remain consistent even after controlling for endogeneity. Additionally, the current enrolment is adequately higher for boys who have more probability to maximize household per capita income than girls have. The estimates are consistent with the alternative specification of ordered probit model regression and other explanatory variables. The findings are robust with regional and provincial heterogeneity. The study recommends government interventions to reduce gender gap by investing in females' human capital to uplift their socio-economic position in a society to meet economic challenges of the country.

Key words: Human capital, Gender, Education, Ordered logit model.

JEL Codes: O15, I24, I25

1. Introduction

The aim of this study is to examine the gender differences in education while incorporating individual and socioeconomic characteristics of the household by using Pakistan Social and Living Standards Measurements (PSLM) survey data from 2005 to 2016. The existence of gender gap in education generate other socioeconomic issues that deteriorate welfare and economic growth in developing countries (Becker 2013; Dollar et al., 2000). According to the Education for All (EFA) report, knowledge stimulates the stock of the human capital in an economy and increases the probability of equal distribution of the resources regardless of gender, regions, and sectors (Barro et al., 2013). Most of the past studies focused on the social and demographic aspects for gender disparities[1] with unidirectional approach of education effect on income. In addition, some only favor the returns of education by ignoring the alternative income approach for human capital (Aslam 2009; Tansel 2012; Card et al., 2015). Therefore, it demands examining the causal effect of household income on education attainment that is directly correlated to the human capital growth at micro level (Subrahmanian 2008)[2]. In recent years, Pakistan has improved its educational strategies to achieve Universal Primary Enrollment (UPE) goals (Chaudhary et al., 2009). However, literacy rate of the country has decreased from 62 to 58 percent in 2018 and the gender specific enrolment rates have dropped drastically.

It has commonly observed that traditional societies attenuate the influential participation of female in the economy (Delgado et al., 2014). Female education has proven effective channel for rapid development in industrial countries and this divergent approach has changed the viewpoint of the policy makers and researcher for social and economic egalitarianism (UNESCO 2010). Gender equality was set in 2005 as an important part of the charter in Millennium Development Goals (MDGs) and the initial target of MDG3 was to eliminate the gender gap in the primary and secondary education that is already quite lower in 94 developing countries including Pakistan. However, it is not straightforward and direct to measure gender gap in the framework of micro data with qualitative and quantitative approaches[3]. The strong patriarchy, cultural norms, regional

[1] The previous literature focus on the determination of the education with age and grades only. They ignored the influence of each level of education with the perspective of gender equality and economic growth (Iddrisu 2014, Sackey 2007, Burney et al., 1995, Kingdon 2001, Psacharopoulos et al., 1994).
[2]For example, Berhman (1997), Chaudhri (2002) and Glick (2000) have not sufficiently examined the reverse causality for human resources development.
[3] Measuring gender inequality in education in South Asia (UNICEF 2006).

conflicts and son preferences are among major factors of meager female human resources in Pakistan.

The gender differences have transitional and long run effects and it is important to highlight those circumstances that elicit investment on a male child. Firstly, gender equality and other welfare measures remain unobserved and undocumented due to severe parental discrimination against daughters and consider unaccountable that some studies have failed to estimate in terms of education expenditures and household's income (Best et al., 2016; Odhiambo 2015). Secondly, a boy has 15 percent more chances to attend the school as compared to the girl. Meanwhile, sons are considered as the financial assistance for parents in their elderly ages and lack of social and universal protection system stimulates gender-biased investment. Previous research analyze the strong correlation between household per capita income and education attainment only for permanent residents but not for temporary ones that are daughters (Munshi 2017). It deliberately influence on the female employment and wage rate, which remain quite low as compared to male in the labor market (Postiglione 2015). Although, there is considerable body of evidence that the increase of education and labor force participation of females reciprocate human resource development (Kingdon 2007; Whalley et al., 2013).

The rapid expansion of gender gap in education appear to have equivalent effects such as; traditionally, parents consider single-gender schools inappropriate for their daughters, therefore, 39 percent girls are not enrolled in these schools as compared to the 30 percent boys. Land ownership for school construction and the allocation of the resources have been remained politicized. Contrary, education returns from secondary and tertiary levels prove to have increasing marginal effect regardless of gender if the political and economic unrest have minimized (Shang et al., 2013; Bandiera et al., 2013). Additionally, insufficient female teaching staff, safe learning environment and high education expenditure discourage parents to educate their girls (Canes et al., 1995). Besides this, traditional concepts regarding females for procreation and increase fertility rate, domestic chores, and early marriages have limited their human capital that immensely require to be stemmed in the economic growth of the country (Amartya Sen 1992). In addition, only 2.9 percent share of GDP in education also reveals that education is not a priority at the state level (World Bank 2017).

This study contributes in the literature by following manners: firstly, factors that influence on the education attainment have probability of misspecification due to limited information about the child's environment and family structure; therefore, it needs to concentrate on the determinants of human capital at micro level. This study examine the factors behind school completion and enrolment rates of the students within and across the households in Pakistan. Secondly, the issue of gender differences in education has not received much attention among researchers in Pakistan[4]. This requires to highlight the importance of gender gap in education by examining categorically over the years with the context of Pakistan. Thirdly, this study establishes the link between gender differences in education and household income by examining the relative position of females in Pakistan with the help of ordered logit model regression for education achievement and logit model regression for current enrolment. It captures the gender discrimination treatments whether it exists or not along with household investment that might has more incentives to boys as compared to girls. Fourthly, the study develops and implements an empirical strategy by dealing the causal effect of household's per capita income on education attainment[5]. It attempts to exploit the exogenous variation in the household per capita income caused by income shocks mainly by income deviation, average income difference, windfall income and average rainfall on the education by using Two Stage Residual Inclusion approach that finds appropriate method for non-linear models.

I begin with the introduction that covers the main interest of the study that is gender role in education in section one. The key features, education statistics of Pakistan of recent decades and undergoing educational programs are discussed in section two. The third section explains the importance of gender equality with the previous evidences. Fourth section describes the methodology and data description. The section five presents results and analysis, while, final section concludes and provides policy implications and limitations of the study.

[4] Few research works have observed on other areas such as on women socioeconomic profile by Raza (2013), Qureshi et al. (2012) and, Shah (1986). Others investigated on female participation by Chishti et al. (1989), cultural context in studies of Ibraz (1993), women decision making by Naqvi et al. (2002). Recent studies have considered impact of female education on labor force participation by Faridi and Basit (2009); Azid et al. (2010).
[5] Past studies have tackled endogeneity issue but they remain limited in specific domains such as Aslam (2009).

2. Stylized facts in Pakistan

The educational policy in Pakistan has shown major shift of the funding from higher education to the basic education after 1990. The allocation of the funding to the grades 1 to 8 increased from 32 percent in 1983-1988 and 50 percent in 1993-1998 (Mahmood 1997) but the government expenditure as percentage of GNP (Gross National Product) has remained low from 1990 to 1996 (World Bank 2001). However, the government has given preference of increase number of girls' enrolment to meet Universal Primary Enrolment targets of MDGs but in last decades there have been one girls' school as compared to two boys' school (Warwick et al., 1995). Many obstacles have interrupted to achieve the educational goals for example, lower per capita income of the household, late admission of the child, poor performance of the child that cause repetition of the same grade over the years and, mobility restriction (Cruces 2013, Siddiqui 1991; Mahmood et al., 1992, 1998). In fact, government sanctioned the small amount of fees to curb the false number of the students in the school where the education is free of cost.

The main strategy under the framework of Sustainable Development Goals (SDGs) includes human endowment improvement in education for increasing females' enrolment rate in science, technology, engineering and mathematics (STEM). Additionally, Gender parity index that has estimated for the gross enrolment rates for males and females separately, ranked Pakistan 151 out of the 153 countries that provides low portfolio of education achievement. This agenda has framed for 2016 to 2023 having core element of the gender inequality (SDG 5) which focuses not only the socio-economic side but also radical expansion in investment and business enterprises. On the gender-based employment, females are appropriate to engage in the high-income profession but they demand higher education and secure working environment (Fox et al., 2014; Munshi 2017)[6], similarly, occupations associated with physical and manual labor work categorize more participation of males (McWayne et al., 2013).

According to UNESCO, 130 million girls between 6 to 17 years of age have never enrolled to the schools. In fact, Umbrella Facility for Gender Equality (UFGE) trust that has developed in 2012 aims to narrow the gender gap with the public collaboration among 50 developing countries. It has examined that approximately 22.6 million children of school going age for secondary level and 5 million children for primary level have never enrolled in any institution. Even,

[6] World Bank Group Gender Equality, Poverty Reduction, and Inclusive Growth Gender strategy 2016-2023.

demographically several statistics reveals severity of gender gap with the low enrolment rates. Such as, 10 percent girls are out of the school in Islamabad that is the capital and highly developed city of Pakistan. Furthermore, tribal areas in the province of Balochistan estimate 75 percent girls out of the schools and in rural areas. Critically, estimates are available that girls receive only 1.01 percent of education throughout their lives as compared to the boys of their relative age groups. It strikes one of the seminal factors for the low-income growth in Balochistan as compared to Punjab because of too expensive education for the local people. Consequently, Ministry of Women Development with social welfare organizations improved retention by accommodating of half million girls in 5000 primary schools in 2006 (TAWANA Pakistan Program). However, other education levels especially tertiary have neglected badly until the present.

To encourage literacy rates in secondary education 4 million scholarships for girls in public schools have been launched (World Bank 2017). The Punjab government with the initiative of World Bank Program is committed to build 7,000 schools to facilitate 21,000 students in rural areas. In addition, the Alternative Learning Programs (APLs) of UNICEF support 1,400 girls in traditional formal schools, besides, UNICEF and UNESCO are collaborating with Education Ministry of Pakistan to support development of SDG4 (Sustainable Development Goals) Action Plan with trustworthy monitoring mechanism and incorporating education plans and strategies. The equity-based education provision considers as the main objective in the policy dialogues and management programs (UNICEF Report 2016). Other relative issues across the country correlate with the political instability and mishandling of the education sector. Firstly, missing, untrained and underqualified teachers have failed to establish any incentive for parents to educate their daughters, especially in public schools. If above criteria is met, the cost associated with the education attainment is beyond the financial capacity of parents. In 1972, all schools have nationalized by the state but after Five Year plan (1983-1988), private schools were encouraged to open under government curriculum (Tan et al., 1987). This introduced another wave of gender discrimination, as parents prefer private and costly schools for the boys and, public and cheaper schools for the girls (Desai et al., 2009). Secondly, gender-segregated schools and degree programs manipulated the performance and cognitive skills of the girls. As empirically, it is evident that girls experience productive scores in the presence of adequate female faculty members (Carrell et al., 2010). Therefore, prevailing poverty, inadequate public investment,

insecurity, limited schools, especially, in conflicted areas imply severity of educational reforms and demand collaborative work of federal and provincial governments to provide education to every single girl of the country.

3. Literature Review

Education can improvise labor inputs to facilitate the long run economic growth and development (Belfield 2000) that are the basic elements of Cobb-Douglas production function and economic growth models (Romer 1994)[7]. The accumulation of human capital from school time, quality of education and educated parents with the other factors of production can derive poor countries into revolutionary process of growth (Glomm 1997). According to the Livingstone (1997, 2018) the addition of schooling remains questionable debate for human capital contribution since 1970, which can determine by the enrolment rate of the country. Many countries experienced the improvement of the enrolment rates but the continuous growth rate seems difficult to achieve. This dilemma of the human capital and education can be revisited and revised that focused not only the quantity of the education but also for the quality of education. While, similar research advocate quality of education with the socio-economic characteristics of the country for human capital growth (Vinod et al., 2007).

Past studies find significant relationship between gender equality in education and economic growth. It has examined higher marginal return to education by female students and this impact is transgenerational that reduce fertility rate. Galor and Weil (1993) in his studies "The gender gap, fertility and growth" examined the mechanism between fertility and growth with compiling three components in their models. They formulated a three-period overlapping generation model with two people; man and woman with equal brains. The first component states, women's relative income increase with addition in the capital per worker, secondly; relative wage of women reduces the fertility by increasing cost of children more than household capital and lastly; lower level of fertility rate improves again capital per worker. These factors eventually boost up the economic growth.

[7] P. Roemer, Increasing returns and long-run growth', Journal of Political Economy vol. 94, 1986, pp. 1002-1037;
R. Lucas, 'On the mechanics of development planning/ Journal of Monetary Economics vol. 22, no. 1, 1988, pp. 3-42; and
R. Barro, and Xavier Sala-i-Martin, Economic Growth (New York: McGraw-Hill, 1995).

The relationship of demographic development and the long-run economic growth in Europe explain trends of female-to-male human capital coordination consist of equilibrium process. Lagerlof (2003) used the data of World Penn for 1990 and the key variables were number of years of schooling to people above 15 years of age and fertility rate. The study focuses on the coordination games among families to invest less in girls' education as compared to boys establishing Nash equilibrium due to gender discrimination despite the symmetric sexes. The paper views the gender stereotype for equal education investment on both sexes of the children by becoming optimal atomistic parent.

Allocation of time of boys and girls schooling, activities to generate income and household work have investigated using data of Peru by Illahi (2001). Boys spend most of the time outside and girls mostly remained busy in-house chores evaluating econometric findings, which suggest that for the household welfare the changes affect the schooling and housework for girls rather than boys. The study conducted by Subrahmanian (2006) "Mainstreaming gender for better girl's education: policy and institutional issues," emphasized on the needs of the implementation of policies for gender awareness by moving beyond targeting women to think systematically on different sectors of education association and the measures attained on different points as outcomes.

Some studies also provides shrinking gender gap in the school assessment scores. The study of Thomas in 2004 measured high performance by girls as compared to boys in reading and writing in 2003 from 2002. Additionally, in their fourth grade statistics provide better scores but in mathematics assessment for secondary level from 1990 to 2003 have accounted low grades. In contrast, working on the household dataset of Nigeria, Rahji M.A.Y (2005) used the multistage sampling technique for data collection and probit modeling for the data analysis. Evidence from the estimations show that more boys have enrolled than girls, predicting gender gap of 12.56 per cent in favor of boys. Klasen and Lamanna (2009) investigated the impact of gender gap in education and employment on economic growth by applying cross-country panel regression from 1960 to 2000. The studies focused on the long run economic growth.

Empirical studies find that wage improves by enhancing female education and their returns are quite larger than males (Card et al., 2015). Evidences reveal that not only gender gap can reduce by investing in the females' education but also human development outcomes such as chances of

child survival will be maximized and better status of health and average years of schooling (Schultz 1993; King et al., 2003). Furthermore, Taiwo (2014) established the relationship between human capital investment and economic development by education attainment for economic output. The study adopted Error Correction Mechanism by Lawanson (2009) for Nigeria from 1983 to 2007 and investigated the positive effect of the investment on health and education on economic growth.

Klasen (2000, 2015) argue the growth rates differences from 0.4 to 0.9 between East Asia and Sub Saharan Africa, South Asia and Middle East from point estimates can consider by the huge gender gaps in education having mostly influence in the latter regions. The same results found positive working with the school enrollment and other factors with different cross-countries data such as Beutel et al. (2001) work on Nepal by using number of schooling in years. Robb et al. (2012) examines the gender differences in education attainment using data of university's graduates by ordered probit model. The female students perform better than male but they are less likely to obtain first class degree. It is evident that factors such as type of institutes, individual's ability or choice of subjects are not the reason for gender differences, but the effects of these factors rise gender gap in performance. The empirical work conducted on the dataset based on university grants. It estimates education outcome with variables such as age, marriage, entry-level education, parents' occupation and subjects. The predict probabilities explains that the likelihood female students get first class degree is 5 percent, compared with 8 percent of the male students.

These differences can be explained by possible ways in which how male students are assessed, biased and prejudiced assessment or may be institution specific factors (McNabb et al., 2002). Treatment differences between sons and daughters in education by the parents in developing countries by using households' survey 1995 are estimated by Kingdon (2002). The analysis showed significant difference in the treatment of daughters' education for intra household structure that is hugely unexplained component in educational attainment. The stratified sample of 1000 households in Lucknow district Uttar Pradesh was conducted on personal and family characteristics including labor market activities. Gender gap in enrolment rates and years of schooling is statistically significant in district of Uttar Pradesh where 75 per cent of the disparity

is unexplained. However, the study remain unable to control the potential endogeneity with age and women's expected returns to employment for the education outcome.

The primary goals of government and economic growth have put influence on the gender equity have been estimated with unit-record data of China In-Depth Fertility Survey 1985 in Hebei, Shaanxi and Shanghai. The trends in gender gap have observed with transition to elementary and junior high school log-odds-ratio. The policies designed by the government encourage male as compared to female children for strong economic development and incentives to education system (Hannum et al., 1994). Industrial countries favors to abolish gender discrimination in pursuit of modernized and welfare economies. For example, Blossfield (1993) has analyzed that coexisting societies provide differential scores with variation in the strata. Social and cultural behavior have increased the probability of getting efficient development strategies but some areas such as, Sweden, Italy, Hungary are required to revise education systems and persisting barriers for gender equity and redistribution of the resources.

Traditional norms favors to boys as compared to girls are observed in rural China (Bauer et al., 1992; Freedman et al., 1990). The other study of Maitra (2003) explains no gender difference in the current enrolment rates between 6 to 12 years of age but higher gap in grade attainment for girls between 13 to 24 age using model of probit and censored probit model simultaneously. This study examines the results based on individual and family characteristics. The first dependent variable was dummy of current enrolment if enrolled currently or otherwise and second one was categorized from 0 to 3 with no level of education to highest level of education completed above grade 10. The explanatory variables used were religion, household size, siblings, household head education and occupation, log of per adult household expenditure and other household characteristics such as bedroom, water, toilet and availability of electricity. The data used from the Matlab Health and Socio-Economic Survey (MHSS) of 1996 in rural Bangladesh containing 149 villages and 180,000 estimated population as per 1982 census. The endogeneity issue of the permanent income tackled with the residual term of the log of the adult expenditure variable. The null hypothesis of exogeneity of permanent income could not be rejected in current enrolment estimation but could be in highest-grade estimation. The coefficient estimate of gender dummy was positive and significant referring that probability of attaining post-secondary schooling is significant in girls as compared to boys with 2.6 percent marginal effect.

In context with Pakistan, Mahmood et al. (2012) by using time series data from 1971 to 2009 for Pakistan investigated the human capital investment and economic growth. In his work, the ARDL (Autoregressive Distributed Lag) and OLS (Ordinary Least Square) models show positive effect between high enrolment rate and economic growth rate in short run as well as in long run. Chaudhary (2007) in his studies "Gender inequality in education and economic growth: Case study of Pakistan" focused on the positive impact of gender equality on economic growth by increasing girls' enrolment ratio and decreasing the cultural and social barriers for female education. Naila Kabeer (2005) in her studies examined the women empowerment is inevitable without reducing gender gap in education. The freedom of choice to secure and protective lives of females from basic health issues to higher education attainment are the mainstream for the achievement of the MDGs (Bar et al., 2015). The funding shift in 1990s' education policy in Pakistan from higher education to the basic primary education was major challenge.

Interestingly, Lloyd et al. (2005) find the allocation of the budget for education add up to 50 percent increase until 1998. It appears that this access is more important for the girls as compared to the boys. The studies assessed the role of primary school availability and types including private and public schools for the boys and the girls based on the parent's decisions. This is also worth noticing that number of researchers have estimated models of the likelihood of school entry using cross-sectional data that control for relevant family and individual factors and add some measure of school access. Some of these factors include the presence of a primary school either at the time of the survey or at the time of the schooling decision such as study of Sawada et al. (2001) for Pakistan, while other explain education endowments with the distance to the nearest school (Sathar et al., 1994; Hazarika 2001)[8].

Sabot (1992) estimated low school enrolments in rural areas and latent demand for girls' schooling using survey by International Food Policy Research Institute. The demand of schooling also channelized by other factors such as parents' education, landholdings and income (Burney et al., 1995). The school going children in age 10-14 are likely to participate in the income creation in poorer families (Sathar et al., 1987). Poverty and non-availability of enough resources to education found huge dropouts from schools, which included time allocation for the take care of

[8] The number of years a school has been present in the community for Nepal (Beutel et al., 2001), for Tanzania (Bommier et al., 2000) or the presence of a school within some fixed distance or travel time for Mozambique (Handa et al., 2000).

younger siblings. The adolescent of the girls is directly proportional to the mothers' household labor time. This age period is different for the boys as they are exempted to the younger siblings' care. The education of the father has direct and significant positive effect on child's education presumably proxy for the household permanent income (Khan et al., 1987). In depth, the house chores and younger siblings care have been observed in peak at girls' age 10 to 15 (Chishti et al., 1991).

Data used in the study of Sathar et al. (2005) gathered from 12 rural communities in provinces of Punjab and Khyber Pakhtun Khawa (KPK). The per capita consumption information was used by PIHS (Pakistan Integrated Household Survey, 1995-1996). Sixty households randomly selected and currently married women between 20-45 ages have interviewed. The data were covered 38 schools including public and private. The parents' preference was strong for separate schools for the girls (Sathar et al., 2001). The nested multinomial logit model used for estimation of mutually exclusive choices not to enroll, to enroll in public or private school. Other variables used are father's education, mother schooling, public and private schools' availability and teachers residing in the same village.

In 2006, UNESCO's EFA Global Monitoring Report Team draws the forecast results for school year 2002 to 2003 to achieve Universal Primary Enrolment (UPE) goal, gender disparity in primary and secondary education and improvement in the literacy rate up to fifty percent in coming recent years. The progress can have been seen in many countries but for the fulfillment of the all MDGs there is immense need of the investment in the education. The very positive signs cannot be ignored as the girl's enrolment ratio has risen up in recent years; similarly, the public funding has been escalated including Pakistan and Indonesia in South Asian countries[9].

Chaudhary (2009) used censored ordered probit model to estimate the gender gap in education by using the data of Uttar Pradesh–Bihar Survey of Living Conditions, 1997-1998 for different age groups. Previous studies has focused gender gap in education but not for long period or for each level of education with respect to household income. He finds way of poverty alleviation that examined by improving female education, reducing family size and dependency ratio with expansion in the female labor participation in Southern Punjab Pakistan. He used individual,

[9] The Malala Fund has founded in 2013 for 12 years free education for the girls believing on the best investment by anyone around the world is in girls' education.

household and community level characteristics and capture parents investment on child with the additional variable of salaried employment. Therefore, ignoring the direct and reverse effect of income and schooling, the study measures the human capital development without considering consumption and income patterns. He used availability of food grains and fuel for exogeneity concerns contrary to Maitra (2003) who instrumented consumption expenditure with livestock and durable goods to analyze the education effect on the household development. While, working on the cognitive achievement rate of selected 800 households for rural Pakistan, Berhman (1997) explain that returns of education is high with the quality of education and exposure of the students among different teachers. The study used current income and estimated the education expenditure with the set of family and household characteristics but the meagerly focus on the family income and its causal behavior on the cognitive achievement. However, the study of Galick (2000) controlled the endogeneity with the sample segregation based on the age, without providing trend and direction of the parent's education on the children school outcomes.

4. Methodology and Data

4.1 Data and Variables

Data:

This study uses micro data from the Pakistan Social and Living Standards Measurements (PSLM) survey conducted by the Pakistan Bureau of Statistics (PBS), Government of Pakistan, for the six rounds (2005-06, 2007-08, 2010-11, 2011-12, 2013-14 & 2015-16) from 2005-2016. It has designed to provide social and economic indicators at provincial and district level, which has been started from 2004 and appears to be true presentation of the country[10]. The sample size of PSLM surveys is 80000 households approximately[11].

Dependent Variables:

[10] The objective of PSLM is to establish the distributional impact of the development programs considering the government expenditure expansion and welfare of people accordingly. The data calculated from these surveys is basically used for the monitoring and assessing the Millennium Development Goals (MDGs) indicators and assisting the government to formulate and design policies and strategies for poverty reduction, employment opportunities, gender equity in education and economic development.

[11] The reasons to use PSLM data conducted by PBS are following; Firstly, PBS takes special measures for the quality and reliability of the data by monitored team with supervisors for the field wok. Entire data is taken from all the regions of Pakistan to the Islamabad Headquarters for further processing. Secondly, the survey covers wide range of topics such as; education, health, occupation, services etc. Thirdly, the survey is the main mechanism for monitoring Millennium Development Goals (MDGs) indicators in Pakistan.

This study develops by using two alternative measure of education attainment, first, highest grade attained that I proxy for education achievement and second, current enrolment[12]. The education achievement is categorical variable that is estimated by ordered logit model and accounts for the children between 13 to 24 years of age. I define these categories as;

$$Education\ achievment = \begin{cases} 0 = \ No\ education \\ 1 = Primary\ education\ (Grade\ 1-5) \\ 2 = Secondary\ education\ (Grade\ 6-12) \\ 3 = Tertiary\ education\ (Grade\ 13-16) \end{cases}$$

Whereas, currently enrolled is dichotomous outcome variable and is examined by using logit model for the children who are equal or below 24 years of age.

$$Current\ enrollment = \begin{cases} 1 = Currently\ enrolled\ in\ school\ or\ institutions \\ 0 = otherwise \end{cases}$$

Explanatory Variables:

Individual characteristics: The explanatory variables include dummy variable of girl, age, square of age and, marital status of the household members (Aslam 2009). I include series of dummy variables for the education of the head, parents for complete schooling in years and members of the household for secondary and higher education who are above 24 years of age (Kingdon 2002). I also incorporate average years of schooling of mother and father in logit model regression. I use series of dummy variables for the occupation of the household members (McNabb 2002) and children 5 years or under this age. Additionally, I also control education spending with series of professions and land in current enrollment model (Maitra 2003).

Household characteristics: The household characteristics include per capita income and size of the household. I proxy for the household infrastructure and advancement in technology with the availability of the electricity, gas and telephone. I include dependency ratio that is number of children less than 15 and older above 65 years divided by total household size (Chaudhary 2009). In addition, I also control for the household physical asset by house ownership, any establishment

[12] The highest grade obtained after completion of professional degrees such as MBBS, Law, Agriculture, MPhil, MS PhD and any other highest degree have accounted in survey with code 17 to 23.

other than agricultural land and currently owning any part of the land where household member cultivate (Sawada 2009). Finally, I include dummy variable for urban and provinces of the country (Holmes 2003; Hazarika 2001). Table 4.1 shows the description and explanation of the selected variables.

Table 4.1 Variables Description and Data Resources

Variables	Explanation of the Variables	Resource
Dependent Variable		
Education achievement	=1 if the highest level of the education is primary (Grade1-5) aged (13-24) =2 if the highest level of the education is secondary (Grade 6-12) aged (13-24) =3 if the highest level of the education is higher (Grade13-16) aged (13-24) =0 if no education aged (13-24)	PSLM
Current enrollment	=1 if the child is currently enrolled in school/institution =0 if the child is not enrolled in any school/institution	PSLM
Explanatory Variables		
Income per capita	Log of per capita income of the household (in Pakistani Rupees)	PSLM
Girl	=1 if the child is girl less than 25 years =0 if the child is boy less than 25 years	PSLM
Age	Age of the person in the household (in years)	PSLM
Square age	Age of the person in the household (in Square)	PSLM
HH size	The size of the household	PSLM
Married	=1 if the person is married =0 otherwise	PSLM
Member secondary	=1 if the person above age 24 in the household at least have secondary education besides parents and head =0 otherwise	PSLM
Member higher	=1 if the person above age 24 in the household at least have higher education besides parents and head =0 otherwise	PSLM
Member math	=1 if member of the household can solve mathematical questions =0 otherwise	PSLM
Edu Mother	=Average years of schooling of the mother in the household	PSLM
Edu father	= Average years of minimum schooling of father in household	PSLM
Edu Parents	=1 if any parent of the household is educated =0 otherwise	PSLM
Head education	=1 if the household Head is educated =0 otherwise	PSLM
Professional	=1 if the person in the household is senior officer =0 otherwise	PSLM
Manager	=1 if the person in the household is professional =0 otherwise	PSLM
Technician	=1 if the person in the household is technician =0 otherwise	PSLM
Clerk	=1 if the person in the household is clerk =0 otherwise	PSLM
Operator	=1 if the person in the household is machine operator =0 otherwise	PSLM
Education spending	=1 if the household spend on education =0 otherwise	PSLM

Child 5	=1 if the child less than 5 years in the household = 0 otherwise	PSLM
Dependency Ratio	The number of children less than 15 and older above 65 years divided by total household size	PSLM
HH size	The size of the household	PSLM
Own house	=1 if the household have their own house =0 otherwise	PSLM
Cultivate land	=1 if HH cultivate agricultural land =0 otherwise	PSLM
Establishment	=1 if HH has nonagricultural establishment =0 otherwise	PSLM
Electricity	=1 if the household has facility of the electricity =0 otherwise	PSLM
Gas	=1 if the household has facility of the gas =0 otherwise	PSLM
Telephone	=1 if the household has facility of the telephone =2 connection extension =3 No direct connection =0 No connection or any extension	PSLM
Urban	=1 if the person lives in the Urban Area =0 if the person lives in the Rural Area	PSLM
Punjab (Default)	=1 Punjab Province =0 otherwise	PSLM
Sindh	=1 Sindh Province =0 otherwise	PSLM
Baloch	=1 Balochistan Province =0 otherwise	PSLM
Rainfall	=Deviation of rainfall from mean	World Bank
Income shock	=1 if HH average per capita income is less than national household average per capita income =0 otherwise	Gallup Survey
Income Difference	= Difference of HH average per capita income and national household average per capita income in log	Gallup Survey
Windfall income	= Log of unearned income (charity, gifts and inheritances)	PSLM

4.2 Empirical Strategy

The study adopt two specifications based on the education attainment such as, ordered logit model for polychotomous outcome variable (education achievement) and logit model for binary outcome variable (current enrollment). I attempt to capture reverse causality between education attainment and income per capita by Instrumental Variable techniques by exogenous income shocks. The main technique to tackle this issue is Two Stage Residual Inclusion method that is particularly designed for non-linear models however, I also incorporate Two Stage Least Square (2SLS here after) and IV Probit estimation for instruments validity and as alternative specifications in which outcome variable I treated as binary. However, the standard errors could be biased due to the unmeasured determinants of education attainment within the households past studies (Deaton 1997) suggested to deal this kind of correlation by estimating robust standard errors. Whereas, there is another possibility of endogeneity of educational expenditure for current

enrollment equation and literature provide instruments relating to the household's head union membership that are lacking in our dataset while some studies refer to the head related occupations (Maitra 2003). The estimation results after instrumenting educational expenditure with the head occupation show that the null hypothesis of exogeneity is not rejected with the p-value 0.59. I try to control educational expenditure with the addition of occupational dummies and asset variables (Shea 2000; Maitra 2004; Maurin 2002). Besides this, the reciprocation of quantity and quality of education attainment is controlled by number of children of 5 years or under 5 years of age (Hazarika 2001; Maitra 2003) [13].

The Model:

The underlying concept for the ordered logit model for education attainment is to incorporate intermediate continuous variable says y in latent regression accompanied with observed (x_i) explanatory variables and unobserved error term (ε_i). The range of y that is divided in adjacent intervals that demonstrate four categories including: 0 = no education, 1 =primary education, 2 = secondary and 3 = tertiary education respectively related to latent variable (Y^*). The underlying process might built on the similar approach to the logit model that add errors terms furthermore ordered logit model assumes continuous process relating to an unknown variable (Y^*) to independent variables (x_i) by some function.

The structural model for latent education is,

$$Y_i^* = x_i\beta + \varepsilon_i \qquad (1)$$

Where, β is vector of parameters to be estimated, ε is disturbance term which is assumed to be independent across observations and y^* can take value with observations.

For the discrete choices the following are observing as,

[13] Wald test also conducted for the coefficients of the variables that are simultaneously equal to zero and for each model, test rejects the null hypothesis describing statistically significant improvement for model fit. Besides, conditional test of specification, commonly called, Link test conducted by logit and ordered logit models. In each model of gender inequality, the test fails to reject the null hypothesis and describes no need of other explanatory variables to add or omit. Apart from link test, likelihood ratio chi-square with p-value report describes that model as a whole, statistically significant at 1 percent, and more appropriate than model having no predictors. Furthermore, I also report Akaike (AIC) and Bayesian Information Criterion (BIC) for model specification and sample fit (Akaike 1974; Stone 1979; Posada et al., 2004). Robust standard errors use for unbiased estimates and to avoid any misspecification as most of the micro dataset suffer from these issues (Blundell et al. 1997).

$$Y_i = 0 \ \ if \ -\infty < x_i\beta + \ \varepsilon_i < \tau_0 \qquad for \ \ (No \ Education) \qquad (2)$$

$$Y_i = 1 \ \ if \ \ \tau_0 \ < x_i\beta + \ \varepsilon_i < \tau_1 \qquad for \ \ (Primary \ Education) \qquad (3)$$

$$Y_i = 2 \ \ if \ \ \tau_1 < x_i\beta + \ \varepsilon_i < \tau_2 \qquad for \ \ (Secondary \ Education) \qquad (4)$$

$$Y_i = 3 \ \ if \ \ x_i\beta + \ \varepsilon_i > \tau_2 \qquad for \ \ (Tertairy \ Education) \qquad (5)$$

Where Y is the category of education attainment and τ denotes the threshold parameters briefly explaining the transition from one category of education attainment to another category.

Consequently, τ must satisfy the rule according to $\tau_0 < \ \tau_1 < \tau_2 < \ \tau_3$ as the ε_i is logistically distributed. The following probabilities can be observed as,

$$P(Y_i = 0) = P(Y_i^* \leq \tau_0) \qquad (6)$$

$$P(Y_i = 1) = P(Y_i^* \leq \tau_1) - P(Y_i^* \leq \tau_0) \qquad (7)$$

$$P(Y_i = 2) = P(Y_i^* \leq \tau_2) - P(Y_i^* \leq \tau_1) \qquad (8)$$

$$P(Y_i = 3) = \ P(\tau_2 \leq Y_i^*) \qquad (9)$$

Hence, the probability of outcome by observing can imply as,

$$P(Y_i = j) = F\left(\tau_j - x_i\beta\right) - F(\tau_{j-1} - x_i\beta) \qquad (10)$$

Meanwhile,

$$F(.) = \frac{exp(.)}{1 + exp(.)} \ demonstrates \ as \ P(Y_i = j) = \frac{1}{1 + e^{-\tau_j + x_i\beta}} - \ \frac{1}{1 + e^{-\tau_{j-1} + x_i\beta}} \qquad (11)$$

Whereas, the log likelihood function for ordered logistic regression,

$$\sum_{i=1}^{J} \sum_{j=1} Ln \left[F\left(\tau_j - x\beta\right) - F\left(\tau_{j-1} - x\beta\right)\right] \qquad (12)$$

The conversion formulates in multi-equations ordered logit models with each equation presenting logit model (Williams 2005).

The Econometric Model:

The econometric model therefore is,

$$Education \ Attainment = f(Individuals \ charac., HH \ charac.., region, provinces + \ \varepsilon_i) \qquad (13)$$

Endogeneity Bias:

The literature explores per capita income as endogenous variable that has dealt with the parental, household characteristics including employment, education, and farm activities (Behrman et al., 1997; Bratti 2007; Hoogerheide 2012; Kuehnle 2014). Some researchers use corresponding variable as permanent income (Kingdon 2005) or union membership corresponding to head and father within community (Chavellier 2013). While, some studies deal family income with government tax changes as the instrument (Paul 2002). Own and rented-in land also used as instrument for the income of the household but with the caution of the weak instrument (Okabe 2016). On the other hand, prior research such as Chevalier et al. (2002) only focus to control children ability without dealing potential endogeneity of the household income.

In this study, the endogeneity arises due to the reverse causality between household per capita income and education attainment, which I have dealt with plausible exogenous income shocks in Pakistan over time. Recent studies deal causal relationship between parents' income and the education outcome with the income shock relating to unemployment, mean deviation or difference of income, rainfall and, climates changes for productivity concerns (Fichera et al., 2015; Powdthavee et al., 2013; Ferreira 2009; Coelli 2005). In this study, I use two sets of instrumental variables. For the causal relationship between education achievement and household income, I use exogenous variables of mean deviation of the average rainfall and average income deviation that are proxy of income shock. Whereas, the causality between current enrolment and household income deals with another set of exogenous variables that include difference between household and annual per capita income levels, and windfall income.

There are two main reasons to proxy rainfall for income shock, firstly, rainfall is the most important environmental factor in the agriculture sector of the country that rely 70 percent on the consumption and export of the food production. It has direct link with the individual household and aggregate income of the country. Secondly, 65 percent of the women workforce is related to the agricultural sector directly or indirectly and deviation in rainfall implies equal loss of income of the household (Björkman-Nyqvist 2013). Furthermore, deviation in the average per capita income and their difference are proxies for income shock due to retrospective analysis of the wage earning, livestock apart from agricultural goods. It has transitional effect on the economic situation of the household (Sawada 2009; Jacoby 1997). In additions, windfall income comprise

mainly unearned income of the household or non-labor income that composed of lottery, inheritances, gifts, unexpected charities and irregular sources of income (Kingdon 2005) that are exogenous (Glick et al., 2000). Each instrument used in this study collectively describe as income shock whether associated with the household unearned income, income deviation and difference, or weather shock. The study examines the reverse causality between income per capita and education attainment by Two Stage Residual Inclusion Method (2SRI). However, I incorporate Two Stage Least Square (2SLS) and Instrumental Variable Probit (IV Probit) estimation for instruments validation and alternative specifications to deal the potential endogeneity.

Two Stage Least Square:

To apply the 2SLS, I specify the following first stage equation for income:

$$X_{en} = Z_i\gamma_i + X_i\beta_i + \mu_i \quad (14)$$

The second stage estimates as,

$$Y_i = \hat{X}_{en}\lambda_i + X_i\beta_i + \varepsilon_i \quad (15)$$

Whereas X_{en} presents endogenous variable, $Z_i \; and \; X_i$ describes as instruments and explanatory variables and λ_i , γ_i and β_i are parameter coefficients with μ_i and ε_i as error terms respectively. A valid instrument implement changes in explanatory variable and does not belong to the explanatory equation but correlated with the endogenous variable. The instrumental method should be consistent for estimation when covariates are correlated with error term in the regression. A valid instrument Z_i needs to correlate with the income such as, $\gamma_i \neq 0$ and must be uncorrelated to the error term such as $cov\,(Z_i, \varepsilon_i) = 0$. The first stage of the IV method gives strong results if the instrument is correlated with the endogenous explanatory variable and it cannot be suffered with the same problem of the predicted variable. The Durbin-Wu-Hausman test compares OLS and 2SLS model coefficients under the null hypothesis of the exogeneity of the variable, which is rejected. Therefore, we need to instrument the household income. The test of overidentification exhibits validation of the instruments. According to the rule of thumb of 10, instruments are not weak. Therefore, simultaneous regressions have performed with OLS and ordered logit model for dealing with instrumental variables.

Two Stage Residual Inclusion:

To apply 2SRI, the very first step to find exogenous variables although this method is different from the standard IV estimation method. The strategy behind choosing variables is that variables predict quite possible definition of exogeneity. The argument behind this method (Terza et al., 2008a) based on the suspected attempt of traditional linear instrumental variable estimator for correction of endogeneity problem. The core advantage of this method that estimated coefficients associated with the residuals from first stage regression significantly express the presence of endogeneity in the model (Huasman 1978). In this method, the first stage comprises of the OLS regression in which the endogenous variable has instrumented on the exogenous variables and rest of the explanatory variable and the second stage estimates with the ordered logit model and inclusion of the first stage residuals. At the end, whole program sets to be bootstrapped. The latent model will establish by splitting explanatory variables into exogenous and endogenous variables say, X_{ex} and X_{en} and equation transforms as,

$$Y_i^* = X'_{ex}\beta_{ex} + X'_{en}\beta_{en} + \varepsilon_i \quad (16)$$

The first stage equation of 2SRI method is estimated for income using all exogenous variables and instruments under the ordinary least square regression as,

$$X_{en} = X'_{ex}\beta_{ex} + Z\gamma + v_i \quad (17)$$

Whereas, $E(X_{en}, Z) \neq 0$ and $E(\varepsilon_i, Z) = 0$, whereas $\beta \; and \; \gamma$ are coefficient parameter and $v_i \; and \; \varepsilon_i$ are error term respectively.

The second stage of 2SRI method estimates with the residuals obtained from the first stage equation taken as control variable along with other explanatory variables and model describes as,

$$Y_i^* = X'_{ex}\beta_{ex} + X'_{en}\beta_{en} + \varphi\hat{v}_i + \varepsilon_i^* \quad (18)$$

This method holds simple test of the endogeneity that if the residual of the first stage statistically significant then the results would be biased in the first model without controlling endogeneity issue[14]. This study covers the first stage of the 2SRI method with the endogenous variable of

[14] The approach has significantly made pace in the literature (Stuart et al., 2009; Dunn et al., 2012; Ali 2012; Howley et al., 2015; Murray et al., 2014; McDowell et al., 2015; Toth et al., 2017; Polat et al., 2017).

income shock with full set of explanatory variables, for validity and relevancy of the instrumental variables must be correlated with the endogenous variable[15].

4.3 Descriptive statistics

Table 4.2 Descriptive Statistics

	Observations	**Average**
Dependent Variable		
Education achievement P	186868	0.1087345
Education achievement S	186868	0.1909851
Education achievement H	186868	0.0357472
No Education	186868	0.6645333
Currently enrolled	597453	0.3359662
Explanatory Variables		
Girl	444372	0.4904449
Income	715218	28474.6
Age	749503	24.25637
Square age	749503	953.0492
Married	749503	0.3749645
Edu mother	67630	8.208064
Edu father	749503	0.019405
Edu parents	749503	0.0151887
Child 5	749503	0.1260235
Edu head	749503	0.0685267
Edu member S	749503	0.4313872
Edu member H	749503	0.1315618
Edu member math	587257	0.8734455
Professional	749503	0.0119239
Clerk	749503	0.0058132
Operator	749503	0.0116784
Manager	749503	0.0067591
Technician	749503	0.0084469
HH size	749503	8.337019
Dependency	749503	0.4222545
Electricity	749503	0.7895352
Gas	749503	0.3693221
Telephone 1	723438	0.4418292
Telephone 2	723438	0.0061664
Telephone 3	723438	0.5397588

[15] The first stage regression states larger F-statistics (3044.92) than the values obtained at the 2SLSL and LIML 5 % Wald test which concludes the instruments are not weak and overidentification test concludes that instruments are well specified (with p-value= 0.5927)

Telephone 0	723438	0.0122457
Establishment	749503	0.0959409
Cultivate land	749503	0.0953485
Own house	749503	0.7347255
Education spending	749503	0.2862484
Rainfall	749501	17.41294
Income shock	749503	0.8384369
Income difference	94759	5.012859
Windfall income	749503	0.2343154
Urban	749503	0.4445319
Punjab	749503	0.400879
Sindh	749503	0.2538829
KPK	749503	0.2146062
Balochistan	749503	0.1306319

The study provides the descriptive statistics of selected variables in the Table 4.2. It has shown that the average age of the member in the household is 24.3 years. On average, almost 37 percent persons are married and 12 percent children are under the age of 5 years in the household. By considering education achievement for the children between 13 to 24 years, statistics show that 10, 19 percent and 3 percent children are in primary, secondary and higher education respectively. The currently enrolled children are 33 percent on average and the number of girls under the age of 25 years is 49 percent in the household.

In addition, the average number of educated parents are 1.5 percent and members other than head and parents who are older than 24 are having in average 13 percent higher and 43 percent secondary education. Examining the statistics of professions, low salaried jobs such as machine operators is higher in ratio. On average, the percentage of dependency ratio is 42.2. Similarly, average household size is 8.3 and 44 percent people living in the urban areas. Meanwhile, 40 percent population living in the Punjab province and second highest ratio is 25 percent in Sindh province.

5. Results

5.1 Education Achievement: Ordered Logit Model `

Table 5.1 narrates estimation results of the ordered logit model for education achievement. The results of full sample (Model 1 to 3) and by gender (for girls Model 3 to 6 and for boys Model 7 to 9) are described with the help of average marginal effects for primary, secondary and higher

education. By examining the full sample models, it conclusively observes that variable girl is significant at 1 percent level of significance by increasing the school achievement with 0.34, 1.13 and 0.08 percentage points at primary, secondary and higher education respectively. The household's income per capita remains highly significant. For 1 unit increase in the per capita income on average increases 0.2, 0.5 and 0.04 percent likelihood to increase primary, secondary and higher education achievement respectively. The effect of age is highly likely to increase the completion of education at secondary level. Whereas, being married the probability to achieve higher education is quite lower as compared to other education levels. Although insignificant, educated parents are more likely to increase education achievement of children at primary level.

Meanwhile, education of the head significantly improves the education achievement with 1.4, 24.4 and 1.9 percentage points for primary, secondary and higher levels respectively. The other household members older than 24 years having secondary are likely to increase secondary and higher education achievement by 38 and 2.5 percent respectively (Wolfe et al., 1995; Thomas et al., 1996). However, if members are highly educated then they are more likely to increase higher education achievement of the children. If the household member is associated with professional job, on average the probability to complete the secondary education of the child is 10.1 as compared to higher education that is 0.7 percentage points. Household members' numerical skills are highly likely to motivate children to achieve their education whether it is primary or higher level.

The results show occupational heterogeneity in which professional jobholders and manual workers are equally likely to support child education achievement in the country. The results show that technicians are more likely to increase the probability of higher education achievement as compared to professional jobholders. Similar interesting statistics reveal that machine operators are equally increasing the secondary education achievement as managers. Generally, the results comprehensively explain that each occupation is directly related to enhance the education completion from primary to higher. It is indicating importance of education in labor market whether associated with manual work or services. The results show economically benefits of education achievement with the reduction in the dependency ratio at 1 percent level of significance. One might get strong intuition of poverty reduction and proper family planning by discouraging higher fertility rate with the gradual increase in education achievement. In addition,

availability of electricity, telephone, internet connection and gas supply are highly likely to complete each level of education. It also explains the benefits of having own house and non-agricultural property that are highly related to increase the education level. Even, unit increase in living in urban area on average likely to increase 0.4, 1.4 and 0.09 percentage points at primary, secondary and higher education achievement respectively. By observing Punjab province as compared to other provinces, it is more likely to achieve higher education. However, the estimates are significantly positive in Sindh and Balochistan for primary and secondary education achievement.

From models 4 to 6, average marginal effects for girl have estimated. It is consistent that each level of education significantly increases per capita income, additionally; secondary education achievement improves household income more than primary and higher levels. The age has significant effect and being married is likely to increase the probability of education completion to 0.1 percentage point at higher and, 0.8 percentage point at secondary education. Educated head increases secondary education achievement by 31 percentage points while other members of the households if highly educated are less likely to increase primary education however more likely to increase the higher education by 76 percent respectively. It is worthy to examine that both low and high-income occupations are significant for the girls 'education. The probability to increase the education particularly at higher level ranges from 1.1 percentage point by clerks, 0.7 percentage points by professional, 0.6 and 0.9 percentage points from managers and machine operators.

Educated girls likely to decrease the dependency ratio by 12 percentage point if they have secondary education, 4 percentage points with primary and 0.8 percent with the higher education. It is evident that household facilities are more likely to support girls' education. The ownership of the house equally improve the education achievement by 4.0, 1.3 and 0.1 percentage points in primary, secondary and higher levels. Additionally, non-agricultural asset has probability of 0.9, 3.2 and 0.2 percentage points being likely to achieve primary, secondary and higher education. Similarly, residing in urban areas increases the probability of education transition from primary to tertiary level of education. Meanwhile, as compared to Punjab, KPK and Balochistan provinces are highly less likely to increase education at tertiary and primary levels of education.

From models 7 to 9, average marginal effects for boys have estimated. The per capita income of the household is comparatively higher for boys than girls. It shows that boys are twice productive to generate household income with primary and secondary education achievement as compared to girls. On the other hand, being married is less likely for boys to achieve higher grades because of dependency of the household expenditures. Educated head and male members of the households are significant to increase the education for boys and estimates are higher in these models. The educated head is likely to increase the probability for boys to being in secondary education by 26, in tertiary by 1.9 and in primary by 1.5 percentage points respectively. Similarly, male members of the household with having secondary and tertiary education are inclined to increase the level of education among children and by each education level, it is higher in secondary as compared to tertiary level. On average the unit change in the occupations of the household's members such as professional, clerk, machine operators, manager or technician increase the probability to being in secondary level by 10, 11,7, 5 and 12 percentage points respectively.

Similarly, the dependency ratio decreases by 13.2, 4 and 0.9 percentage points with secondary, primary and higher education in boys as compared to girls. However, availability of electricity, gas and telephone connections are likely to improve education in boys in primary and secondary levels more as compared to girls. In addition, ownership of the house improves the probability by 0.2, 0.7 and 0.1 percentage points in the completion of primary, secondary and tertiary education that is slightly lower from girls. Further, living in urban area is more appropriate to complete education for boys, yet, Sindh, KPK and Balochistan provinces are less likely to increase education at tertiary and primary levels as compared to Punjab.

Table 5.1 Average Marginal Effects from Ordered Logit Model Regression of Full Sample and by Gender

	Both			Girl			Boy		
Variables	**Primary**	**Secondary**	**Higher**	**Primary**	**Secondary**	**Higher**	**Primary**	**Secondary**	**Higher**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Girl	0.00338***	0.01134***	0.00076***						
	(0.00045)	(0.00150)	(0.00010)						
Per capita income	0.00158***	0.00532***	0.00036***	0.00143***	0.00474***	0.00031***	0.00188***	0.00637***	0.00043***
	(0.00010)	(0.00035)	(0.00003)	(0.00014)	(0.00047)	(0.00004)	(0.00016)	(0.00054)	(0.00004)
Age	0.00169**	0.00567**	0.00038**	0.00015	0.00051	0.00003	0.00206*	0.00696*	0.00047*
	(0.00081)	(0.00273)	(0.00018)	(0.00116)	(0.00387)	(0.00026)	(0.00114)	(0.00386)	(0.00026)
Square age	0.00003	0.00010	0.00001	0.00007**	0.00022**	0.00001**	0.00002	0.00008	0.00001
	(0.00002)	(0.00007)	(0.00000)	(0.00003)	(0.00010)	(0.00001)	(0.00003)	(0.00010)	(0.00001)
Married	-0.00288***	-0.00944***	-0.00064***	0.00249***	0.00838***	0.00055***	-0.01540***	-0.04568***	-0.00335***
	(0.00065)	(0.00208)	(0.00014)	(0.00080)	(0.00271)	(0.00018)	(0.00124)	(0.00326)	(0.00029)
Edu parents	0.01903	0.09810	0.00628	0.01972	0.19105	0.01296	-0.00227	-0.00748	-0.00051
	(0.01212)	(0.12473)	(0.00814)	(0.01621)	(0.23115)	(0.01948)	(0.03593)	(0.11517)	(0.00800)
Edu Head	0.01594***	0.24442***	0.01747***	0.00034	0.31152***	0.02662***	0.01528***	0.26447***	0.01916***
	(0.00094)	(0.00639)	(0.00082)	(0.00451)	(0.01791)	(0.00307)	(0.00119)	(0.00730)	(0.00110)
Edu member S	-0.00657***	0.38653***	0.02541***	-0.01298***	0.39770***	0.02662***	-0.00045	0.37458***	0.02429***
	(0.00112)	(0.00412)	(0.00090)	(0.00170)	(0.00583)	(0.00134)	(0.00147)	(0.00583)	(0.00120)
Edu member H	-0.12252***	-0.00547	0.76212***	-0.12425***	-0.00675	0.76280***	-0.12077***	-0.00324	0.76050***
	(0.00094)	(0.00545)	(0.00607)	(0.00136)	(0.00727)	(0.00823)	(0.00129)	(0.00817)	(0.00899)
Edu member math	0.11468***	0.18966***	0.03283***	0.11838***	0.18968***	0.03465***	0.11081***	0.18916***	0.03098***
	(0.00108)	(0.00109)	(0.00061)	(0.00151)	(0.00149)	(0.00090)	(0.00153)	(0.00159)	(0.00081)
Professional	0.02026***	0.10866***	0.00710***	0.02033***	0.11142***	0.00721***	0.02017***	0.10582***	0.00700***
	(0.00079)	(0.00916)	(0.00067)	(0.00097)	(0.01258)	(0.00092)	(0.00126)	(0.01329)	(0.00098)
Clerk	0.02184***	0.14175***	0.00926***	0.02106***	0.17303***	0.01146***	0.02059***	0.11161***	0.00729***
	(0.00040)	(0.01168)	(0.00089)	(0.00081)	(0.01709)	(0.00143)	(0.00131)	(0.01562)	(0.00112)
Operator	0.01541***	0.06766***	0.00431***	0.01429***	0.06086***	0.00384***	0.01624***	0.07268***	0.00469***
	(0.00088)	(0.00540)	(0.00037)	(0.00134)	(0.00773)	(0.00051)	(0.00119)	(0.00749)	(0.00052)
Manager	0.01552***	0.06906***	0.00443***	0.01862***	0.09315***	0.00589***	0.01157***	0.04682***	0.00307***
	(0.00145)	(0.00928)	(0.00061)	(0.00149)	(0.01392)	(0.00094)	(0.00247)	(0.01232)	(0.00081)
Technician	0.02176***	0.13469***	0.00875***	0.02159***	0.14212***	0.00916***	0.02174***	0.12709***	0.00835***
	(0.00044)	(0.00927)	(0.00072)	(0.00048)	(0.01305)	(0.00102)	(0.00082)	(0.01305)	(0.00100)
HH size	0.00089***	0.00298***	0.00020***	0.00057***	0.00189***	0.00013***	0.00127***	0.00430***	0.00029***
	(0.00007)	(0.00022)	(0.00002)	(0.00009)	(0.00031)	(0.00002)	(0.00009)	(0.00032)	(0.00003)
Dependency	-0.03837***	-0.12874***	-0.00865***	-0.03767***	-0.12502***	-0.00831***	-0.03990***	-0.13505***	-0.00919***
	(0.00129)	(0.00437)	(0.00040)	(0.00181)	(0.00607)	(0.00055)	(0.00184)	(0.00629)	(0.00059)
Electricity	0.01834***	0.05265***	0.00380***	0.02134***	0.05918***	0.00429***	0.01545***	0.04583***	0.00330***
	(0.00077)	(0.00193)	(0.00020)	(0.00113)	(0.00269)	(0.00030)	(0.00104)	(0.00277)	(0.00026)

Gas	0.00867***	0.02906***	0.00196***	0.00883***	0.02933***	0.00196***	0.00837***	0.02826***	0.00193***
	(0.00057)	(0.00193)	(0.00015)	(0.00082)	(0.00275)	(0.00021)	(0.00080)	(0.00270)	(0.00020)
Telephone 1 (Ref=0)	0.01410***	0.04031***	0.00292***	0.02146***	0.05717***	0.00429***	0.00687*	0.02116**	0.00150*
	(0.00279)	(0.00700)	(0.00056)	(0.00412)	(0.00918)	(0.00083)	(0.00371)	(0.01064)	(0.00078)
Telephone 2	0.02363***	0.07677***	0.00529***	0.03237***	0.10031***	0.00704***	0.01458***	0.04964***	0.00339***
	(0.00347)	(0.01171)	(0.00083)	(0.00496)	(0.01640)	(0.00121)	(0.00485)	(0.01684)	(0.00116)
Telephone 3	0.01510***	0.04367***	0.00315***	0.02189***	0.05862***	0.00438***	0.00845**	0.02651**	0.00186**
	(0.00277)	(0.00696)	(0.00056)	(0.00410)	(0.00911)	(0.00082)	(0.00369)	(0.01059)	(0.00078)
Establishment	0.00882***	0.03276***	0.00213***	0.00888***	0.03273***	0.00210***	0.00870***	0.03249***	0.00214***
	(0.00063)	(0.00257)	(0.00018)	(0.00089)	(0.00364)	(0.00025)	(0.00088)	(0.00362)	(0.00026)
Own house	0.00316***	0.01040***	0.00070***	0.00411***	0.01331***	0.00089***	0.00232***	0.00777***	0.00053***
	(0.00054)	(0.00176)	(0.00012)	(0.00079)	(0.00250)	(0.00018)	(0.00075)	(0.00247)	(0.00017)
Urban	0.00423***	0.01405***	0.00095***	0.00471***	0.01548***	0.00103***	0.00383***	0.01285***	0.00088***
	(0.00056)	(0.00184)	(0.00013)	(0.00080)	(0.00262)	(0.00018)	(0.00078)	(0.00259)	(0.00018)
Sindh (Ref=Punjab)	-0.00449***	-0.01571***	-0.00102***	-0.00323***	-0.01122***	-0.00072***	-0.00568***	-0.02007***	-0.00132***
	(0.00055)	(0.00189)	(0.00013)	(0.00079)	(0.00269)	(0.00017)	(0.00077)	(0.00266)	(0.00018)
KPK	-0.00767***	-0.02577***	-0.00170***	-0.00725***	-0.02389***	-0.00156***	-0.00848***	-0.02895***	-0.00192***
	(0.00064)	(0.00203)	(0.00014)	(0.00090)	(0.00283)	(0.00020)	(0.00090)	(0.00289)	(0.00021)
Balochistan	-0.01501***	-0.04659***	-0.00318***	-0.01581***	-0.04752***	-0.00325***	-0.01485***	-0.04734***	-0.00324***
	(0.00088)	(0.00244)	(0.00020)	(0.00134)	(0.00355)	(0.00030)	(0.00117)	(0.00335)	(0.00028)
Thresholds Points	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	161,919	161,919	161,919	80,342	80,342	80,342	81,577	81,577	81,577
Log-Likelihood	-124888.75			-61678.67			-63080.19		
Wald Chi-square	25929.16			12360.36			13653.89		
AIC	249840.50			123417.34			126220.39		
BIC	250149.34			123696.16			126500.67		
Pseudo R2	0.239			0.247			0.232		
Nagelkerke R2	0.442			0.455			0.431		
Prob > chi2	0.000			0.000			0.000		
Linktest(_hatsq)	0.513								

*The dependent variable is education achievement that is categorical variable. The category 1 displays for primary, 2 for secondary and 3 for tertiary level of education and 0 demonstrates no education (reference category). The reference category for the telephone is no direct connection and any extension. Robust standard errors are in parentheses. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

5.2 Endogeneity Bias for Education Achievement

Table 5.2 Average Marginal Effects of Education Achievement by 2SRI/Ordered Logit Model Regression

	Both			Girl			Boy		
Variables	**Primary**	**Secondary**	**Higher**	**Primary**	**Secondary**	**Higher**	**Primary**	**Secondary**	**Higher**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Girl	0.00365***	0.01224***	0.00082***						
	(0.00050)	(0.00112)	(0.00013)						
Per capita income	0.00448***	0.01502***	0.00101***	0.00394***	0.01307***	0.00087***	0.00524***	0.01772***	0.00121***
	(0.00045)	(0.00073)	(0.00015)	(0.00054)	(0.00080)	(0.00008)	(0.00045)	(0.00132)	(0.00024)
Age	0.00163***	0.00546	0.00037***	0.00015	0.00049	0.00003	0.00192***	0.00651	0.00044
	(0.00061)	(0.00361)	(0.00012)	(0.00152)	(0.00408)	(0.00037)	(0.00011)	(0.00637)	(0.00032)
Square age	0.00003**	0.00011	0.00001***	0.00007*	0.00023**	0.00002	0.00003***	0.00010	0.00001
	(0.00002)	(0.00009)	(0.00000)	(0.00004)	(0.00011)	(0.00001)	(0.00000)	(0.00016)	(0.00001)
Married	-0.00330***	-0.01078***	-0.00073***	0.00213*	0.00714***	0.00047***	-0.01594***	-0.04706***	-0.00347***
	(0.00048)	(0.00285)	(0.00016)	(0.00116)	(0.00217)	(0.00005)	(0.00164)	(0.00191)	(0.00038)
Edu parents	0.01906**	0.09835	0.00630*	0.01918	0.19835	0.01358	-0.00406	-0.01311	-0.00091
	(0.00802)	(0.14163)	(0.00352)	(0.01638)	(0.26522)	(0.02487)	(0.06196)	(0.12793)	(0.02702)
Edu Head	0.01402***	0.25786***	0.01888***	-0.00278	0.32362***	0.02865***	0.01289***	0.27978***	0.02088***
	(0.00088)	(0.00873)	(0.00094)	(0.00326)	(0.02600)	(0.00263)	(0.00110)	(0.00229)	(0.00122)
Edu member S	-0.00638***	0.38587***	0.02531***	-0.01280***	0.39712***	0.02652***	-0.00027	0.37383***	0.02419***
	(0.00121)	(0.00422)	(0.00073)	(0.00129)	(0.00517)	(0.00216)	(0.00118)	(0.00349)	(0.00148)
Edu member H	-0.12237***	-0.00003	0.75591***	-0.12411***	-0.00231	0.75764***	-0.12062***	0.00348	0.75295***
	(0.00087)	(0.00720)	(0.00658)	(0.00109)	(0.00718)	(0.01390)	(0.00269)	(0.00615)	(0.01049)
Edu member math	0.11457***	0.18945***	0.03279***	0.11829***	0.18951***	0.03461***	0.11068***	0.18890***	0.03094***
	(0.00076)	(0.00103)	(0.00044)	(0.00056)	(0.00077)	(0.00074)	(0.00222)	(0.00267)	(0.00081)
Professional	0.01959***	0.10099***	0.00658***	0.01980***	0.10459***	0.00674***	0.01932***	0.09722***	0.00642***
	(0.00096)	(0.00649)	(0.00060)	(0.00129)	(0.00831)	(0.00145)	(0.00135)	(0.00867)	(0.00129)
Clerk	0.02169***	0.13607***	0.00885***	0.02124***	0.16807***	0.01107***	0.02005***	0.10522***	0.00686***
	(0.00034)	(0.00746)	(0.00068)	(0.00073)	(0.02181)	(0.00226)	(0.00083)	(0.01649)	(0.00097)
Operator	0.01468***	0.06319***	0.00403***	0.01366***	0.05722***	0.00361***	0.01538***	0.06727***	0.00435***
	(0.00085)	(0.00459)	(0.00007)	(0.00167)	(0.00922)	(0.00106)	(0.00133)	(0.00690)	(0.00080)
Manager	0.01377***	0.05837***	0.00375***	0.01757***	0.08389***	0.00530***	0.00897***	0.03455***	0.00228***
	(0.00073)	(0.00533)	(0.00035)	(0.00120)	(0.03001)	(0.00084)	(0.00188)	(0.00697)	(0.00052)
Technician	0.02152***	0.12860***	0.00833***	0.02149***	0.13671***	0.00878***	0.02133***	0.12022***	0.00788***
	(0.00034)	(0.00789)	(0.00089)	(0.00086)	(0.02165)	(0.00172)	(0.00108)	(0.00607)	(0.00106)
HH size	0.00078***	0.00260***	0.00017***	0.00047***	0.00156***	0.00010***	0.00114***	0.00386***	0.00026***
	(0.00006)	(0.00050)	(0.00001)	(0.00012)	(0.00040)	(0.00001)	(0.00008)	(0.00054)	(0.00004)
Dependency	-0.03449***	-0.11564***	-0.00777***	-0.03424***	-0.11357***	-0.00755***	-0.03548***	-0.12003***	-0.00818***

	(0.00175)	(0.00655)	(0.00044)	(0.00072)	(0.00788)	(0.00102)	(0.00159)	(0.01071)	(0.00051)
Electricity	0.01841***	0.05281***	0.00381***	0.02140***	0.05930***	0.00430***	0.01554***	0.04603***	0.00332***
	(0.00064)	(0.00168)	(0.00015)	(0.00180)	(0.00202)	(0.00021)	(0.00131)	(0.00187)	(0.00010)
Gas	0.00772***	0.02583***	0.00174***	0.00801***	0.02657***	0.00177***	0.00725***	0.02446***	0.00167***
	(0.00060)	(0.00156)	(0.00012)	(0.00049)	(0.00166)	(0.00018)	(0.00045)	(0.00178)	(0.00025)
Telephone 1 (Ref=0)	0.01402***	0.03977***	0.00290***	0.02136***	0.05656***	0.00425***	0.00683***	0.02082	0.00148*
	(0.00201)	(0.00486)	(0.00055)	(0.00398)	(0.00729)	(0.00085)	(0.00183)	(0.02049)	(0.00076)
Telephone 2	0.02434***	0.07934***	0.00547***	0.03296***	0.10249***	0.00718***	0.01546***	0.05277***	0.00360**
	(0.00337)	(0.01533)	(0.00106)	(0.00440)	(0.01568)	(0.00148)	(0.00141)	(0.01428)	(0.00168)
Telephone 3	0.01579***	0.04573***	0.00330***	0.02246***	0.06022***	0.00450***	0.00931***	0.02922	0.00205***
	(0.00167)	(0.00463)	(0.00060)	(0.00401)	(0.00716)	(0.00079)	(0.00196)	(0.02063)	(0.00078)
Establishment	0.00711***	0.02581***	0.00169***	0.00740***	0.02670***	0.00172***	0.00673***	0.02447***	0.00163***
	(0.00064)	(0.00255)	(0.00014)	(0.00059)	(0.00273)	(0.00010)	(0.00086)	(0.00298)	(0.00038)
Own house	0.00363***	0.01191***	0.00081***	0.00451***	0.01455***	0.00098***	0.00288***	0.00960***	0.00066***
	(0.00076)	(0.00258)	(0.00013)	(0.00098)	(0.00099)	(0.00017)	(0.00100)	(0.00083)	(0.00020)
Urban	0.00358***	0.01191***	0.00080***	0.00414***	0.01360***	0.00091***	0.00310***	0.01040***	0.00071***
	(0.00036)	(0.00092)	(0.00007)	(0.00025)	(0.00283)	(0.00018)	(0.00079)	(0.00141)	(0.00011)
Sindh (Ref=Punjab)	-0.00576***	-0.01989***	-0.00130***	-0.00432***	-0.01482***	-0.00096***	-0.00715***	-0.02494***	-0.00164***
	(0.00049)	(0.00071)	(0.00009)	(0.00127)	(0.00306)	(0.00019)	(0.00083)	(0.00367)	(0.00026)
KPK	-0.00632***	-0.02166***	-0.00142***	-0.00606***	-0.02033***	-0.00132***	-0.00693***	-0.02423***	-0.00160***
	(0.00051)	(0.00303)	(0.00017)	(0.00077)	(0.00208)	(0.00015)	(0.00094)	(0.00189)	(0.00025)
Balochistan	-0.01624***	-0.04997***	-0.00343***	-0.01691***	-0.05042***	-0.00346***	-0.01623***	-0.05128***	-0.00352***
	(0.00108)	(0.00226)	(0.00022)	(0.00059)	(0.00498)	(0.00020)	(0.00206)	(0.00316)	(0.00037)
Observations	749,503	749,503	749,503	749,503	749,503	749,503	749,503	749,503	749,503
Instruments Criteria									
Hausman Test F-stats	18.7844								
Overidentification	0.5927								
First stage	3044.92								

*The dependent variable is education achievement that is categorical variable. The category 1 displays for primary, 2 for secondary and 3 for tertiary level of education and 0 demonstrates no education (reference category). The reference category for the telephone is no direct connection and any extension. . The set of instruments used in these models are income shocks that includes (i) deviation of rainfall from mean and (ii) household average per capita income is less than national household average per capita income. The validity of instruments are measured under the 2SLS estimators. The Hausman test provides F-statistics and test of overidentification states P-value. The value for First Stage regressions give F-statistics. Standard errors are bootstrapped presented in parentheses. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

Table 5.2 shows results after dealing reverse causality between income and education with 2SRI approach. Most of the estimates find consistent and significant impact on education achievement after controlling endogeneity. The results explain that the probability of education completion increases with the increase of age, while, marital status of being married is inversely associated with education. The educated members of the households are highly tend to increase the education achievement of the children as compared to previous models after controlling endogeneity bias. One of the interesting estimates reveals that low-income professions are more likely to achieve education as compared to high-income jobs. My results also explains that after dealing with causality issue, the education is highly likely to reduce the dependency ratio in the household and ratio of educated boys and girls increases in urban areas from primary to higher level of education. It examines that the provinces of KPK and Balochistan have immense capacity to increase education of the children at higher level as well. Meanwhile, availability of electricity and other technological facilities also improve infrastructure of the household, especially with secondary education of the children. The coefficient estimates by three approaches are presented in Table A.6.

5.3 Logit Model Regression for Current Enrolment

Table 5.3 describes the average marginal effects of current enrollment by the help of logit model regression. The dependent variable is current enrollment that is dichotomous. The estimate of variable girl is negative but insignificant that produces similar results from previous studies (Maitra 2003). The results describe more likelihood to increase the probability of enrollment of boys as compared to the girls. The unit increase in income per capita is more likely to raise the current enrollment in boys with 0.6 percentage points. The effect of age is non-linear with the addition of square term and illustrate that with the increase in age there is decrease in the current enrolment. One of the interesting results is the mother average years of schooling for the girls is highly significant that is opposite for the father's education. In contrast, education of mother is insignificant for boys. It is obvious in the patriarchal society of Pakistan; mothers who suffer from poverty and weak empowerment are well aware about the importance of education attainment by the time. Furthermore, educated mothers are likely to raise their daughters with less gender biasedness and equal opportunities of basic needs including health and education. However, education of the member of the household in mathematics also significantly increases the current education for boys and girls.

Table 5.3 Coefficients Estimates of Logit Model Regression for Current Enrollment

	Both	Girl	Boy
Variables	**(1)**	**(2)**	**(3)**
Girl	-0.00162		
	(0.00500)		
Per capita income	0.00496***	0.00408**	0.00593***
	(0.00138)	(0.00185)	(0.00206)
Age	0.04102***	0.03781***	0.04412***
	(0.00251)	(0.00353)	(0.00356)
Square age	-0.00136***	-0.00122***	-0.00150***
	(0.00009)	(0.00013)	(0.00012)
Married	-0.12005***	-0.14358***	-0.05932***
	(0.00908)	(0.01042)	(0.01948)
Edu mother	0.00152**	0.00189**	0.00116
	(0.00066)	(0.00092)	(0.00095)
Edu father	0.00350	0.00258	0.00547
	(0.01127)	(0.01469)	(0.01730)
Person Math	0.25050***	0.24555***	0.25525***
	(0.00428)	(0.00582)	(0.00628)
Professional	-0.03367	-0.03625	-0.03012
	(0.02441)	(0.03254)	(0.03689)
Clerk	-0.09380***	-0.11585**	-0.07647*
	(0.03011)	(0.04811)	(0.03958)
Operator	-0.11066***	-0.13197***	-0.09230***
	(0.02213)	(0.03076)	(0.03167)
Manager	-0.02140	-0.04978	0.01064
	(0.03965)	(0.05180)	(0.06099)
Technician	-0.05820**	-0.04638	-0.07051*
	(0.02792)	(0.03937)	(0.03888)
Child 5	0.01949	0.01655	0.02230
	(0.01394)	(0.01958)	(0.01982)
Education spending	0.27318***	0.27020***	0.27611***
	(0.00569)	(0.00798)	(0.00812)
Cultivate land	-0.11842***	-0.12083***	-0.11596***
	(0.00783)	(0.01057)	(0.01155)
HH size	-0.00050	-0.00020	-0.00086
	(0.00063)	(0.00089)	(0.00090)
Dependency	0.17789***	0.16210***	0.19229***
	(0.01534)	(0.02145)	(0.02199)
Electricity	0.05140***	0.06115***	0.04316***
	(0.00759)	(0.01074)	(0.01071)
Gas	0.04712***	0.04401***	0.05001***
	(0.00664)	(0.00926)	(0.00951)
Establishment	-0.13924***	-0.13728***	-0.14022***
	(0.00651)	(0.00885)	(0.00963)
Own house	-0.04412***	-0.03296***	-0.05602***
	(0.00702)	(0.00969)	(0.01014)
Urban	0.02634***	0.02406***	0.02869***
	(0.00653)	(0.00910)	(0.00937)
Sindh (Ref=Punjab)	-0.05316***	-0.06282***	-0.04327***
	(0.00594)	(0.00822)	(0.00855)
KPK	0.04997***	0.03743***	0.06350***
	(0.00746)	(0.01043)	(0.01068)
Balochistan	-0.00587	-0.01863	0.00625
	(0.00821)	(0.01164)	(0.01156)

Observations	24,531	12,212	12,319
Log-Likelihood	-11130.9	-5384.19	-5728.85
Chi-square test	3737.50	1894.96	1849.354
AIC	22315.82	10820.39	11509.70
BIC	22534.73	11013.05	11702.60
Pseudo R2	0.197	0.208	0.189
Nagelkerke R2	0.295	0.308	0.285
Prob > chi2	0.000	0.000	0.000
Linktest (_hatsq)	0.379	0.417	0.645

*The dependent variable is currently enrolled that is dummy variable. The category 1 displays for currently enrolled in primary, secondary or tertiary level of education and 0 demonstrates not currently enrolled. The Linktest describes in p-value. Robust standard errors are in parentheses. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

On the other hand, professions of the household members are less likely to increase the current enrollment regardless of the gender. For example, machine operators and clerks are less likely to increase enrollment in boys and girls however, its ratio has wider gap. Oppositely, high-income professions such as professionals including doctors and engineers as well as mangers have insignificant impact on the enrollment rate. Broadly, it describes the transformation of the school-to-work particularly for boys as they are assumed to be responsible of livelihood in Pakistan. One of the important thing is to notice that the cost of education more often play crucial role with the higher dropouts rates. Moreover, the physical asset has negative effect on currently enrolled student because of three main reasons; people who hold property or ownership of land are less motivated to participate in the labor market so as for the education attainment. Secondly, the increase of monetary assets do not provide incentive to transit from lower education to higher education level. Thirdly, with the increase of current enrolment there is decrease in the land productivity and cultivation. The allocation of the time shifts from the agricultural activities to the schools. In the end, there is positive association between KPK province and current enrolment in which boys have higher marginal effects. This is due to new setup towards betterment of the provinces and since 2013, the allocation of the resources have increased to 128 percent (KPK Government Statistics 2018).

5.4 Endogeneity Concerns for Current Enrolment

The average marginal effects for current enrollment are presented in Table 5.4 by instrumenting per capita income of the household with exogenous variables of windfall income and difference of household and annual per capita income. I follow the similar pattern of evaluating results with three estimators while further coefficient estimates are provided in the appendices. After dealing

with reverse causality, the variable girl becomes significant in 2SRI model. The variable girl increases the probability of current enrollment with 1.62 percentage points. Additionally, most of the estimates remain same after controlling endogeneity such as marital status, mother and father education. However, the marginal effects of maternal education are slightly higher. On the other hand, professions of the household members are significantly less likely to enroll girls and high marginal effects are associated with the high-salaried occupations such as professional jobs and managers.

Table 5.4 Average Marginal Effects of 2SRI/Logit for Current Enrolment

	Both	Girl	Boy
Variables	**(1)**	**(2)**	**(3)**
Girl	0.0162*		
	(0.0123)		
Per capita income	0.0555***	0.0430	0.0706**
	(0.0204)	(0.0288)	(0.0289)
Age	0.0710***	0.0662***	0.0755***
	(0.00632)	(0.00896)	(0.00892)
Square age	-0.00227***	-0.00207***	-0.00245***
	(0.000216)	(0.000311)	(0.000303)
Married	-0.139***	-0.185***	-0.0117
	(0.0216)	(0.0241)	(0.0510)
Edu mother	0.00302*	0.00532**	0.000748
	(0.00162)	(0.00226)	(0.00230)
Edu father	-0.0312	-0.0434	-0.0151
	(0.0234)	(0.0316)	(0.0351)
Person Math	0.274***	0.270***	0.277***
	(0.0104)	(0.0158)	(0.0135)
Professional	-0.155***	-0.146***	-0.168***
	(0.0321)	(0.0522)	(0.0389)
Clerk	-0.175***	-0.149**	-0.218***
	(0.0471)	(0.0689)	(0.0550)
Operator	-0.113**	-0.0983	-0.137*
	(0.0513)	(0.0702)	(0.0721)
Manager	-0.125***	-0.153***	-0.100
	(0.0409)	(0.0490)	(0.0656)
Technician	-0.0700	-0.120*	-0.0204
	(0.0545)	(0.0686)	(0.0836)
Child 5	0.0477	0.0313	0.0641
	(0.0382)	(0.0536)	(0.0541)
Education spending	0.0648*	0.0336	0.0986**
	(0.0331)	(0.0476)	(0.0458)
Cultivate land	-0.108***	-0.0492	-0.155***
	(0.0256)	(0.0418)	(0.0309)
HH size	-0.00186	-0.00150	-0.00296
	(0.00236)	(0.00336)	(0.00332)
Dependency	0.219***	0.242***	0.204***
	(0.0421)	(0.0597)	(0.0592)
Electricity	0.122***	0.150***	0.102***
	(0.0262)	(0.0362)	(0.0367)
Gas	-0.0294	-0.0223	-0.0392
	(0.0199)	(0.0282)	(0.0281)

Establishment	-0.102***	-0.0963***	-0.105***
	(0.0162)	(0.0231)	(0.0228)
Own house	-0.0280*	-0.0470**	-0.0107
	(0.0157)	(0.0221)	(0.0222)
Urban	0.00590	-0.00332	0.0191
	(0.0189)	(0.0269)	(0.0264)
Sindh (Ref=Punjab)	-0.0278*	-0.0318	-0.0282
	(0.0149)	(0.0212)	(0.0210)
KPK	0.0300*	0.00312	0.0563**
	(0.0192)	(0.0268)	(0.0274)
Balochistan	-0.0110	-0.00239	-0.0156
	(0.0226)	(0.0328)	(0.0313)
Observations	4,626	2,277	2,349
Instruments Criteria			
Hausman Test F-stats	8.00952		
Overidentification	0.6237		
First stage	48.7065		

*The dependent variable is currently enrolled that is dummy variable. The category 1 displays for currently enrolled in primary, secondary or tertiary level of education and 0 demonstrates not currently enrolled. The set of instruments used in these models are income shocks, first, income windfall and second, difference of the household per capita from average household per capita income. The validity of instruments are measured under the 2SLS estimators. Robust standard errors are in parentheses. The Hausman test provides F-statistics and test of overidentification states P-value. In addition, The value for First Stage regressions give F-statistics. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

Meanwhile, high education cost is positively related with the current enrolment and boys are significantly and more likely to increase education cost as compared to girls that remain insignificant. It might be due to three main reasons. Firstly, the cost effectiveness is questionable in the Pakistani society for girls. They consider productive for non-monetary aspects such as procreation and nurturing generations. At this point, their social status do not receive adequate attention for education and income generation, if any financial benefits might considerable then they are highly assumed for marital families. Secondly, higher education in Pakistan is costly and average income households are unable to afford the fee structure of the universities and research labs. Additionally, sons being permanent members and robust asset of the household in long run are more appropriate for parental education investment. Finally, structure of the educational programs are gender-specific and in other terms, female oriented diplomas are less likely to receive attention and investment in the traditional society that ultimately describe higher technical diplomas and degree programs to be male biased. Other estimates are consistent that include land cultivation, physical asset possession and ownership. Similarly, estimates of KPK as compared to Punjab remain positive and significant with the increase of education enrolment. In fact, boys significantly have five times higher chances to enroll after IV approach.

5.5 Robustness Test

Heterogeneity by Location

It is interesting to examine the education attainment by regions as in Pakistan most of the population approximately 63 percent living in rural areas and depending on agriculture sector. The extent of gender differences and concentration might provide clear ideas regarding under development of country. Table 5.5 shows results by regions and provinces. In first two models, it is interesting to examine that girl variable is having higher ratio in rural area as compared to urban. However, the returns of economic contribution is highly associated in urban areas for education achievement. There are opposite relationships of education achievement with marital status and age in terms of rural-urban diversification.

Notably it is important that educated head and other educated members of the household are likely to contribute in completion of the education are almost equally in rural areas as urban ones. Additionally, each profession can attribute higher rate of education completion in rural areas conditional to salary group such as laborer such as machine operators are more likely to impact in urban areas while clerks are more inclined to support education achievement in rural areas. Another things that is negotiable is the dependency ratio that is concentrated in urban location and on the other side, possession of the asset is less likely to increase education achievement in rural areas. However, Balochistan province is less likely at its rural part to increase the probability of education achievement.

As far as concern about the provincial diversity, I examine higher rate of education achievement on average in Sindh province followed by KPK. Contrary, the probability to increase education with unit increase of income per capita has observed in KPK, followed by Balochistan and Punjab. It is one of the important findings that KPK and Balochistan are more underdeveloped with tribal composition and patriarchal systems as compared to Sindh. However, these areas can maximize the returns once provided with education. The educated members and head are more likely to increase the probability of education achievement in Punjab; meanwhile, low salaried professions are equally contributing in each province, on the other side I find high rate of dependency ratio in KPK and Balochistan. The results show prominent impact of household infrastructure to achieve education in these two provinces as well.

Table 5.5 Coefficient Estimates of Ordered Logit Model for Education Achievement by Location

	Region		Provinces			
	Urban	Rural	Punjab	Sindh	KPK	Balochistan
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Girl	0.05562***	0.11588***	0.06032***	0.14589***	0.07843***	0.05743
	(0.01575)	(0.01676)	(0.01677)	(0.02346)	(0.02621)	(0.03790)
Per capita income	0.03682***	0.04726***	0.04182***	0.02754***	0.04353***	0.04200***
	(0.00368)	(0.00393)	(0.00380)	(0.00802)	(0.00459)	(0.01183)
Age	-0.00038	0.09310***	0.00937	0.07942*	0.07243	0.07876
	(0.02865)	(0.03043)	(0.03057)	(0.04287)	(0.04690)	(0.06780)
Square age	0.00191**	-0.00055	0.00183**	-0.00020	-0.00022	-0.00040
	(0.00077)	(0.00082)	(0.00082)	(0.00115)	(0.00126)	(0.00183)
Married	0.15371***	-0.23698***	-0.00855	-0.18372***	0.06849*	-0.26252***
	(0.02360)	(0.02305)	(0.02388)	(0.03296)	(0.03651)	(0.05519)
Edu Head	1.22863***	1.79340***	1.29859***	1.90585***	1.47291***	1.58958***
	(0.05530)	(0.04965)	(0.05192)	(0.07155)	(0.08297)	(0.15078)
Edu member S	1.87058***	2.80051***	2.29690***	2.33430***	2.01625***	2.25815***
	(0.02818)	(0.04189)	(0.03242)	(0.05918)	(0.05240)	(0.07861)
Edu member H	7.15618***	8.76792***	7.38285***	8.73090***	7.39628***	6.83860***
	(0.09504)	(0.18355)	(0.12398)	(0.21214)	(0.17830)	(0.22566)
Edu member math	3.19286***	3.36760***	2.80830***	3.34584***	3.48576***	4.83456***
	(0.08624)	(0.07838)	(0.07928)	(0.14787)	(0.11247)	(0.28951)
Professional	0.71550***	0.74386***	0.67384***	0.82821***	0.48355***	1.32812***
	(0.06454)	(0.10070)	(0.08590)	(0.10798)	(0.11391)	(0.17083)
Clerk	0.86903***	0.95199***	0.92491***	0.90501***	0.88617***	0.89714***
	(0.07472)	(0.14010)	(0.11461)	(0.12556)	(0.14998)	(0.17224)
Operator	0.48163***	0.43050***	0.43284***	0.42580***	0.64444***	0.46925***
	(0.04274)	(0.05844)	(0.04792)	(0.07717)	(0.08034)	(0.11447)
Manager	0.49244***	0.42894***	0.55231***	0.54755***	0.48347***	0.13757
	(0.06893)	(0.10783)	(0.08633)	(0.15079)	(0.11937)	(0.16818)
Technician	0.79457***	1.01082***	0.91144***	0.87078***	0.80425***	0.92486***
	(0.06319)	(0.09947)	(0.08185)	(0.11874)	(0.12252)	(0.13534)
HH size	0.02109***	0.02258***	0.03440***	0.03106***	0.01089***	0.01550***
	(0.00242)	(0.00239)	(0.00291)	(0.00373)	(0.00303)	(0.00465)
Dependency	-1.03246***	-0.94615***	-0.95016***	-0.99665***	-1.10153***	-1.07886***
	(0.04686)	(0.04751)	(0.04848)	(0.06897)	(0.07511)	(0.11095)
Electricity	0.18369***	0.47635***	0.39452***	0.45087***	0.04174	0.49625***
	(0.03167)	(0.02092)	(0.02886)	(0.02830)	(0.04261)	(0.05163)
Gas	0.20574***	0.26813***	0.21589***	0.39687***	0.06375**	0.14711***
	(0.01766)	(0.02503)	(0.02103)	(0.03250)	(0.03131)	(0.04287)
Telephone 1 (Ref=0)	0.15839**	0.62826***	0.40667***	0.28967**	0.03297	0.53278***
	(0.08028)	(0.10747)	(0.10508)	(0.11283)	(0.15828)	(0.17210)
Telephone 2	0.50090***	0.75036***	0.60723***	0.57438***	0.32306	0.92020***
	(0.11617)	(0.14709)	(0.13802)	(0.17131)	(0.22535)	(0.28530)
Telephone 3	0.27177***	0.58072***	0.42725***	0.29908***	0.05202	0.59562***
	(0.08022)	(0.10666)	(0.10467)	(0.11203)	(0.15789)	(0.17073)
Establishment	0.30151***	0.12148***	0.23535***	0.28000***	0.27954***	0.03652
	(0.02250)	(0.03012)	(0.02387)	(0.04606)	(0.03962)	(0.07033)
Own house	0.16303***	-0.01668	0.13807***	0.05321*	0.02685	0.07728*
	(0.01663)	(0.02335)	(0.01989)	(0.03006)	(0.02915)	(0.04406)
Urban			0.06928***	0.20905***	0.05799*	0.06251
			(0.02058)	(0.03165)	(0.02987)	(0.04191)
Sindh (Ref=Punjab)	0.01388	-0.25437***				
	(0.0188)	(0.0213)				
KPK	-0.22527***	-0.17939***				
	(0.0217)	(0.0225)				
Balochistan	-0.34012***	-0.38061***				

	(0.0274)	(0.0300)				
Observations	78,582	83,337	67,779	39,826	35,193	19,121
Log-Likelihood	-64787.83	-59000.56	-57429.30	-30307.56	-24516.92	-12056.70
Wald Chi2	13472.7	11924.5	11703.9	6193.2	5130.5	2406.2
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.250	0.210	0.213	0.254	0.248	0.272

*The dependent variable is education achievement that is categorical variable. The category 1 displays for primary, 2 for secondary and 3 for tertiary level of education and 0 demonstrates no education. The reference category for the telephone is no direct connection and any extension. Robust standard errors are in parentheses. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

Alternative Specification

I find consistent estimates for education achievement in Table A.9 for full sample and by gender while applying ordered probit model regression. Additionally, I examine current enrollment in Table A.10 by probit model regression (McNabb et al., 2002). In both models, results are highly significant and provide evidence for previous estimations. In both tables, there are slightly differences in the average marginal effects for examples, first examining Table A.9; the variable girl is more likely to increase education achievement at primary level. Additionally, there is marginal increase in the tertiary education for girls and boys both as compared to previous results. I observe parental education and other members who are secondary educated both significantly increase the girls' education achievement at primary and secondary levels. On the other side, in Table A.10, the unit increase in income per capita is slightly lower in probit model regression in current enrollment. However, consistent results observe for education spending, maternal education for girls and increase in dependency ratio for boys.

By Age

However, consistent results observe for education spending, maternal education for girls and increase in dependency ratio for boys. The Table A.11 and Table A.12 provide estimates for the education achievement by age and gender respectively. The findings show increase probability with the increase of age, particularly when girls are aged 22-24. However, in each age group there is higher ratio of education achievement by unit increase in income in boys than girls. It clearly indicate the parental investment behavior for household resource allocation. Another important finding reveal that educated head is more likely to increase education achievement in girls when she is 16-18 aged while it is opposite for boys as they are highly likely to achieve education with the increase of age. Similarly, secondary educated members are likely to support

girls and boys to achieve education and it might increase with children's age. On the opposite side, if the member is highly educated, the positive but decreasing trend observed with the increase of age. It indicates the structure of the household and composition in other manner with the addition of highly educated members. Additionally, urban areas, household infrastructure are more likely to increase the probability of education achievement at lower age groups, contrary; dependency ratio tends to decrease by the increase of children.

6. Discussion, Conclusion & Policy Implications

This study uses two measurements of the education attainment, first, highest-grade completion that describes education achievement and second, current enrolment. The study attempts to deal with the reverse causality between per capita income and (i) education achievement and (ii) current enrollment with help of advance approach of instrumental variable for non-linear models (2SRI). Empirically, the link between household income and education attainment is difficult to construct. However, this study establishes an association between household income and education attainment with exogenous income shocks to differentiate estimates for full sample and by gender. The estimated findings provide insight for the related research questions that I narrate precisely. My findings explain that individual and household characteristics provide significant impact on the education attainment. The probability of education attainment of the girls is equally significant as boys however, associated socio-economic and individuals' characteristics are playing major role in the related marginal differences. Such as, findings reveal that lower rate of female education has direct link with lower income level, larger household size and low skilled occupations that support previous studies (Behrman 1997; McNabb et al., 2002; Bladen et al., 2004; Orepoulos et al., 2007).

The household income proves to be the pivotal element for female education attainment and their respective choices. It reflects the female acceptance as productive addition in the society and accessibility of basic human rights and empowerment.

The findings of this study accord with the empirical research and examining the indicators separately appeared to be appropriate. The share of the income by gender indicates household's economic condition while describing empowerment, basic human rights and accessibility of the women in society. My findings support Jacob (2002) that highlights the positive relationship of education achievement and per capita income and significant transformation of education from

lower levels to higher levels. However, the analysis even after controlling for endogeneity indicate lower education achievement for girls as compared to boys that draw three important factors. Firstly, minimum returns associated with female education, particularly, in poor and middle-income families, however marital status might be ignored. Secondly, cost of education accounts by gender for education achievement as limited availability of high schools, colleges and universities and lastly, cultural restrictions on females to access education out-of-home, especially, in rural areas. On the other side, after controlling endogeneity, there is positive and significant relationship with the girls and current enrollment, nevertheless, differences in marginal effects for economic returns describe gap within the household. Boys have almost 2.76 percent more chances to increase household's income by enrolling in the school as compared to girls that supports our elaborated factors earlier.

My findings support Ghimire (2006) in which transition in a social and cultural framework highlights the importance of education for the choice of marriage. The inverse relationship for both gender in our finding suggest that the more educated females are more likely to raise income and late marriages. On the other hand, similar effects of household size appears in our results. The findings suggest that the allocation of the time changes its pattern with the increase in education that is evident to Maitra (2003). As educated females trade off domestic chores with the education attainment. In comparison, the negative effect of being married for boys is higher, particularly at secondary education achievement mainly because of two reasons, first, boys endowed with the small family sizes and higher quality of life are likely to increase their education that is contrary in Pakistan as sixty percent people roughly are living below the poverty line. As the main earners of the families alternative cost of education differ by gender, boys' transition from school-to-work start at young age and perpetuate less probability to achieve higher grades and likewise for marital life (Tan et al., 1987). Since age has the non-linear effect that significantly provided in the current enrolment models highlighting diminishing marginal effect. My findings imply that effect of age in boys determine economic returns at higher levels that is the plausible explanation of delayed admission in the tertiary education (Freedom et al., 1990). Besides, the findings are robust in different age groups where between age 22 to 24, boys are likely to participate more in education completion by two percent comparatively.

Meanwhile, the effect of education of the parents is predictively positive in the current education enrolment. My findings accord with the Delgado-Gaitan (1990) and Galick (2000) that explains importance of parental education for children completion rate. Education of the mother has strong effect on the current enrolment of girls but it appears to be insignificant in the case of boys. These findings implement the maternal resource mobilization, empowerment on household decision-making and household economic and social structure to reduce the gender gap. In comparison, the education of the head of the household and other members older than 24 years also constitute significant and positive influence on the education completion of the children. The higher level of education of the household members improve the children highest grade in success levels. My findings suggest that members with intermediate education are less likely for girls and boys in their primary education achievement, however, members are highly inclined to increase the secondary education achievement of the girls as compared to the boys. Furthermore, there is almost equivalent increase in the higher education achievement for girls and boys with the tertiary education of the household's head and older members. These findings rise three major concerns; firstly, female cognitive skills are equally productive for the labor market and economic growth if they achieve higher grades (Aslam 2009; Gong et al., 2016). Secondly, there is a tradeoff between fertility and mortality rates with the increase in the female higher education (Galor 1993). Thirdly, households with weak economic structure are inclined to facilitate their children with higher education and educated members can diversify social concepts associated with the females for advance skills. In other words, the influence of educated members is positively related to the higher school completion rate, lower dropouts and long run economic growth (Huang et al., 2009).

The set of different occupations establish the diversification of the economic structure of the household. The household where members are in professional jobs such as doctors, engineers and lawyers are largely in the favor of education investment for boys. The findings suggest that not only high-income occupations as well as low-income ones equally tend to increase the probability of education attainment for boys. Some of the important findings reveal that low-income jobs including technicians and clerks are highly likely for educating girls. My findings contradicts Chowdary et al. (2011) and suggest that lower socio-economic backgrounds and lower income families provide higher aspirations for education achievement. This raises a sense of social responsibility and economic welfare within the households among educated adults.

Recent research are accordance with the capability approach and education endowment that can uplift the households from the poverty cycle (Buchman 2008; Jacoby 1997). On the other hand, my findings support past research (McNabb 2001) that children belong to the households where members are engaged in professional jobs have advantage in current enrollment over those families who have professions related to manual works.

The gender-specific differences are evident in the estimates of household characteristics. They provide in detail the magnitude of the gender disparity within household. Although, household characteristics such as electricity comprises with high probability of female education because of the reduce labor work and the dependency on domestic chores. Furthermore, it alters the parental behavior on female child that involve manual work of the household. Looking at the marginal effects, findings suggest that each household infrastructure increases the probability of education completion. In addition, these effects provide related gender differences at each level of education that remains limited in transitional approach by Willis (1979). The availability of electricity, gas and telephone are significantly determine the education achievement and current enrolment but they are also male-biased. However, girls are likely to complete tertiary education with access of telephone and electricity as compared to secondary education. The importance of learning with digital technology have seen during Pandemic of Covid-19[16]. The social attitude for females has been deteriorating whether it is matter of physical and mental fatigue or marginal intervene in the household decision-making, economic uncertainty with female informal work and, domestic abuse. The gender differences have appeared to be crucial in health and especially, discontinuation of education, which highlighted the need of awareness and technology[17]. Firstly, in rural and tribal areas, most of the females, belonging to higher secondary and tertiary education are lacking advance medium of communication as these areas are deprived of the

[16] COVID-19 is infectious disease that outbreak in Wuhan China in December 31, 2019. The spread of the virus mainly due to close contact, coughing, sneezing and talking that are mediums to transfer small droplets that make it deadly contagious virus. The first two cases were confirmed on 26 February 2020 in Pakistan and up to now 234,509 cases have been confirmed whereas the number of active cases are 94,713 (Government of Pakistan, Ministry of Health).

[17] The first closing of schools to avert the spread of the virus was 13 March 2020. The Ministry of education, Education Boards and Higher institutes announced to close schools, colleges and universities until the end of Corona virus, meanwhile, there is long wait for vaccination. 2 million people could lose their jobs associated with education industry by the end of 2020 and overall the education sector has suffered from the $2 billion loss (KPMG "Klynveld Peat Marwick Goerdeler" Pakistan).

broadband and mobile digital networks[18]. Secondly, the shift of physical classes to virtual or online classes have dropped the number of girls to complete their education due to unavailability of network or domestic chores. Whereas, social mobility and freedom of communication have different approach for the boys. My findings reveals that access to digital communication or even the extension of the broadband in a household can increase the education completion of the girls twice as compared to boys (Wutoh et al., 2004). The estimates suggest that average marginal effect to complete girls' education is 0.2 and 0.5 percentage points in secondary and higher education respectively.

I control the physical asset of the household with the dummy variables of house ownership and any establishment such as shop. The physical asset variables are significantly influencing the school completion of the children and marginal effects reveal that girls have advantage over boys if the family owns its house. This might explain the behavior of protection and value of capital that not only empower mothers to facilitate their daughters but also motivate to reduce gender gap. Conversely, physical belongings are having negative effect on the current enrolment rate that might be due to the low participation of the people in the employment and skills training that directly reduce their current enrolment rate.

The demand for girls' education clearly gives insight about the residence of the household members, as urban areas are more favorable for the education achievement (Freedman et al., 1990). The findings explain larger difference in marginal effects and highlight the gender gap where boys are tends to complete their each level of education comparatively in higher percentage points. It consists of four main areas regrading demography and household structure. Firstly, with the increase of education level, there is increase in the dependency rate; in addition, provided with the inverse relationship of the household size and education achievement, it is entirely convincible that low income families are unable to bear the education cost for their daughters (Behrman 1997). Secondly, with 2.1 percent population growth (World Bank 2018) and only $ 587.069 household per capita income (Pakistan Bureau of Statistics 2019), it is less likely for parents residing in urban areas to invest on daughters by ignoring their sons. Most of the urban areas are flooded with the private institutions where tradeoff between education cost

[18] The total broadband users if 70 million (Pakistan Telecommunication Company Ltd., 2020; Pakistan telecommunication Authority; Tribune Pakistan July, 2020) out of the total population of 212.2 million (World Bank 2018). They also suffer from the internet speed, limited ISPs and disrupted networks.

and one meal of the family is quite out of the sight (Tan et al., 1987). Thirdly, regional and provincial stratification equally contribute in the education of the girls and gender inequality. Lastly, social and cultural restrictions and barriers for female education are independent of the region.

The gender-specific variations are accounted in provinces of the country. As compared to Punjab province, that holds high population density, other provinces are less likely to increase the probability of tertiary education achievement. The strong negative effects are associated with the primary grades for both girls and boys. However, the worst situation of education estimated in Balochistan and KPK with tribal, armed and conflicted areas that are suffering from schools destruction, ban on the female education and freedom of mobility.

Summing up, this study has investigated gender inequality in education in Pakistan for household integrated micro survey dataset from 2005 to 2016 by using logit and ordered logit models. Firstly, the findings favor the education attainment with the individual and household characteristics and strive to exercise transition of female education for human capital investment. Secondly, it emphasizes the importance to establish the existence of causality between income and education in order to facilitate assistance to the policy makers. It deals the potential endogeneity with instrumental variable techniques that has significantly formulated with Two Stage Residuals Inclusion approach. Although the probability of education attainment increases with income but it declines from primary education to higher education for girls. The girls are less likely to complete their tertiary education while increasing dependency ratio of the household. Nevertheless, it is also evident that female education reduces the early and child marriages. The probability of educational transition favors boys and higher marginal effect associated with the high-income occupations and regional distribution, however, household infrastructure seems to evolve effective mediums to narrow gender gap. The findings indicate to counter household growth rate that can eventually increase the likelihood of completing education of girls for primary and specifically tertiary levels. The findings are robust with alternative specification such as model structure, other control variables and distribution of dataset according to the age, region and provinces.

Lastly, the findings highlights valuable recommendations for policy makers to perpetuate gender inequality.

- The education policies must be reformed by prioritizing educational strategies equally applicable in urban, rural and conflicted areas that have suffered in the recent decades with adequate funds.
- Policies should formulate to improve the economic returns of education for females by increasing the incentive to acquire schooling and employment opportunities. The gap between having enrolled and not having enrolled should be minimized with the equal distribution of income by considering low-income groups of the society.
- The returns of higher education must be improve with the provincial and federal governments efforts by maintaining single gender universities with the advance laboratories where there are limited resources and media should play its role with awareness campaigns.
- Economic policies that can facilitates the income increase at micro level and can directly raise the transitional effect on education to maximize gender equity.
- Government should provide cost effective education in remote and tribal areas for middle-income groups such as KPK and Balochistan.
- To control the high demand of education, supply side must be oriented with the new projects that include mobile learning and distance education.
- The empirical statistics reveal that the transition from secondary to higher education is quite low that propose to improve the university curriculum and education expenditures by providing scholarships and grants to the girls.
- Efforts on macro level should form to get rid pro-male biasedness at tertiary education. There is need to develop framework from basic to higher education levels that incorporate committees by collaboration of parents and teachers.

Finally, some potential limitations should be noted that might suggest for future research. Firstly, this study focused on education attainment for children 24 years of age and less however, other age groups, particularly for tertiary level might be considered. Secondly, the study dealt with the causality between education and income, on the other sides, explanatory variables, especially, parents ‘education might also suffer. Thirdly, further qualitative research urge to develop with household characteristics other than that I have used in this study.

References

Abdullah, A., Doucouliagos, H., & Manning, E. (2015). Does education reduce income inequality? A meta-regression analysis. *Journal of Economic Surveys*, *29*(2), 301-316.

Aderemi, T. (2014). Does human capital investment matter in economic development? Evidence from a Nigerian micro-data. *International Journal of Education Economics and Development*, *5*(2), 127-139.

Agasisti, T., & Longobardi, S. (2014). Inequality in education: Can Italian disadvantaged students close the gap? *Journal of Behavioral and Experimental Economics*, *52*, 8-20.

Ahrens, J. P., Landmann, A., & Woywode, M. (2015). Gender preferences in the CEO successions of family firms: Family characteristics and human capital of the successor. *Journal of Family Business Strategy*, *6*(2), 86-103.

Akaike, H. (1974). A new look at the statistical model identification. *IEEE transactions on automatic control*, *19*(6), 716-723.

Akarçay-Gürbüz, A., & Polat, S. (2017). Schooling opportunities and intergenerational educational mobility in Turkey: An IV estimation using Census data. *The Journal of Development Studies*, *53*(9), 1396-1413.

Alderman, H., & Chishti, S. (1991). Simultaneous determination of household and market-oriented activities of women in rural Pakistan. *Research in Population Economics*, *7*, 245-65.

Ali, H. E. (2012). Military expenditures and inequality in the Middle East and North Africa: A panel analysis. *Defence and Peace Economics*, *23*(6), 575-589.

Arif, G. M., us Saqib, N., Zahid, G. M., & Khan, A. H. (1999). Poverty, Gender, and Primary School Enrolment in Pakistan [with Comments]. *The Pakistan Development Review*, 979-992.

Aslam, M. (2009). Education gender gaps in Pakistan: Is the labor market to blame? *Economic Development and Cultural Change*, *57*(4), 747-784.

Aslam, M. (2009). Education gender gaps in Pakistan: Is the labor market to blame?. *Economic Development and Cultural Change*, *57*(4), 747-784.

Azid, T., Ejaz Ali Khan, R., & Alamasi, A. M. (2010). Labor force participation of married women in Punjab (Pakistan). *International Journal of Social Economics*, *37*(8), 592-612.

Baetschmann, G., Staub, K. E., & Winkelmann, R. (2015). Consistent estimation of the fixed effects ordered logit model. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, *178*(3), 685-703.

Baker, S. R., & Bloom, N. (2013). *Does uncertainty reduce growth? Using disasters as natural experiments* (No. w19475). National Bureau of Economic Research.

Bandiera, O., & Natraj, A. (2013). Does gender inequality hinder development and economic growth? Evidence and policy implications. *The World Bank Research Observer*, *28*(1), 2-21.

Bandyopadhyay, M., & Subrahmanian, R. (2008). *Gender equity in education: A review of trends and factors*. Consortium for Research on Educational Access, Transitions and Equity (CREATE).

Barro, R. J., & Lee, J. W. (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of Development Economics*, *104*, 184-198.

Bauer, J., Feng, W., Riley, N. E., & Xiaohua, Z. (1992). Gender inequality in urban China: Education and employment. *Modern China*, *18*(3), 333-370.

Behrman, J. R., & Stacey, N. (1997). *The social benefits of education*. University of Michigan Press.

Behrman, J. R., Khan, S., Ross, D., & Sabot, R. (1997). School quality and cognitive achievement production: A case study for rural Pakistan. *Economics of Education Review*, *16*(2), 127-142.

Behrman, J. R., Khan, S., Ross, D., & Sabot, R. (1997). School quality and cognitive achievement production: A case study for rural Pakistan. *Economics of Education Review*, *16*(2), 127-142.

Belfield, C. R. (2000). Economic principles for education. *Books*.

Best, J. W., & Kahn, J. V. (2016). *Research in Education*. Pearson Education India.

Beutel, A. M., & Axinn, W. G. (2002). Gender, social change, and educational attainment. *Economic Development and Cultural Change*, *51*(1), 109-134.

Björkman-Nyqvist, M. (2013). Income shocks and gender gaps in education: Evidence from Uganda. *Journal of Development Economics*, *105*, 237-253.

Blossfeld, H. P., & Timm, A. (Eds.). (2003). *Who marries whom? Educational systems as marriage markets in modern societies* (Vol. 12). Springer Science & Business Media.

Boachie, M. K., Mensah, I. O., Sobiesuo, P., Immurana, M., Iddrisu, A. A., & Kyei-Brobbey, I. (2014). Determinants of public health expenditure in Ghana: a cointegration analysis. *J Behav Econ Finance Entrep Account Transp*, *2*(2), 35-40.

Bommier, A., & Lambert, S. (2000). Education demand and age at school enrollment in Tanzania. *Journal of Human Resources*, 177-203.

Bratti, M. (2007). Parents' income and children's school dropout at 16 in England and Wales: evidence from the 1970 British cohort study. *Review of Economics of the Household*, *5*(1), 15-40.

Buchmann, C., DiPrete, T. A., & McDaniel, A. (2008). Gender inequalities in education. *Annu. Rev. Sociol*, *34*, 319-337.

Burney, N. A., & Irfan, M. (1995). Determinants of child school enrolment: evidence from LDCs using choice-theoretic approach. *International Journal of Social Economics*.

Burnside, C., & Dollar, D. (2004). Aid, policies, and growth: reply. *American Economic Review*, *94*(3), 781-784.

Canes, B. J., & Rosen, H. S. (1995). Following in her footsteps? Faculty gender composition and women's choices of college majors. *ILR Review*, *48*(3), 486-504.

Card, D., Cardoso, A. R., & Kline, P. (2015). Bargaining, sorting, and the gender wage gap: Quantifying the impact of firms on the relative pay of women. *The Quarterly Journal of Economics*, *131*(2), 633-686.

Carrell, S. E., Page, M. E., & West, J. E. (2010). Sex and science: How professor gender perpetuates the gender gap. *The Quarterly Journal of Economics*, *125*(3), 1101-1144.

Chaudhry, I. S. (2007). Gender inequality in education and economic growth: case study of Pakistan. *Pakistan Horizon*, *60*(4), 81-91.

Chaudhry, I. S., & Rahman, S. (2009). The impact of gender inequality in education on rural poverty in Pakistan: An empirical analysis. *European Journal of Economics, Finance and Administrative Sciences*, *15*(1), 174-188.

Chaudhry, M. G., Khan, Z., & Abella, M. I. (1987). Female Labour Force Participation Rates in Rural Pakistan: Some Fundamental Explanations and Policy Implications [with Comments]. *The Pakistan Development Review*, *26*(4), 687-697.

Chevalier, A., & Lanot, G. (2002). The relative effect of family characteristics and financial situation on educational achievement. Education Economics, 10(2), 165-181.

Chevalier, A., Harmon, C., O'Sullivan, V., & Walker, I. (2013). The impact of parental income and education on the schooling of their children. *IZA Journal of Labor Economics*, *2*(1), 8.

Chowdry, H., Crawford, C., & Goodman, A. (2011). The role of attitudes and behaviours in explaining socio-economic differences in attainment at age 16. *Longitudinal and Life Course Studies*, *2*(1), 59-76.

Cruces, G., Perez-Truglia, R., & Tetaz, M. (2013). Biased perceptions of income distribution and preferences for redistribution: Evidence from a survey experiment. *Journal of Public Economics*, *98*, 100-112.

Delgado, M. S., Henderson, D. J., & Parmeter, C. F. (2014). Does education matter for economic growth? *Oxford Bulletin of Economics and Statistics*, *76*(3), 334-359.

Delgado-Gaitan, C. (1990). *Literacy for empowerment: The role of parents in children's education*. Routledge.

Desai, S., Adams, C. D., & Dubey, A. (2009). Segmented schooling: inequalities in primary education. *Blocked by Caste: Discrimination and Social Exclusion in Modern India*, 230-52.

DiPaola, M., Tschannen-Moran, M., & Walther-Thomas, C. (2004). School principals and special education: Creating the context for academic success. *Focus on Exceptional Children*, *37*(1), 1.

Fichera, E., & Savage, D. (2015). Income and health in Tanzania. An instrumental variable approach. *World Development*, *66*, 500-515.

Galor, O., & Weil, D. N. (1993). *The gender gap, fertility, and growth* (No. w4550). National Bureau of Economic Research.

Gandhi Kingdon, G. (2002). The gender gap in educational attainment in India: How much can be explained? *Journal of Development Studies*, *39*(2), 25-53.

Ghimire, D. J., Axinn, W. G., Yabiku, S. T., & Thornton, A. (2006). Social change, premarital nonfamily experience, and spouse choice in an arranged marriage society. *American Journal of Sociology*, *111*(4), 1181-1218.

Glick, P., & Sahn, D. E. (2000). Schooling of girls and boys in a West African country: the effects of parental education, income, and household structure. *Economics of Education Review*, *19*(1), 63-87.

Glomm, G. (1997). "Parental choice of human capital investment." *Journal of Development Economics* 53(1): 99-114.

Greiner, A., Semmler, W., & Gong, G. (2016). *The forces of economic growth: a time series perspective*. Princeton University Press.

Handa, S., & Simler, K. (2000). *Quality or Quantity? The Supply-Side Determinants of Primary Schooling in Rural Mozambique*. Food Consumption and Nutrition Division, International Food Policy Research Institute.

Hannum, E., & Xie, Y. (1994). INEOUALITY IN CHINA: 1949-1985. *Research in social stratification and mobility*, *13*, 73-98.

Hansen, M. N. (1997). Social and economic inequality in the educational career. Do the effects of social background characteristics decline? *European Sociological Review*, *13*(3), 305-321.

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: Journal of the Econometric Society*, 1251-1271.

Hazarika, G. (2001). The sensitivity of primary school enrollment to the costs of post-primary schooling in rural Pakistan: A gender perspective. *Education Economics*, *9*(3), 237-244.

Hazarika, G. (2001). The sensitivity of primary school enrollment to the costs of post-primary schooling in rural Pakistan: A gender perspective. *Education Economics*, *9*(3), 237-244.

Holmes, J. (2003). Measuring the determinants of school completion in Pakistan: analysis of censoring and selection bias. *Economics of Education Review*, *22*(3), 249-264.

Hoogerheide, L., Block, J. H., & Thurik, R. (2012). Family background variables as instruments for education in income regressions: A Bayesian analysis. *Economics of Education Review*, *31*(5), 515-523.

Howley, P. (2015). Addressing endogeneity in estimating the effect of social capital on psychological health. *Applied Economics Letters*, *22*(1), 76-79.

Huang, F., Jin, L., & Sun, X. (2009). Relationship between scale of higher education and economic growth in China. *Asian Social Science*, *5*(11), 55-60.

Ibraz, T. S. (1993). The cultural context of women's productive invisibility: A case study of a Pakistani village. *The Pakistan Development Review*, 101-125.

Iddrisu, A. M., Danquah, M., & Quartey, P. (2017). Analysis of School Enrollment in Ghana: A Sequential Approach. *Review of Development Economics*, *21*(4), 1158-1177.

Illahi, N. (2001). Children's Work and Schooling: Does Gender Matters? *Evidence from the Peru LSMS Panel Data', Paper for The Policy Research Report on Gender, The World Bank*.

Jacoby, H. G., & Skoufias, E. (1997). Risk, financial markets, and human capital in a developing country. *The Review of Economic Studies*, *64*(3), 311-335.

Jimenez, E., & Sawada, Y. (2001). Public for private: The relationship between public and private school enrollment in the Philippines. *Economics of Education Review*, *20*(4), 389-399.

Jimenez, E., & Tan, J. P. (1987). Decentralised and private education: The case of Pakistan. *Comparative Education*, *23*(2), 173-190.

Kabeer, N. (2005). Gender equality and women's empowerment: A critical analysis of the third millennium development goal 1. *Gender & Development*, *13*(1), 13-24.

Kazi, S., Raza, B., & Duncan, A. (1991). Duality of Female Employment in Pakistan [with Comments]. *The Pakistan Development Review*, *30*(4), 733-743.

Khan, A. H., & Mahmood, N. (1997). Education in Pakistan: Fifty Years of Neglect [with Comments]. *The Pakistan Development Review*, 647-667.

King, R. A., A. D. Swanson, et al. (2003). School Finance: Achieving High Standards With Equity And Efficiency. Boston, Allyn and Bacon.

Kingdon, G. G. (2005). Where has all the bias gone? Detecting gender bias in the intrahousehold allocation of educational expenditure. *Economic Development and Cultural Change*, *53*(2), 409-451.

Kingdon, G. G. (2007). The progress of school education in India. *Oxford Review of Economic Policy*, *23*(2), 168-195.

Klasen, S. (2000). Does gender inequality reduce growth and development? Evidence from cross-country regressions.

Klasen, S., & Pieters, J. (2015). What explains the stagnation of female labor force participation in urban India? *The World Bank Economic Review*, *29*(3), 449-478.

Klein, S. S., Richardson, B., Grayson, D. A., Fox, L. H., Kramarae, C., Pollard, D. S., & Dwyer, C. A. (Eds.). (2014). *Handbook for achieving gender equity through education*. Routledge.

Knight, J. B., Sabot, R. H., & Hovey, D. C. (1992). Is the rate of return on primary schooling really 26 per cent? *Journal of African Economies*, *1*(2), 192-205.

Krause, J. S., Terza, J. V., & Dismuke, C. (2008). Earnings among people with spinal cord injury. *Archives of physical medicine and rehabilitation*, *89*(8), 1474-1481.

Kuehnle, D. (2014). The causal effect of family income on child health in the UK. *Journal of Health Economics*, *36*, 137-150.

Lagerlöf, N. P. (2003). Gender equality and long-run growth. *Journal of Economic Growth*, *8*(4), 403-426.

Lavely, W., Zhenyu, X., Bohua, L., & Freedman, R. (1990). The rise in female education in China: National and regional patterns. *The China Quarterly*, *121*, 61-93.

Lawanson, O. I. (2009). Human capital investment and economic development in Nigeria: The role of education and health. In *Oxford Business & Economics Conference Programme.www.gcbe.us. Accessed on* (Vol. 17, pp. 07-10).

Livingstone, D. W. (1997). "The Limits of Human Capital Theory: Expanding Knowledge, Informal Learning and Underemployment." Policy Options.

Livingstone, D. W. (2018). *The Education-Jobs Gap: Underemployment or Economic Democracy?* Routledge.

Lloyd, C. B., Mete, C., & Sathar, Z. A. (2005). The effect of gender differences in primary school access, type, and quality on the decision to enroll in rural Pakistan. *Economic Development and Cultural Change*, *53*(3), 685-710.

Lobos, G., Grunert, K. G., Bustamante, M., & Schnettler, B. (2016). With health and good food, great life! Gender differences and happiness in Chilean rural older adults. *Social Indicators Research*, *127*(2), 865-885.

Lucas, S. R. (2001). Effectively maintained inequality: Education transitions, track mobility, and social background effects. *American Journal of Sociology*, *106*(6), 1642-1690.

Mahmood, A., Mahmood, S. T., & Malik, A. B. (2012). A comparative study of student satisfaction level in distance learning and live classroom at higher education level. *Turkish Online Journal of Distance Education*, *13*(1).

Mahmood, N. (1998). Gender dimensions of demographic change in Pakistan. *Pakistan Development Review*, *37*(4), 705-727.

Mahmood, N. (2004). Transition in primary and secondary schooling in Pakistan: Gender and age Cohort analysis. *The Pakistan Development Review*, 53-71.

Mahmood, N., Zahid, G. M., & Ghafoor, A. (1992). Measuring the Education Gap in Primary and Secondary Schooling in Pakistan [with Comments]. *The Pakistan Development Review*, *31*(4), 729-740.

Maitra, P. (2003). Schooling and educational attainment: evidence from Bangladesh. *Education Economics*, *11*(2), 129-153.

Matheson, F. I., Dunn, J. R., Smith, K. L., Moineddin, R., & Glazier, R. H. (2012). Development of the Canadian Marginalization Index: a new tool for the study of inequality. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, S12-S16.

McCullagh, P. (1980). Regression models for ordinal data. *Journal of the Royal Statistical Society. Series B (Methodological)*, 109-142.

McDowell, B. D., Chapman, C. G., Smith, B. J., Button, A. M., Chrischilles, E. A., & Mezhir, J. J. (2015). Pancreatectomy predicts improved survival for pancreatic adenocarcinoma: results of an instrumental variable analysis. *Annals of surgery*, *261*(4), 740.

McNabb, R., Pal, S., & Sloane, P. (2002). Gender differences in educational attainment: The case of university students in England and Wales. *Economica*, *69*(275), 481-503.

McWayne, C., Downer, J. T., Campos, R., & Harris, R. D. (2013). Father involvement during early childhood and its association with children's early learning: A meta-analysis. *Early Education & Development*, *24*(6), 898-922.

Migliore, G., Schifani, G., & Cembalo, L. (2015). Opening the black box of food quality in the short supply chain: Effects of conventions of quality on consumer choice. *Food Quality and Preference*, *39*, 141-146.

Miller, L. C., & Tainter, M. (1944). Estimation of the ED50 and its error by means of logarithmic-probit graph paper. *Proceedings of the society for Experimental Biology and Medicine*, *57*(2), 261-264.

Mohammadi, H., Mohammadi, A. M., & Nojavan, S. (2017). Factors Affecting Farmer's Chemical Fertilizers Consumption and Water Pollution in Northeastern Iran. *Journal of Agricultural Science*, *9*(2), 234.

Muhammad, S., Shaheen, G., Naqvi, S., & Zehra, S. (2012). Women empowerment and microfinance: A case study of Pakistan.

Munshi, S. (2017). 'Arranged'Marriage, Education, and Dowry: A Contract-Theoretic Perspective. *Journal of Economic Development*, *42*(1), 35.

Nguyen, J. K., Fleming, C. M., & Su, J. J. (2015). Does income inequality make us less happy? *Australian Economic Review*, *48*(1), 15-32.

Odhiambo, N. M. (2015). Government expenditure and economic growth in South Africa: An empirical investigation. *Atlantic Economic Journal*, *43*(3), 393-406.

Okabe, M. (2016). Gender-preferential intergenerational patterns in primary educational attainment: An econometric approach to a case in rural Mindanao, the Philippines. *International Journal of Educational Development*, *46*, 125-142.

Parish, J. C. B. (2000). Women in education: Effective leadership styles as inspired by spirituality.

Pasha, H. K. (2019). Economic Welfare and Education: Attain Education, Gain Voice. The contribution of educated single females in the society for economic welfare (No. halshs-02315675).

Pasha, H. K. (2020). Strategic Life Choices in Women's Economic Empowerment: Does society scared from educated and economically empowered women?

Paul, J., & Wahlberg, K. (2002, March). Global taxes for global priorities. In *Global Policy Forum*.

Pervaiz, Zahid, Muhammad Irfan Chani, Sajjad Ahmad Jan, and Amatul R. Chaudhary. "Gender inequality and economic growth: a time series analysis for Pakistan." (2011): 434-439.

Posada, D., & Buckley, T. R. (2004). Model selection and model averaging in phylogenetics: advantages of Akaike information criterion and Bayesian approaches over likelihood ratio tests. *Systematic biology*, *53*(5), 793-808.

Postiglione, G. A. (2015). *Education and social change in China: Inequality in a market economy*. Routledge.

Pour-Rouholamin, M., & Zhou, H. (2016). Investigating the risk factors associated with pedestrian injury severity in Illinois. *Journal of Safety Research*, *57*, 9-17.

Powdthavee, N., Lekfuangfu, W. N., & Wooden, M. (2013). The marginal income effect of education on happiness: Estimating the direct and indirect effects of compulsory schooling on well-being in Australia.

Psacharopoulos, G. (1994). Returns to investment in education: A global update. *World Development*, *22*(9), 1325-1343.

Rahji, M. A. Y., & Falusi, A. O. (2005). A gender analysis of farm households' labor use and its impacts on household income in southwestern Nigeria. *Quarterly Journal of International Agriculture*, *44*(2), 155-166.

Robb, A. M., & Watson, J. (2012). Gender differences in firm performance: Evidence from new ventures in the United States. *Journal of Business Venturing*, *27*(5), 544-558.

Romer, P. M. (1994). "The Origins of Endogenous Growth." *Journal of Economic Perspectives* 8(1): 3-22.

Sackey, H. A. (2007). The determinants of school attendance and attainment in Ghana: a gender perspective.

Sargan, J. D. (1958). The estimation of economic relationships using instrumental variables. *Econometrica: Journal of the Econometric Society*, 393-415.

Sathar, Z. A., & Lloyd, C. B. (1994). Who gets primary schooling in Pakistan: Inequalities among and within families? *The Pakistan Development Review*, 103-134.

Sathar, Z., Callum, C., & Jejeebhoy, S. (2001, August). Gender, region, religion and reproductive behavior in India and Pakistan. In *IUSSP, XXIV General Population Conference, Salvador, Brazil* (pp. 18-24)

Sawada, Y., & Lokshin, M. (2009). Obstacles to school progression in rural Pakistan: An analysis of gender and sibling rivalry using field survey data. *Journal of Development Economics*, *88*(2), 335-347.

Schultz, T. P. (1993). Returns to women's education. *Women's education in developing countries: Barriers, benefits, and policies*, 51-99.

Sen, A. (1992). *Inequality reexamined*. Clarendon Press.

Serbin, L. A., Stack, D. M., & Kingdon, D. (2013). Academic success across the transition from primary to secondary schooling among lower-income adolescents: Understanding the effects of family resources and gender. *Journal of youth and adolescence*, *42*(9), 1331-1347.

Shah, N. M. (1986). Pakistani women: A socioeconomic and demographic profile.

Shang, Q., & Weinberg, B. A. (2013). Opting for families: Recent trends in the fertility of highly educated women. *Journal of Population Economics*, *26*(1), 5-32.

Sharma, N., Vaid, S., & Dhawan, R. (2004). Parental concepts about preschool education. *The Anthropologist*, *6*(3), 201-208.

Shavit, Y., & Blossfeld, H. P. (1993). *Persistent Inequality: Changing Educational Attainment in Thirteen Countries. Social Inequality Series*. Westview Press, 5500 Central Avenue, Boulder, CO 80301-2847.

Shavit, Y., & Westerbeek, K. (1998). Reforms, expansion, and equality of opportunity. *European Sociological Review*, *14*(1), 33-47.

Siddiqui, M. A. (1991). *In-service teacher education*. Aph Publishing Corporation.

Stuart, L. H., Mills, A. M., & Remus, U. (2009). School leaders, ICT competence and championing innovations. *Computers & Education*, *53*(3), 733-741.

Subrahmanian, R. (2006). *Mainstreaming Gender for Better Girls' Education: Policy and Institutional Issues*. United Nations Children's Fund, Regional Office for South Asia.

Tansel, A. (1997). Schooling attainment, parental education, and gender in Cote d'Ivoire and Ghana. *Economic Development and Cultural Change*, *45*(4), 825-856.

Tansel, A., & Bodur, F. B. (2012). Wage inequality and returns to education in Turkey: A quantile regression analysis. *Review of Development Economics*, *16*(1), 107-121.

Telcs, A., Kosztyan, Z. T., Neumann-Virag, I., Katona, A., & Torok, A. (2015). Analysis of Hungarian students' college choices. *Procedia-Social and Behavioral Sciences*, *191*, 255-263.

Toth, M., Holmes, M., Van Houtven, C., Toles, M., Weinberger, M., & Silberman, P. (2017). Rural–urban Differences in the Effect of Follow-up Care on Post discharge Outcomes. *Health services research*, *52*(4), 1473-1493.

Vinod, H. D., & Kaushik, S. K. (2007). Human capital and economic growth: evidence from developing countries. *The American Economist*, *51*(1), 29-39.

Warwick, D. P., & Reimers, F. (1995). *Hope or despair? Learning in Pakistan's primary schools*. Greenwood Publishing Group.

Whalley, J., & Zhao, X. (2013). The contribution of human capital to China's economic growth. *China Economic Policy Review*, *2*(01), 1350001.

Willis, R. J., & Rosen, S. (1979). Education and self-selection. *Journal of Political Economy*, *87*(5, Part 2), S7-S36.

Woodhead, M., Dornan, P., & Murray, H. (2014). What inequality means for children. *The International Journal of Children's Rights*, *22*(3), 467-501.

Wutoh, R., Boren, S. A., & Balas, E. A. (2004). ELearning: a review of Internet-based continuing medical education. *Journal of Continuing Education in the Health Professions*, *24*(1), 20-30.

Appendix A: Tables

(I) Tables: Stylized facts in Pakistan

Table A.1 Percentage of Education Attainment in Pakistan

	Primary		Secondary		Higher		Total	
Year	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
2005-2016	12.6	13.5	18.6	20.8	4.4	4.7	35.7	39.1
2015-2016	19.3	19.3	27.7	28.4	6.9	6.9	54.1	54.6
2013-2014	8.7	8.9	15.4	15.6	3.6	3.8	27.9	28.5
2011-2012	9.0	8.9	16.4	17.3	4.2	4.3	29.7	30.1
2010-2011	18.2	22.9	18.4	29.8	3.4	5.6	40.1	58.4
2007-2008	9.0	9.1	15.5	15.9	3.5	3.6	28.1	28.7
2005-2006	8.9	9.2	14.1	14.7	3.2	3.4	26.3	27.3

Source: Pakistan Social and Living standards Measures 2005-2016

Table A.2 Percentage of Females and Males in Labor Force Participation (Province wise)

Province	**All**		**Punjab**		**Sindh**		**KPK**		**Baloch**	
Years	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
2005-2016	32.9	35.2	14.12	14.6	9.79	10.71	5.54	5.7	3.44	4.0
2015-2016	29.2	31.6	11.2	13.2	8.7	9.6	5.2	5.5	2.7	3.1
2013-2014	41.3	43.6	16.5	17.1	14.0	14.8	6.8	6.9	3.9	4.6
2011-2012	30.6	32.3	13.3	13.6	9.2	10.4	4.9	5.3	2.5	2.9
2010-2011	36.2	43.9	15.8	16.5	9.6	10.5	5.78	5.8	5.0	5.6
2007-2008	30.7	33.1	13.5	14.1	8.6	9.4	5.1	5.3	3.5	4.2
2005-2006	30.4	32.84	13.3	13.7	8.5	9.5	5.3	5.6	3.2	3.8

Source: Pakistan Social and Living standards Measures 2005-2016

Table A.3 Human Development Report 2015 (Pakistan)

	GII value	GII Rank	Population with least secondary education		Labor force participation		Contribution to poverty deprivation	Expected years of schooling	Mean years of schooling
			Female	Male	Female	Male	Education		
Pakistan	0.536	121	19.3	46.1	24.6	82.9	31.6	7.8	4.7
India	0.563	130	27.0	56.5	27.0	79.9	44.8	11.7	5.4
Bangladesh	0.503	111	34.1	41.3	57.4	84.1	44.9	10.0	5.1
South Asia	0.536	-	29.1	54.6	29.8	80.3	-	11.2	5.5
Low HDI	0.583	-	14.8	28.3	57.2	79.1	-	9.0	4.5

Source: Human Development report 2015

Table A.4 Selective variables detailed summary statistics

Variables	S.D.	Min	Max	Percentile 25	Percentile 50	Percentile 75
Income per capita (Log)	2.375403	0	15.443	9.1050	9.7981	10.394
Age	19.09655	0	99	9	19	36
Square age	1320.739	0	9801	81	361	1296
Edu mother	3.921528	0	23	5	8	10
HH size	4.01896	1	63	5	7	10
Dependency ratio	0.227371	0	1	0.25	0.4444	0.6

(II) Tables: Coefficient Estimation Results

Table A.5 Coefficient Estimates for Education Achievement: Ordered Logit Model Regression

	Both	Girls	Boy
Variables	**(1)**	**(2)**	**(3)**
Girl	0.08659***		
	(0.01147)		
Per capita income	0.04058***	0.03643***	0.04847***
	(0.00267)	(0.00362)	(0.00410)
Age	0.04332**	0.00392	0.05292*
	(0.02083)	(0.02973)	(0.02935)
Square age	0.00078	0.00173**	0.00060
	(0.00056)	(0.00079)	(0.00079)
Married	-0.07287***	0.06393***	-0.37459***
	(0.01624)	(0.02057)	(0.02893)
Edu parents	0.65850	1.20796	-0.05761
	(0.75777)	(1.32805)	(0.89953)
Edu Head	1.49811***	1.92742***	1.60006***
	(0.03625)	(0.11602)	(0.04093)
Edu member S	2.23906***	2.33144***	2.15387***
	(0.02369)	(0.03480)	(0.03245)
Edu member H	7.61906***	7.68789***	7.56454***
	(0.08485)	(0.12061)	(0.11982)
Edu member math	3.27682***	3.38102***	3.17068***
	(0.05791)	(0.08311)	(0.08078)
Professional	0.72362***	0.74507***	0.70417***
	(0.05500)	(0.07577)	(0.07985)
Clerk	0.91718***	1.10392***	0.73789***
	(0.06774)	(0.09817)	(0.09301)
Operator	0.46991***	0.42890***	0.50037***
	(0.03460)	(0.05051)	(0.04743)
Manager	0.47840***	0.63292***	0.33221***
	(0.05923)	(0.08576)	(0.08214)
Technician	0.87651***	0.92567***	0.82941***
	(0.05408)	(0.07621)	(0.07640)
HH size	0.02277***	0.01453***	0.03270***
	(0.00170)	(0.00238)	(0.00242)
Dependency	-0.98282***	-0.96139***	-1.02715***
	(0.03321)	(0.04636)	(0.04765)
Electricity	0.43045***	0.49297***	0.36921***
	(0.01696)	(0.02435)	(0.02364)
Gas	0.21946***	0.22297***	0.21275***
	(0.01437)	(0.02060)	(0.02010)
Telephone 1 (Ref=0)	0.33558***	0.49777***	0.16910*
	(0.06346)	(0.09128)	(0.08852)
Telephone 2	0.59989***	0.80851***	0.37805***
	(0.09035)	(0.12952)	(0.12734)
Telephone 3	0.36126***	0.50889***	0.20982**
	(0.06314)	(0.09080)	(0.08811)
Establishment	0.23937***	0.24088***	0.23661***
	(0.01805)	(0.02570)	(0.02534)
Own house	0.08010***	0.10357***	0.05947***

	(0.01366)	(0.01968)	(0.01900)
Urban	0.10709***	0.11878***	0.09764***
	(0.01402)	(0.02006)	(0.01965)
Sindh (Ref=Punjab)	-0.11686***	-0.08404***	-0.14856***
	(0.01416)	(0.02023)	(0.01984)
KPK	-0.19513***	-0.18293***	-0.21762***
	(0.01561)	(0.02204)	(0.02218)
Balochistan	-0.36729***	-0.38146***	-0.36854***
	(0.02031)	(0.03033)	(0.02743)
Observations	161,919	80,342	81,577
Log-Likelihood	-124888.75	-61678.67	-63080.19
Wald Chi-square	25929.16	12360.36	13653.89
AIC	249840.50	123417.34	126220.39
BIC	250149.34	123696.16	126500.67
Pseudo R2	0.239	0.247	0.232
Nagelkerke R2	0.442	0.455	0.431
Prob > chi2	0.000	0.000	0.000
Linktest(_hatsq)	0.513		

*The dependent variable is education achievement that is categorical variable. The category 1 displays for primary, 2 for secondary and 3 for tertiary level of education and 0 demonstrates no education. The reference category for the telephone is no direct connection and any extension. Robust standard errors are in parentheses. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

Table A.6 Alternative Specification: Instrumental Variable Estimates for Education Achievement

	Two Stage Least Square			IV Probit			Two Stage Residual Inclusion		
Variables	**Both**	**Girl**	**Boy**	**Both**	**Girl**	**Boy**	**Both**	**Girl**	**Boy**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Girl	0.03033***			0.06157***			0.09349***		
	(0.00394)			(0.00718)			(0.01096)		
Per capita income	0.03586***	0.02895***	0.04642***	0.10117***	0.08249***	0.12909***	0.11473***	0.10055***	0.13488***
	(0.00464)	(0.00595)	(0.00753)	(0.00754)	(0.00983)	(0.01193)	(0.01302)	(0.01678)	(0.01133)
Age	-0.00094	-0.01245	0.00104	0.04610***	0.02006	0.05290***	0.04171*	0.00379	0.04954*
	(0.00700)	(0.00993)	(0.00991)	(0.01302)	(0.01870)	(0.01821)	(0.02510)	(0.02665)	(0.02847)
Square age	0.00070***	0.00097***	0.00066**	-0.00014	0.00050	-0.00030	0.00087	0.00177**	0.00074
	(0.00019)	(0.00027)	(0.00027)	(0.00035)	(0.00050)	(0.00049)	(0.00067)	(0.00075)	(0.00079)
Married	-0.02721***	0.01834**	-0.12926***	-0.03861***	0.04805***	-0.23920***	-0.08339***	0.05460***	-0.38720***
	(0.00572)	(0.00730)	(0.00970)	(0.01084)	(0.01366)	(0.01939)	(0.01561)	(0.01714)	(0.01887)
Edu parents	0.29443	0.48614	-0.16406	0.41584	0.48168	0.20732	0.66021	1.25016	-0.10211
	(0.32355)	(0.41149)	(0.35879)	(0.54871)	(0.72113)	(0.86633)	(1.51819)	(0.78204)	(0.61879)
Edu Head	0.67262***	0.90064***	0.70114***	1.61421***	3.34809***	1.60730***	1.57634***	2.00788***	1.68955***
	(0.01709)	(0.05851)	(0.01838)	(0.04564)	(0.38616)	(0.04673)	(0.04499)	(0.08771)	(0.05378)
Edu member S	0.93417***	0.96772***	0.90003***	1.08888***	1.14022***	1.03581***	2.23546***	2.32797***	2.15017***
	(0.00802)	(0.01137)	(0.01131)	(0.01483)	(0.02137)	(0.02090)	(0.01687)	(0.01094)	(0.01557)
Edu member H	1.91085***	1.91915***	1.89859***	1.35746***	1.38192***	1.32530***	7.57166***	7.64680***	7.50936***
	(0.01192)	(0.01608)	(0.01775)	(0.02207)	(0.03088)	(0.03211)	(0.03252)	(0.05898)	(0.12717)
Edu member math	0.47505***	0.47856***	0.46894***	1.64032***	1.68958***	1.58575***	3.27211***	3.37738***	3.16447***
	(0.00312)	(0.00440)	(0.00451)	(0.02435)	(0.03411)	(0.03514)	(0.09245)	(0.03397)	(0.06500)
Professional	0.25365***	0.25896***	0.24839***	0.27432***	0.29305***	0.25402***	0.67751***	0.70391***	0.65250***
	(0.01833)	(0.02538)	(0.02644)	(0.03142)	(0.04312)	(0.04590)	(0.08770)	(0.02418)	(0.05240)
Clerk	0.35163***	0.41011***	0.29284***	0.40463***	0.50922***	0.30526***	0.88447***	1.07560***	0.70004***
	(0.02407)	(0.03473)	(0.03314)	(0.04084)	(0.06050)	(0.05550)	(0.08552)	(0.07583)	(0.05611)
Operator	0.17589***	0.15918***	0.18903***	0.32407***	0.31045***	0.33305***	0.44128***	0.40508***	0.46613***
	(0.01451)	(0.02096)	(0.02005)	(0.02605)	(0.03816)	(0.03564)	(0.03573)	(0.04664)	(0.03800)
Manager	0.18127***	0.24754***	0.11772***	0.17563***	0.27634***	0.07616	0.40963***	0.57557***	0.24936***
	(0.02307)	(0.03322)	(0.03195)	(0.03799)	(0.05486)	(0.05276)	(0.09231)	(0.07283)	(0.06411)
Technician	0.32099***	0.34246***	0.29803***	0.40878***	0.45803***	0.35832***	0.84113***	0.89419***	0.78941***
	(0.01962)	(0.02800)	(0.02744)	(0.03383)	(0.04857)	(0.04721)	(0.06367)	(0.08814)	(0.05681)
HH size	0.00598***	0.00386***	0.00865***	0.00961***	0.00492***	0.01542***	0.01987***	0.01201***	0.02935***
	(0.00060)	(0.00082)	(0.00086)	(0.00114)	(0.00161)	(0.00163)	(0.00170)	(0.00281)	(0.00346)
Dependency	-0.3159***	-0.3149***	-0.32179***	-0.45144***	-0.4619***	-0.45149***	-0.88322***	-0.87367***	-0.91345***
	(0.01223)	(0.01682)	(0.01776)	(0.02316)	(0.03220)	(0.03355)	(0.03586)	(0.06139)	(0.03104)

Electricity	0.12886***	0.14383***	0.11363***	0.24442***	0.28903***	0.20101***	0.43209***	0.49424***	0.37117***
	(0.00480)	(0.00673)	(0.00685)	(0.01065)	(0.01533)	(0.01483)	(0.01832)	(0.01250)	(0.02289)
Gas	0.08698***	0.08989***	0.08177***	0.07261***	0.07041***	0.06942***	0.19537***	0.20223***	0.18450***
	(0.00531)	(0.00749)	(0.00756)	(0.00932)	(0.01333)	(0.01311)	(0.02415)	(0.01293)	(0.03863)
Telephone 1 (Ref=0)	0.09698***	0.13801***	0.05578**	0.17640***	0.26395***	0.09794*	0.33288***	0.49460***	0.16745***
	(0.01715)	(0.02267)	(0.02599)	(0.03898)	(0.05453)	(0.05628)	(0.06658)	(0.09900)	(0.00795)
Telephone 2	0.20010***	0.26076***	0.13804***	0.38476***	0.50820***	0.26627***	0.61980***	0.82554***	0.40198***
	(0.02865)	(0.03948)	(0.04178)	(0.05913)	(0.08339)	(0.08445)	(0.04624)	(0.15741)	(0.09209)
Telephone 3	0.11554***	0.15070***	0.08077***	0.23008***	0.30212***	0.16882***	0.37838***	0.52275***	0.23144***
	(0.01699)	(0.02234)	(0.02598)	(0.03889)	(0.05423)	(0.05639)	(0.06609)	(0.09526)	(0.01894)
Establishment	0.07240***	0.07637***	0.06745***	0.12753***	0.13136***	0.12164***	0.19029***	0.19802***	0.18008***
	(0.00720)	(0.01020)	(0.01015)	(0.01302)	(0.01827)	(0.01860)	(0.01671)	(0.02888)	(0.01981)
Own house	0.04486***	0.05326***	0.03592***	0.04425***	0.05719***	0.02951***	0.09192***	0.11343***	0.07362**
	(0.00473)	(0.00679)	(0.00662)	(0.00826)	(0.01198)	(0.01142)	(0.01511)	(0.01454)	(0.03648)
Urban	0.04186***	0.04873***	0.03550***	0.03436***	0.03811***	0.03161**	0.09081***	0.10446***	0.07903
	(0.00490)	(0.00693)	(0.00692)	(0.00888)	(0.01272)	(0.01240)	(0.02901)	(0.00841)	(0.04828)
Sindh (Ref=Punjab)	-0.05025***	-0.0382***	-0.06161***	-0.11339***	-0.0852***	-0.13997***	-0.14872***	-0.11150***	-0.18570***
	(0.00531)	(0.00757)	(0.00743)	(0.00932)	(0.01341)	(0.01291)	(0.02090)	(0.00895)	(0.02011)
KPK	-0.04051***	-0.0390***	-0.04419***	-0.12343***	-0.1175***	-0.13454***	-0.16252***	-0.15446***	-0.18017***
	(0.00559)	(0.00774)	(0.00807)	(0.01014)	(0.01426)	(0.01452)	(0.01942)	(0.02522)	(0.00988)
Balochistan	-0.11283***	-0.1115***	-0.11830***	-0.27112***	-0.2765***	-0.27579***	-0.39603***	-0.40680***	-0.40142***
	(0.00627)	(0.00900)	(0.00875)	(0.01240)	(0.01855)	(0.01667)	(0.01407)	(0.02874)	(0.01560)
Constant	-0.71588***	-0.5726***	-0.77420***	-4.14624***	-3.8274***	-4.31662***	-0.07707***	-0.06684***	-0.08936***
	(0.08351)	(0.11419)	(0.12429)	(0.14713)	(0.20746)	(0.21061)	(0.01192)	(0.01826)	(0.00943)
Observations	161,919	80,342	81,577	161,919	80,342	81,577	749,503	749,503	749,503
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000			
Wald Chi2	138546	73913	65213	27018	13082	14192			
R-squared	0.36835	0.38117	0.35630						
Instruments Criteria									
Hausman Test F-stats	18.7844								
Overidentification	0.5927								
First stage	3044.92								

*The dependent variable is education achievement that is categorical variable. The category 1 displays for primary, 2 for secondary and 3 for tertiary level of education and 0 demonstrates no education. The reference category for the telephone is no direct connection and any extension. The set of instruments used in these models are income shocks, first, deviation of rainfall from mean and second, household average per capita income is less than national household average per capita income. The validity of instruments are measured under the 2SLS estimators. Robust standard errors are in parentheses. The Hausman test provides F-statistics and test of overidentification states P-value. In addition, The value for First Stage regressions give F-statistics. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

Table A.7 Coefficients Estimates of Logit Model Regression for Current Enrollment

	Both	Girl	Boy
Variables	**(1)**	**(2)**	**(3)**
Girl	-0.01093		
	(0.03375)		
Per capita income	0.03349***	0.02845**	0.03892***
	(0.00936)	(0.01293)	(0.01358)
Age	0.27712***	0.26394***	0.28971***
	(0.01728)	(0.02510)	(0.02397)
Square age	-0.00919***	-0.00851***	-0.00982***
	(0.00061)	(0.00090)	(0.00084)
Married	-0.93455***	-1.18098***	-0.41521***
	(0.08496)	(0.10734)	(0.14655)
Edu mother	0.01025**	0.01318**	0.00761
	(0.00448)	(0.00643)	(0.00625)
Edu father	0.02364	0.01803	0.03594
	(0.07612)	(0.10259)	(0.11361)
Person Math	3.00044***	3.10755***	2.90937***
	(0.13818)	(0.20824)	(0.18514)
Professional	-0.23642	-0.26440	-0.20434
	(0.17859)	(0.24865)	(0.25913)
Clerk	-0.72144***	-0.97015*	-0.55237*
	(0.27074)	(0.50738)	(0.31941)
Operator	-0.87724***	-1.14499***	-0.68297**
	(0.21426)	(0.35540)	(0.27052)
Manager	-0.14808	-0.37021	0.06913
	(0.28139)	(0.41314)	(0.39221)
Technician	-0.42258*	-0.34315	-0.50475
	(0.21978)	(0.31047)	(0.30728)
Child 5	0.13031	0.11448	0.14484
	(0.09233)	(0.13430)	(0.12739)
Edu Expenditure	1.64381***	1.67564***	1.62021***
	(0.03551)	(0.05115)	(0.04959)
Cultivate land	-0.91858***	-0.97689***	-0.86686***
	(0.07303)	(0.10422)	(0.10226)
HH size	-0.00339	-0.00140	-0.00563
	(0.00427)	(0.00619)	(0.00591)
Dependency	1.20185***	1.13170***	1.26273***
	(0.10490)	(0.15140)	(0.14634)
Electricity	0.36305***	0.45240***	0.29334***
	(0.05630)	(0.08490)	(0.07557)
Gas	0.31698***	0.30606***	0.32674***
	(0.04458)	(0.06427)	(0.06204)
Establishment	-1.10075***	-1.12461***	-1.07314***
	(0.06429)	(0.09087)	(0.09156)
Own house	-0.28945***	-0.22481***	-0.35523***
	(0.04487)	(0.06469)	(0.06242)
Urban	0.17818***	0.16816***	0.18852***
	(0.04426)	(0.06378)	(0.06165)
Sindh (Ref=Punjab)	-0.37516***	-0.45788***	-0.29702***
	(0.04261)	(0.06127)	(0.05946)
KPK	0.31665***	0.24421***	0.39239***
	(0.04661)	(0.06725)	(0.06500)
Balochistan	-0.03914	-0.12840	0.04056
	(0.05493)	(0.08121)	(0.07478)

Constant	-7.17315*** (0.22433)	-7.29240*** (0.32505)	-7.09950*** (0.31090)
Observations	24,531	12,212	12,319
Log-Likelihood	-11130.9	-5384.19	-5728.85
Chi-square test	3737.50	1894.96	1849.354
AIC	22315.82	10820.39	11509.70
BIC	22534.73	11013.05	11702.60
Pseudo R2	0.197	0.208	0.189
Nagelkerke R2	0.295	0.308	0.285
Prob > chi2	0.000	0.000	0.000
Linktest (_hatsq)	0.379	0.417	0.645

*The dependent variable is currently enrolled that is dummy variable. The category 1 displays for currently enrolled in primary, secondary or tertiary level of education and 0 demonstrates not currently enrolled. The Linktest describes in p-value. Robust standard errors are in parentheses. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

Table A.8 Coefficient Estimates by Instrumental Variable Approaches for Current Enrolment

	Two Stage Least Square			IV Probit			Two Stage Residual Inclusion		
	Both	Girl	Boy	Both	Girl	Boy	Both	Girl	Boy
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Girl	0.01879			0.05079			0.0953*		
	(0.01301)			(0.04155)			(0.0570)		
Per capita income	0.06087***	0.04648*	0.07689**	0.17710***	0.11909	0.22703***	0.326***	0.256	0.414**
	(0.02126)	(0.02814)	(0.03191)	(0.06146)	(0.09129)	(0.07868)	(0.119)	(0.178)	(0.188)
Age	0.06595***	0.06334***	0.06903***	0.22484***	0.22311***	0.22447***	0.417***	0.395***	0.442***
	(0.00586)	(0.00832)	(0.00831)	(0.02374)	(0.03281)	(0.03498)	(0.0410)	(0.0479)	(0.0550)
Square age	-0.00211***	-0.00198***	-0.00224***	-0.00717***	-0.00700***	-0.00723***	-0.0133***	-0.0124***	-0.0143***
	(0.00020)	(0.00030)	(0.00029)	(0.00082)	(0.00113)	(0.00121)	(0.00145)	(0.00162)	(0.00189)
Married	-0.15126***	-0.19613***	-0.02997	-0.51877***	-0.72080***	-0.09494	-0.953***	-1.337***	-0.0693
	(0.02430)	(0.03042)	(0.04572)	(0.09843)	(0.12727)	(0.17094)	(0.177)	(0.248)	(0.302)
Edu mother	0.00252	0.00506**	-0.00016	0.00930*	0.01888**	-0.00010	0.0177**	0.0317**	0.00438
	(0.00175)	(0.00242)	(0.00255)	(0.00561)	(0.00799)	(0.00779)	(0.00717)	(0.0145)	(0.0150)
Edu father	-0.02759	-0.04271	-0.00404	-0.10910	-0.14451	-0.06330	-0.183	-0.259	-0.0882
	(0.02284)	(0.02818)	(0.03781)	(0.07825)	(0.10692)	(0.11722)	(0.138)	(0.159)	(0.157)
Person Math	0.23749***	0.23046***	0.24302***	1.48937***	1.48501***	1.47954***	3.121***	2.952***	3.333***
	(0.01706)	(0.02283)	(0.02589)	(0.18327)	(0.23504)	(0.28452)	(0.519)	(0.673)	(1.052)
Professional	-0.19723***	-0.17674**	-0.22681***	-0.60752***	-0.56494**	-0.66843***	-1.134***	-1.057*	-1.268**
	(0.04815)	(0.07622)	(0.06526)	(0.16891)	(0.27211)	(0.21225)	(0.374)	(0.575)	(0.577)
Clerk	-0.23005***	-0.19700**	-0.27589***	-0.74690***	-0.60881	-1.02285**	-1.361**	-1.086	-2.005**
	(0.06101)	(0.09218)	(0.07287)	(0.28662)	(0.37339)	(0.48983)	(0.669)	(0.759)	(0.887)
Operator	-0.13126**	-0.10450	-0.18238*	-0.42119*	-0.39528	-0.53849	-0.764	-0.655	-0.974
	(0.06656)	(0.08710)	(0.09376)	(0.23326)	(0.31733)	(0.35399)	(0.574)	(0.592)	(0.688)
Manager	-0.16268***	-0.18903***	-0.16054	-0.46075**	-0.58586**	-0.42319	-0.858**	-1.126*	-0.663
	(0.05862)	(0.07220)	(0.10159)	(0.18883)	(0.26079)	(0.28037)	(0.398)	(0.619)	(0.683)
Technician	-0.09329	-0.14129*	-0.04895	-0.25241	-0.47985	-0.11210	-0.443	-0.831	-0.122
	(0.06190)	(0.07427)	(0.09842)	(0.21051)	(0.31697)	(0.29245)	(0.506)	(0.682)	(0.583)
Child 5	0.06677**	0.05615	0.07904*	0.16736	0.12503	0.20081	0.275	0.185	0.366
	(0.03257)	(0.04626)	(0.04628)	(0.12086)	(0.17859)	(0.16371)	(0.197)	(0.283)	(0.280)
Edu Expenditure	0.06884**	0.03218	0.10765**	0.19147*	0.05143	0.31586**	0.384*	0.201	0.587*
	(0.03332)	(0.04480)	(0.04951)	(0.10141)	(0.14935)	(0.13003)	(0.211)	(0.282)	(0.303)
Cultivate land	-0.10349***	-0.04171	-0.16217***	-0.36892***	-0.12157	-0.58093***	-0.711***	-0.306	-1.098***
	(0.02769)	(0.03918)	(0.03924)	(0.10094)	(0.14997)	(0.13718)	(0.228)	(0.320)	(0.266)
HH size	-0.00239	-0.00144	-0.00442	-0.00357	0.00102	-0.01108	-0.0109	-0.00894	-0.0173
	(0.00259)	(0.00326)	(0.00415)	(0.00797)	(0.01085)	(0.01135)	(0.0154)	(0.0199)	(0.0222)
Dependency	0.22223***	0.24034***	0.20590***	0.73584***	0.80518***	0.66593***	1.285***	1.441***	1.192***
	(0.04623)	(0.06358)	(0.06681)	(0.13336)	(0.19898)	(0.17939)	(0.319)	(0.379)	(0.414)

Electricity	0.11225***	0.14858***	0.08773**	0.43938***	0.59909***	0.35136**	0.822***	1.080***	0.668**
	(0.02560)	(0.03639)	(0.03566)	(0.11554)	(0.18582)	(0.14758)	(0.223)	(0.374)	(0.301)
Gas	-0.03126	-0.02900	-0.03588	-0.09888	-0.07651	-0.12418	-0.172	-0.133	-0.228
	(0.02141)	(0.02953)	(0.03140)	(0.06477)	(0.09738)	(0.08558)	(0.135)	(0.172)	(0.162)
Establishment	-0.10699***	-0.09641***	-0.11437***	-0.34242***	-0.32318***	-0.33423***	-0.643***	-0.610***	-0.663***
	(0.01839)	(0.02563)	(0.02649)	(0.05880)	(0.08784)	(0.08011)	(0.121)	(0.166)	(0.139)
Own house	-0.02445	-0.04123*	-0.00905	-0.08896*	-0.15327**	-0.03844	-0.162*	-0.274**	-0.0620
	(0.01637)	(0.02279)	(0.02355)	(0.05287)	(0.07715)	(0.07233)	(0.0904)	(0.130)	(0.146)
Urban	0.00867	0.00757	0.01346	0.02712	0.00803	0.05042	0.0347	-0.0198	0.113
	(0.01980)	(0.02716)	(0.02927)	(0.06390)	(0.09261)	(0.08908)	(0.138)	(0.158)	(0.188)
Sindh (Ref=Punjab)	-0.02878*	-0.03172	-0.02555	-0.09960*	-0.12540	-0.07957	-0.166*	-0.193	-0.169
	(0.01577)	(0.02199)	(0.02269)	(0.05171)	(0.07661)	(0.07096)	(0.0963)	(0.134)	(0.128)
KPK	0.04064**	0.01611	0.06596**	0.10688*	0.02906	0.17447**	0.171*	0.0183	0.314*
	(0.02007)	(0.02730)	(0.03001)	(0.06195)	(0.09119)	(0.08463)	(0.0998)	(0.145)	(0.178)
Balochistan	-0.01486	-0.01102	-0.01017	-0.05000	-0.02460	-0.03957	-0.0645	-0.0141	-0.0926
	(0.02344)	(0.03435)	(0.03343)	(0.07705)	(0.11616)	(0.10400)	(0.120)	(0.213)	(0.205)
Constant	-1.09746***	-0.95830***	-1.24230***	-5.75648***	-5.32092***	-6.06603***	-10.93***	-10.11***	-12.02***
	(0.21193)	(0.28792)	(0.31048)	(0.48855)	(0.83308)	(0.54272)	(1.279)	(1.889)	(2.217)
Observations	4,626	2,277	2,349	4,626	2,277	2,349	749,503	749,503	749,503
R-squared	0.06425	0.11320	0.00615						
Wald Chi2	869.1	492.3	401.2	651.6	320.2	367.3			
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000			
Log-Likelihood				-11940	-5812	-6107			
Instruments Criteria									
Hausman Test F-stats	8.00952								
Overidentification	0.6237								
First stage	48.7065								

*The dependent variable is currently enrolled that is dummy variable. The category 1 displays for currently enrolled in primary, secondary or tertiary level of education and 0 demonstrates not currently enrolled. The set of instruments used in these models are income shocks, first, income windfall and second, difference of the household per capita from average household per capita income. The validity of instruments are measured under the 2SLS estimators. Robust standard errors are in parentheses for 2SLS, while they are bootstrapped for 2SRI regressions . The Hausman test provides F-statistics and test of overidentification states P-value. In addition, The value for First Stage regressions give F-statistics. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

(III) Tables: Robustness Checks

(i) By Alternative Specification

Table A.9 AMEs of Ordered Probit Model for Education Achievement by Gender

	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
		Both			Girl			Boy	
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Girl	0.00249***	0.00955***	0.00119***						
	(0.00038)	(0.00146)	(0.00018)						
Per capita income	0.00137***	0.00527***	0.00066***	0.00125***	0.00474***	0.00060***	0.00161***	0.00622***	0.00077***
	(0.00009)	(0.00034)	(0.00005)	(0.00012)	(0.00046)	(0.00006)	(0.00014)	(0.00053)	(0.00007)
Age	0.00116*	0.00446*	0.00056*	-0.00022	-0.00082	-0.00010	0.00158	0.00612	0.00076
	(0.00069)	(0.00263)	(0.00033)	(0.00098)	(0.00373)	(0.00047)	(0.00096)	(0.00372)	(0.00046)
Square age	0.00003	0.00011	0.00001	0.00006**	0.00023**	0.00003**	0.00002	0.00007	0.00001
	(0.00002)	(0.00007)	(0.00001)	(0.00003)	(0.00010)	(0.00001)	(0.00003)	(0.00010)	(0.00001)
Married	-0.0015***	-0.00569***	-0.00071***	0.00296***	0.01150***	0.00145***	-0.0122***	-0.0415***	-0.00519***
	(0.00055)	(0.00205)	(0.00026)	(0.00066)	(0.00264)	(0.00034)	(0.00111)	(0.00329)	(0.00043)
Edu parents	0.01656*	0.09893	0.01326	0.01822***	0.16822	0.02552	-0.00589	-0.02099	-0.00259
	(0.00930)	(0.11200)	(0.01693)	(0.00483)	(0.16430)	(0.03371)	(0.03424)	(0.11279)	(0.01396)
Edu Head	0.01652***	0.21528***	0.03505***	0.00501*	0.27799***	0.05793***	0.01632***	0.23172***	0.03793***
	(0.00060)	(0.00590)	(0.00157)	(0.00294)	(0.01287)	(0.00588)	(0.00080)	(0.00680)	(0.00193)
Edu member S	0.00796***	0.32058***	0.05069***	0.00467***	0.32767***	0.05363***	0.01104***	0.31266***	0.04774***
	(0.00069)	(0.00355)	(0.00125)	(0.00106)	(0.00509)	(0.00188)	(0.00090)	(0.00497)	(0.00166)
Edu member H	-0.11010***	0.11756***	0.62334***	-0.1115***	0.10981***	0.63010***	-0.1087***	0.12651***	0.61520***
	(0.00118)	(0.00655)	(0.00822)	(0.00169)	(0.00884)	(0.01123)	(0.00165)	(0.00969)	(0.01201)
Edu member math	0.10635***	0.18976***	0.03231***	0.10976***	0.18933***	0.03406***	0.10283***	0.18970***	0.03055***
	(0.00104)	(0.00119)	(0.00033)	(0.00147)	(0.00164)	(0.00050)	(0.00147)	(0.00174)	(0.00044)
Professional	0.01754***	0.10872***	0.01493***	0.01724***	0.10548***	0.01455***	0.01793***	0.11278***	0.01544***
	(0.00062)	(0.00828)	(0.00136)	(0.00089)	(0.01155)	(0.00187)	(0.00086)	(0.01181)	(0.00196)
Clerk	0.01876***	0.13508***	0.01905***	0.01873***	0.15504***	0.02280***	0.01800***	0.11485***	0.01559***
	(0.00037)	(0.00965)	(0.00172)	(0.00040)	(0.01430)	(0.00279)	(0.00088)	(0.01293)	(0.00212)
Operator	0.01299***	0.06514***	0.00835***	0.01218***	0.05949***	0.00767***	0.01361***	0.06951***	0.00886***
	(0.00072)	(0.00498)	(0.00070)	(0.00109)	(0.00715)	(0.00099)	(0.00097)	(0.00691)	(0.00097)
Manager	0.01334***	0.06829***	0.00884***	0.01585***	0.09001***	0.01201***	0.01026***	0.04815***	0.00608***
	(0.00117)	(0.00861)	(0.00120)	(0.00123)	(0.01241)	(0.00186)	(0.00202)	(0.01186)	(0.00156)
Technician	0.01864***	0.12884***	0.01797***	0.01857***	0.13228***	0.01868***	0.01864***	0.12486***	0.01719***
	(0.00039)	(0.00776)	(0.00137)	(0.00048)	(0.01103)	(0.00198)	(0.00063)	(0.01089)	(0.00188)

HH size	0.00074***	0.00284***	0.00036***	0.00050***	0.00189***	0.00024***	0.00104***	0.00401***	0.00050***
	(0.00006)	(0.00021)	(0.00003)	(0.00008)	(0.00029)	(0.00004)	(0.00008)	(0.00031)	(0.00004)
Dependency	-0.03185***	-0.12223***	-0.01528***	-0.0311***	-0.1183***	-0.0150***	-0.0333***	-0.1287***	-0.01589***
	(0.00110)	(0.00420)	(0.00060)	(0.00153)	(0.00582)	(0.00084)	(0.00157)	(0.00607)	(0.00086)
Electricity	0.01596***	0.05233***	0.00652***	0.01858***	0.05884***	0.00748***	0.01350***	0.04571***	0.00560***
	(0.00066)	(0.00188)	(0.00027)	(0.00098)	(0.00262)	(0.00040)	(0.00090)	(0.00270)	(0.00036)
Gas	0.00742***	0.02869***	0.00357***	0.00740***	0.02839***	0.00358***	0.00729***	0.02839***	0.00348***
	(0.00048)	(0.00187)	(0.00024)	(0.00068)	(0.00264)	(0.00035)	(0.00067)	(0.00264)	(0.00033)
Telephone 1 (Ref=0)	0.01291***	0.04112***	0.00520***	0.01913***	0.05667***	0.00739***	0.00675**	0.02319**	0.00287**
	(0.00247)	(0.00680)	(0.00089)	(0.00366)	(0.00887)	(0.00124)	(0.00327)	(0.01036)	(0.00129)
Telephone 2	0.02152***	0.07890***	0.00997***	0.02900***	0.10140***	0.01311***	0.01374***	0.05276***	0.00655***
	(0.00297)	(0.01106)	(0.00144)	(0.00425)	(0.01523)	(0.00207)	(0.00415)	(0.01608)	(0.00203)
Telephone 3	0.01439***	0.04681***	0.00591***	0.02020***	0.06077***	0.00791***	0.00866***	0.03057***	0.00378***
	(0.00246)	(0.00676)	(0.00089)	(0.00364)	(0.00880)	(0.00124)	(0.00326)	(0.01030)	(0.00129)
Establishment	0.00773***	0.03313***	0.00415***	0.00772***	0.03282***	0.00415***	0.00770***	0.03321***	0.00412***
	(0.00051)	(0.00243)	(0.00032)	(0.00072)	(0.00344)	(0.00046)	(0.00071)	(0.00342)	(0.00045)
Own house	0.00375***	0.01403***	0.00176***	0.00484***	0.01776***	0.00225***	0.00277***	0.01054***	0.00130***
	(0.00047)	(0.00170)	(0.00022)	(0.00068)	(0.00241)	(0.00032)	(0.00064)	(0.00239)	(0.00030)
Urban	0.00411***	0.01568***	0.00195***	0.00460***	0.01740***	0.00220***	0.00369***	0.01421***	0.00175***
	(0.00047)	(0.00178)	(0.00023)	(0.00067)	(0.00252)	(0.00033)	(0.00066)	(0.00252)	(0.00031)
Sindh (Ref=Punjab)	-0.00331***	-0.01325***	-0.00163***	-0.0022***	-0.0086***	-0.0011***	-0.0044***	-0.0178***	-0.00216***
	(0.00046)	(0.00183)	(0.00022)	(0.00066)	(0.00259)	(0.00032)	(0.00065)	(0.00259)	(0.00031)
KPK	-0.00545***	-0.02110***	-0.00260***	-0.0050***	-0.0191***	-0.0024***	-0.0062***	-0.0245***	-0.00297***
	(0.00053)	(0.00196)	(0.00024)	(0.00075)	(0.00274)	(0.00034)	(0.00075)	(0.00281)	(0.00035)
Balochistan	-0.01235***	-0.04359***	-0.00539***	-0.0128***	-0.0437***	-0.0055***	-0.0124***	-0.0449***	-0.00546***
	(0.00076)	(0.00239)	(0.00031)	(0.00114)	(0.00347)	(0.00046)	(0.00102)	(0.00329)	(0.00042)
Observations	161,919	161,919	161,919	80,342	80,342	80,342	81,577	81,577	81,577

*The dependent variable is education achievement that is categorical variable. The category 1 displays for primary, 2 for secondary and 3 for tertiary level of education and 0 demonstrates no education. The reference category for the telephone is no direct connection and any extension. Robust standard errors are in parentheses. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

Table A.10 Probit Model Regression Results for Current Enrolment

	Coefficient			AMEs		
	Both	**Girl**	**Boy**	**Both**	**Girl**	**Boy**
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Girl	-0.00911			-0.00233		
	(0.01954)			(0.00500)		
Per capita income	0.01721***	0.01517**	0.01930***	0.00440***	0.00377**	0.00506***
	(0.00512)	(0.00710)	(0.00739)	(0.00131)	(0.00176)	(0.00193)
Age	0.15678***	0.14981***	0.16365***	0.04009***	0.03721***	0.04291***
	(0.00988)	(0.01429)	(0.01373)	(0.00248)	(0.00350)	(0.00353)
Square age	-0.00519***	-0.00482***	-0.00554***	-0.00133***	-0.00120***	-0.00145***
	(0.00035)	(0.00051)	(0.00048)	(0.00009)	(0.00013)	(0.00012)
Married	-0.52295***	-0.65796***	-0.24113***	-0.11792***	-0.14144***	-0.05960***
	(0.04671)	(0.05897)	(0.08144)	(0.00895)	(0.01039)	(0.01883)
Edu mother	0.00662**	0.00799**	0.00544	0.00169**	0.00199**	0.00143
	(0.00259)	(0.00371)	(0.00362)	(0.00066)	(0.00092)	(0.00095)
Edu father	0.01246	0.00730	0.02181	0.00319	0.00181	0.00572
	(0.04368)	(0.05888)	(0.06509)	(0.01117)	(0.01463)	(0.01707)
Person Math	1.59208***	1.62206***	1.56507***	0.24953***	0.24366***	0.25504***
	(0.06463)	(0.09777)	(0.08635)	(0.00433)	(0.00605)	(0.00622)
Professional	-0.14392	-0.17433	-0.10981	-0.03544	-0.04132	-0.02800
	(0.10146)	(0.14080)	(0.14669)	(0.02399)	(0.03172)	(0.03632)
Clerk	-0.39877***	-0.51192*	-0.31229*	-0.09091***	-0.10899**	-0.07515*
	(0.15092)	(0.26298)	(0.18498)	(0.02999)	(0.04618)	(0.04030)
Operator	-0.49553***	-0.63648***	-0.39402***	-0.10958***	-0.13000***	-0.09253***
	(0.11765)	(0.18716)	(0.15204)	(0.02171)	(0.02958)	(0.03128)
Manager	-0.06985	-0.17665	0.04243	-0.01754	-0.04181	0.01124
	(0.15741)	(0.22709)	(0.22048)	(0.03880)	(0.05100)	(0.05900)
Technician	-0.24721**	-0.19631	-0.31126*	-0.05907**	-0.04622	-0.07492*
	(0.12600)	(0.17270)	(0.18184)	(0.02790)	(0.03834)	(0.03964)
Child 5	0.07182	0.06510	0.07876	0.01852	0.01630	0.02084
	(0.05344)	(0.07754)	(0.07382)	(0.01389)	(0.01956)	(0.01969)
Education spending	0.96687***	0.98309***	0.95459***	0.27357***	0.27090***	0.27617***
	(0.02057)	(0.02961)	(0.02870)	(0.00569)	(0.00799)	(0.00811)
Cultivate land	-0.51035***	-0.53523***	-0.49158***	-0.11544***	-0.11679***	-0.11469***
	(0.04115)	(0.05907)	(0.05739)	(0.00792)	(0.01083)	(0.01151)
HH size	-0.00086	0.00037	-0.00218	-0.00022	0.00009	-0.00057
	(0.00246)	(0.00356)	(0.00342)	(0.00063)	(0.00088)	(0.00090)
Dependency	0.67950***	0.63440***	0.71575***	0.17376***	0.15759***	0.18767***
	(0.06046)	(0.08700)	(0.08444)	(0.01532)	(0.02142)	(0.02192)
Electricity	0.21625***	0.26641***	0.17700***	0.05302***	0.06266***	0.04491***
	(0.03231)	(0.04817)	(0.04367)	(0.00756)	(0.01064)	(0.01069)
Gas	0.18817***	0.18666***	0.18941***	0.04838***	0.04661***	0.04995***
	(0.02593)	(0.03727)	(0.03617)	(0.00669)	(0.00934)	(0.00956)
Establishment	-0.60669***	-0.61905***	-0.58941***	-0.13504***	-0.13335***	-0.13526***
	(0.03580)	(0.05046)	(0.05106)	(0.00657)	(0.00892)	(0.00973)
Own house	-0.16783***	-0.13239***	-0.20403***	-0.04412***	-0.03363***	-0.05526***
	(0.02594)	(0.03737)	(0.03610)	(0.00699)	(0.00969)	(0.01005)
Urban	0.10525***	0.09308**	0.11610***	0.02690***	0.02311**	0.03043***
	(0.02575)	(0.03703)	(0.03588)	(0.00657)	(0.00918)	(0.00940)
Sindh (Ref=Punjab)	-0.22278***	-0.27102***	-0.17634***	-0.05471***	-0.06465***	-0.04439***
	(0.02458)	(0.03519)	(0.03441)	(0.00594)	(0.00822)	(0.00856)
KPK	0.17940***	0.13831***	0.22325***	0.04869***	0.03662***	0.06190***
	(0.02716)	(0.03901)	(0.03799)	(0.00747)	(0.01044)	(0.01068)

Balochistan	-0.02977	-0.08335*	0.01839	-0.00770	-0.02094*	0.00487
	(0.03231)	(0.04752)	(0.04416)	(0.00832)	(0.01179)	(0.01173)
Constant	-4.00450***	-4.04713***	-3.98177***			
	(0.11902)	(0.17224)	(0.16504)			
Observations	24,531	12,212	12,319	24,531	12,212	12,319
Log-Likelihood	-11141.53	-5391.05	-5733.26			
Chi-square test	3941.17	1970.00	1990.52			
AIC	22337.06	10834.10	11519.53			
BIC	22555.96	11026.77	11711.42			
Pseudo R2	0.196	0.207	0.188			
Nagelkerke R2	0.294	0.307	0.284			
Prob > chi2	0.000	0.000	0.000			

*The dependent variable is currently enrolled that is dummy variable. The category 1 displays for currently enrolled in primary, secondary or tertiary level of education and 0 demonstrates not currently enrolled. Robust standard errors are in parentheses. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

(ii) By Age and Gender

Table A.11 Coefficient Estimation Results of Ordered Logit Model for Education Achievement by Age

Age Groups	**(13-15)**	**(16-18)**	**(19-21)**	**(22-24)**
Variables	**(1)**	**(2)**	**(3)**	**(4)**
Girl	0.06757***	0.04881**	0.05894**	0.15793***
	(0.02315)	(0.02115)	(0.02373)	(0.02440)
Per capita income	0.04242***	0.03777***	0.03451***	0.04662***
	(0.00537)	(0.00488)	(0.00544)	(0.00584)
Married	0.10988	-0.05688	-0.02021	-0.06582***
	(0.19686)	(0.03978)	(0.02748)	(0.02519)
Edu Head	0.59407	1.41039***	1.47134***	1.56386***
	(0.52096)	(0.10825)	(0.07239)	(0.04826)
Edu member S	1.67212***	2.30683***	2.75358***	2.71057***
	(0.04585)	(0.04682)	(0.05084)	(0.04836)
Edu member H	9.20421***	8.50655***	7.12850***	7.12508***
	(0.25104)	(0.20410)	(0.16168)	(0.14763)
Edu member math	2.82374***	3.19241***	3.42117***	3.75701***
	(0.10598)	(0.10830)	(0.12117)	(0.13282)
Professional	1.03430***	0.72276***	0.73069***	0.69681***
	(0.19464)	(0.10016)	(0.09897)	(0.09448)
Clerk	0.39836	0.91267***	0.96647***	0.96079***
	(0.27369)	(0.12431)	(0.12516)	(0.11430)
Operator	0.53430***	0.53138***	0.50826***	0.34071***
	(0.11936)	(0.06014)	(0.06638)	(0.06265)
Manager	0.36926*	0.60528***	0.32997***	0.55427***
	(0.19791)	(0.10795)	(0.11138)	(0.10350)
Technician	0.78061***	0.90302***	0.86960***	0.93656***
	(0.17254)	(0.09584)	(0.09523)	(0.10739)
HH size	0.02488***	0.02846***	0.02031***	0.01270***
	(0.00327)	(0.00329)	(0.00371)	(0.00345)
Dependency	-1.04813***	-1.27605***	-0.93371***	-0.64751***
	(0.06286)	(0.06172)	(0.07320)	(0.06950)
Electricity	0.26899***	0.34346***	0.51855***	0.63177***
	(0.03522)	(0.03120)	(0.03475)	(0.03418)
Gas	0.15460***	0.13476***	0.25522***	0.36246***
	(0.03023)	(0.02684)	(0.02924)	(0.02928)

Telephone 1 (Ref=0)	0.08547	0.42993***	0.12475	0.65139***
	(0.12994)	(0.12220)	(0.13049)	(0.12334)
Telephone 2	0.38803**	0.98566***	0.17870	0.69724***
	(0.18743)	(0.16807)	(0.18864)	(0.18187)
Telephone 3	0.34951***	0.47619***	0.02233	0.51433***
	(0.12883)	(0.12159)	(0.12988)	(0.12283)
Establishment	0.42193***	0.23944***	0.18333***	0.12005***
	(0.03793)	(0.03429)	(0.03699)	(0.03540)
Own house	0.48335***	0.10432***	-0.10196***	-0.18505***
	(0.03111)	(0.02569)	(0.02734)	(0.02722)
Urban	0.18840***	0.10345***	0.05505*	0.09015***
	(0.02918)	(0.02613)	(0.02833)	(0.02875)
Sindh (Ref=Punjab)	-0.15250***	-0.12684***	-0.02470	-0.14506***
	(0.03034)	(0.02653)	(0.02866)	(0.02820)
KPK	-0.22525***	-0.19816***	-0.12931***	-0.21913***
	(0.03184)	(0.02957)	(0.03163)	(0.03235)
Balochistan	-0.37318***	-0.32462***	-0.32098***	-0.46214***
	(0.04159)	(0.03773)	(0.04130)	(0.04273)
Observations	42,912	46,820	36,684	35,503
Log-Likelihood	-29498.04	-35821.78	-29811.42	-28784.57
Wald Chi2	4682.0	6206.23	5675.10	7358.58
Pseudo R2	0.200	0.208	0.235	0.291
Prob > chi2	0.000	0.000	0.000	0.000

*The dependent variable is education achievement that is categorical variable. The category 1 displays for primary, 2 for secondary and 3 for tertiary level of education and 0 demonstrates no education. The reference category for the telephone is no direct connection and any extension. Robust standard errors are in parentheses. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

Table A.12 Coefficient Estimations of Ordered Logit Analysis for Education Achievement by Age and Gender

	Girl				Boy			
Age Groups	**(13-15)**	**(16-18)**	**(19-21)**	**(22-24)**	**(13-15)**	**(16-18)**	**(19-21)**	**(22-24)**
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Per capita income	0.03807***	0.03069***	0.02931***	0.04410***	0.04578***	0.04551***	0.04496***	0.06013***
	(0.00763)	(0.00673)	(0.00721)	(0.00745)	(0.00754)	(0.00711)	(0.00850)	(0.01084)
Married	0.20650	-0.00685	0.08367**	0.16277***	-0.31457	-0.26185**	-0.27423***	-0.36195***
	(0.22806)	(0.04415)	(0.03318)	(0.03506)	(0.41046)	(0.10338)	(0.05192)	(0.03790)
Edu Head		2.23848***	2.24648***	1.76183***	0.71667	1.40023***	1.53902***	1.72417***
		(0.62250)	(0.28676)	(0.12582)	(0.49837)	(0.10956)	(0.07900)	(0.05649)
Edu member S	1.75224***	2.49184***	2.76795***	2.72087***	1.61661***	2.15631***	2.73137***	2.70470***
	(0.06792)	(0.07063)	(0.07169)	(0.06870)	(0.06237)	(0.06270)	(0.07236)	(0.06882)
Edu member H	10.03094***	8.55828***	7.12852***	7.15274***	8.65950***	8.47981***	7.15155***	7.11366***
	(0.43239)	(0.29182)	(0.22487)	(0.20399)	(0.31135)	(0.28645)	(0.23406)	(0.21538)
Edu member math	2.85566***	3.10147***	3.66412***	4.16253***	2.79716***	3.31061***	3.19140***	3.41655***
	(0.14562)	(0.14214)	(0.18655)	(0.21970)	(0.15451)	(0.16665)	(0.15871)	(0.16699)
Professional	1.00190***	0.75047***	0.75714***	0.73011***	1.06953***	0.69327***	0.70107***	0.68459***
	(0.27239)	(0.13928)	(0.13811)	(0.12578)	(0.27708)	(0.14453)	(0.14094)	(0.14305)
Clerk	0.07255	1.00043***	1.14395***	1.30195***	0.65306*	0.83390***	0.79331***	0.65147***
	(0.39313)	(0.18351)	(0.17568)	(0.17034)	(0.37329)	(0.16772)	(0.17827)	(0.15193)
Operator	0.54377***	0.41635***	0.68314***	0.20713**	0.50286***	0.62735***	0.37084***	0.46315***
	(0.18398)	(0.08741)	(0.09860)	(0.09047)	(0.15564)	(0.08283)	(0.08942)	(0.08762)
Manager	0.69521**	0.78853***	0.48360***	0.61638***	0.04795	0.45779***	0.16751	0.49608***
	(0.27466)	(0.16443)	(0.15629)	(0.14531)	(0.27919)	(0.14323)	(0.15847)	(0.14905)
Technician	0.96484***	0.94195***	1.03095***	0.74662***	0.60913**	0.86489***	0.71201***	1.12083***
	(0.24347)	(0.13972)	(0.12983)	(0.15014)	(0.24231)	(0.13155)	(0.13891)	(0.15023)
HH size	0.02210***	0.02686***	0.01000**	-0.00670	0.02740***	0.03003***	0.03370***	0.04095***
	(0.00473)	(0.00468)	(0.00501)	(0.00470)	(0.00452)	(0.00465)	(0.00541)	(0.00532)
Dependency	-1.09509***	-1.25104***	-0.92622***	-0.56601***	-0.99486***	-1.29839***	-0.97040***	-0.96226***
	(0.09025)	(0.08798)	(0.10200)	(0.09347)	(0.08787)	(0.08677)	(0.10453)	(0.10549)
Electricity	0.29013***	0.48768***	0.56755***	0.65855***	0.24504***	0.21429***	0.47328***	0.62217***
	(0.04996)	(0.04593)	(0.04905)	(0.04945)	(0.04966)	(0.04268)	(0.04934)	(0.04749)
Gas	0.03408	0.12019***	0.30253***	0.46863***	0.26420***	0.15243***	0.20779***	0.24703***
	(0.04318)	(0.03856)	(0.04224)	(0.04187)	(0.04244)	(0.03747)	(0.04059)	(0.04130)
Telephone 1 (Ref=0)	0.28212	0.63156***	0.04193	1.10991***	-0.09842	0.22466	0.25581	0.27052
	(0.18575)	(0.18620)	(0.17460)	(0.17680)	(0.18077)	(0.16417)	(0.19440)	(0.17221)
Telephone 2	0.67441***	1.32382***	0.00102	1.19821***	0.12521	0.65226***	0.30929	0.30245
	(0.25561)	(0.25075)	(0.26812)	(0.25802)	(0.27548)	(0.22831)	(0.27474)	(0.25556)

Telephone 3	0.46281**	0.67800***	-0.04109	0.97225***	0.24409	0.27176*	0.13332	0.13416
	(0.18418)	(0.18525)	(0.17342)	(0.17623)	(0.17930)	(0.16340)	(0.19375)	(0.17153)
Establishment	0.45878***	0.24897***	0.13130**	0.12378**	0.38771***	0.23307***	0.23653***	0.10649**
	(0.05473)	(0.04882)	(0.05208)	(0.05077)	(0.05288)	(0.04835)	(0.05256)	(0.04940)
Own house	0.44767***	0.08837**	-0.04695	-0.07288*	0.52186***	0.11817***	-0.15541***	-0.28177***
	(0.04486)	(0.03719)	(0.03941)	(0.03872)	(0.04321)	(0.03555)	(0.03806)	(0.03853)
Urban	0.15080***	0.10415***	0.09604**	0.13283***	0.23034***	0.10150***	0.01213	0.04276
	(0.04120)	(0.03744)	(0.04075)	(0.04121)	(0.04135)	(0.03658)	(0.03947)	(0.04040)
Sindh (Ref=Punjab)	-0.05113	-0.10002***	-0.01310	-0.14114***	-0.25060***	-0.15342***	-0.03680	-0.14674***
	(0.04354)	(0.03789)	(0.04079)	(0.04039)	(0.04241)	(0.03722)	(0.04035)	(0.03955)
KPK	-0.12399***	-0.21308***	-0.14140***	-0.22886***	-0.32236***	-0.18689***	-0.12731***	-0.22092***
	(0.04537)	(0.04217)	(0.04453)	(0.04486)	(0.04479)	(0.04153)	(0.04513)	(0.04725)
Balochistan	-0.36953***	-0.34104***	-0.30272***	-0.55442***	-0.38578***	-0.31246***	-0.35082***	-0.42010***
	(0.06062)	(0.05635)	(0.06202)	(0.06629)	(0.05733)	(0.05090)	(0.05574)	(0.05643)
Observations	20,795	22,955	18,606	17,986	22,117	23,865	18,078	17,517
Log-Likelihood	-14351.29	-17492.76	-14928.18	-14385.69	-15103.20	-18299.89	-14841.46	-14287.93
Wald Chi2	2151.85	3097.56	3018.60	3167.06	2547.60	3120.94	2853.66	3495.63
Pseudo R2	0.205	0.215	0.245	0.304	0.198	0.203	0.227	0.283
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

*The dependent variable is education achievement that is categorical variable. The category 1 displays for primary, 2 for secondary and 3 for tertiary level of education and 0 demonstrates no education. The reference category for the telephone is no direct connection and any extension. Robust standard errors are in parentheses. Significance levels denote as *** p<0.01, ** p<0.05, * p<0.1*

Appendix B: Figures

Figure B.1. Education Achievement by Age (2005-2016)

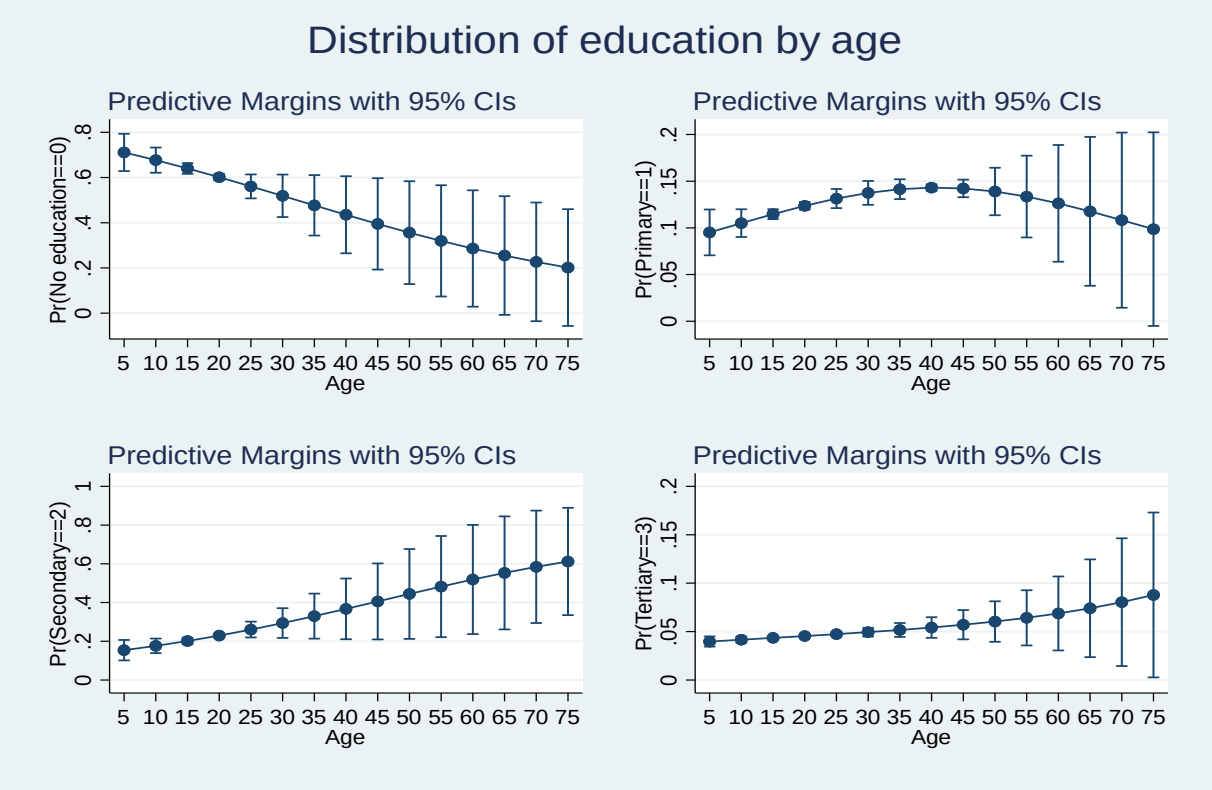

Figure 1 describes the predictive margins between age and education levels. The probability to complete primary education decreases after the age 40, whereas, it is opposite for the tertiary level. Meanwhile, with the increase of age, it is more likely to complete secondary education level.

Figure B.2. Relationship between Income and Age

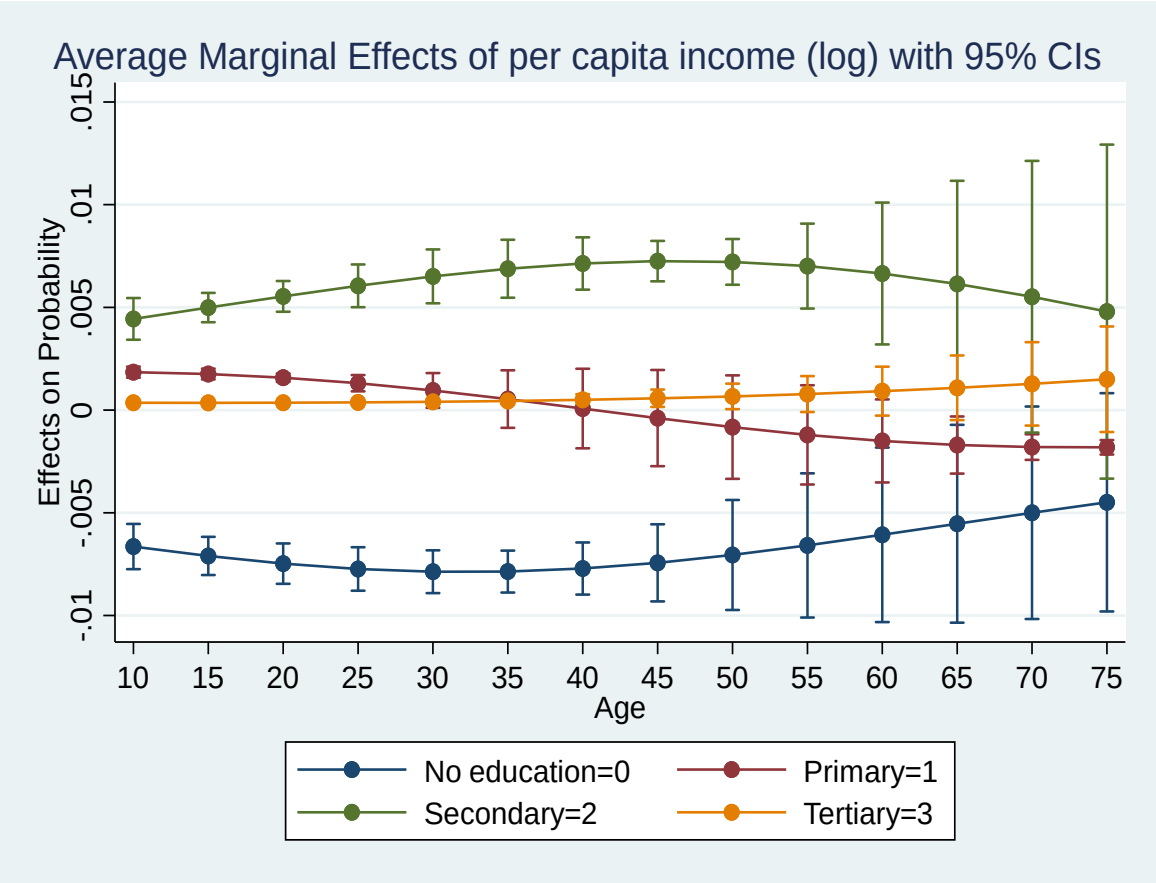

Figure 2 shows the average marginal effects of per capita income with age and education. With no education, there is less likely to increase the probability of income per capita. However, with the increase in age after 40, the completion of secondary education is likely to increase per capita income of the household. Contrary, tertiary level show meager effect on the contribution of income of the household.