

Role of Socio-economic Constraints in Female Education in Pakistan: A Binary Outcome Approach

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ArticleInfo	Abstract
<p><i>Article History</i></p> <p>Received: February 24,2021</p> <p>Accepted: April 30,2021</p> <p><i>Keywords:</i> Economic, Enrollment, Logistic, Economic Status, Household, Education</p> <p>DOI: 10.5281/zenodo.4991675</p>	<p><i>The aim of this paper is to investigate different socio-economic factors that influence girls' education at the household level in rural areas of Pakistan. The analysis is based on the secondary data obtained from Pakistan Rural Household Panel Survey 2013-14. A logistic regression model has been estimated and results illustrate that the household economic status has a positive and significant role in determining the girls' school enrollment status while poverty affects negatively and significantly. The estimates also reveal that parents prefer boys' education over the girls' education and the gender of teachers is important to them, which negatively affects girls' school enrollment status. The number of children in a household-based on age and gender has a significant influence on the schooling status of girls. The father's education, girls' age, and the households benefitting from the social safety net are also important factors. The government should consider the measures to alleviate poverty and provide pre-schooling facilities to increase the girls' enrollment in rural areas. The government should also increase social protection programs and encourage rural households to encourage savings.</i></p>

Introduction

Education is a prime requirement in this modern age of globalization. It does not only provide insights but it has a significant role in building characters, grooming personality, giving skills, and inculcating moral values. The first step for each human activity requires education in this phase of technological revolution. The welfare of the individuals and living standards is concerned with the vital role of education. An important factor that brings changes in human behavior is education. These changes insist a human to recognize his or her important role in social, economic, and political life. To bring these changes, equal opportunities of acquiring education to males and females are necessary. The Gender and Development approach identified that relations and roles of gender are the key factors to improve the lives of women, with the term 'gender' suggests that there is a need to focus on both men and women. The projects by the Gender and Development approach are holistic and try to eliminate the discriminated forms of institutions against women's interest, for example, acquiring land rights, and living violence-free lifestyle (Molyneux, 1985; Moser, 1989). The international agencies and developing countries diverted their focus towards human investment in the 1980s. Education and ensuring equal opportunities for women were two of the eight millennium development goals in the 2000s. Therefore, treating gender roles as an important aspect of economic development has become the subject matter of each developing country (Bradshaw, 2013).

Human capital has chief importance in the organization of human resources because it has been utilized to meet sustainable social and economic growth. For the attainment of social and economic growth, numerous education strategies have been implemented for this development by each government across the world (Nousheen & Awan, 2018). The primary role of women's participation in different sectors of an economy reflects in the productivity of the labor force and in allocative efficiency. Education is always considered as an important determinant of poverty reduction and sustainable development. Therefore, the structural transformation and growth of an economy is only possible by providing equal opportunities for education to men and women. Women's education plays a vital role to cut both child and maternal mortality, which surges expectancy of life (World Bank, 2001; Herz & Sperling, 2004). The social and economic barriers for women in Pakistan do not make sure the equal rights of

education particularly in rural areas of Pakistan. The situation of female enrollment and literacy rate in rural areas of Pakistan is alarming.

Figure 1: Literacy Rate in Rural Areas of Pakistan

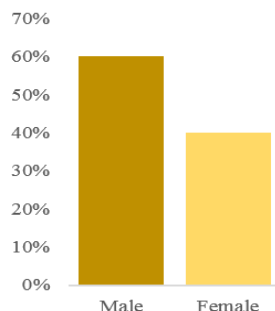
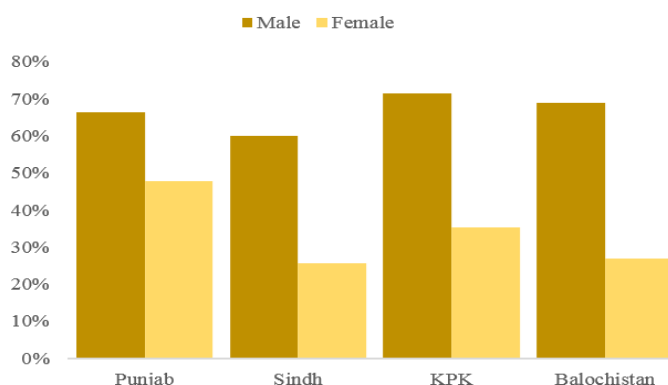


Figure 2: Province Wise Literacy Rate in Rural Areas



Source: Pakistan Education Statistics 2017-18

In Pakistan, a person is said to be literate if he or she can write or read his or her name. Despite this, the literacy rate of Pakistan is still lower, and Pakistan has appeared on the third number in the world ranking list of highest adult illiterate. The literacy rate in the rural areas of Pakistan is shown in figure 1, depicting that there is clear gender inequality in the literacy rate. The literacy rate for rural areas is obviously lower than the urban areas but interestingly the female literacy rate is less than male in both areas urban and rural (Ashraf et al., 2015). The gap between male and female enrollment at different levels of education in all provinces is a question of matter. Figure 2 shows the literacy rate of all provinces and the graph depicts the lower literacy rate of females as compared to males in all provinces. The patriarchal values have a dominant effect on the social structure in Pakistan. Ideologically, the home tasks are assigned to a woman because she born to serve her family within the walls of a home as wife and mother whereas men borne to earn and allocate resources as breadwinner outside the home (Farid et al., 2014). In Pakistan, it is mandatory to find true determinants of female education, particularly in rural areas to develop effective education policy. In order to determine female enrollment status, the aim of this study is to find the factors that maximize the rural girl's probability of being enrolled in school at the household level in Pakistan. This study tries to incorporate a set of qualitative as well as quantitative determinants that are not discussed in earlier studies and play important role in determining the female enrollment status. Nowadays, the Fourth Goal of Sustainable Development Goals needs attention to improve all mandatory determinants of gender enrollment. To pursue this goal, the analysis will help out each authority of the respective province to investigate the reasons for lower female enrollment in rural areas and will recommend possible solutions of the investigated problems.

This paper is organized as follows. Section two of the paper briefly explains the literature review. The third section discusses the data and methodology. The results along with their interpretations are reported in section four. The last section provides the conclusion and relevant policy recommendations.

Literature Review

The role of education in Economic growth has been proved positive and significant in monetary terms as well as in physical terms such as the productivity of labor and efficiency of farms. Investing in women's education is essential to transform economic growth into desired outcomes of development such as opportunities for women, child health, and the fertility rate is concerned with the literacy rate of women in the country. Since the objective is to explore all possible factors determining female enrollment status, therefore, all the socio-economic factors discussed in earlier studies are of much importance. So, this section will briefly present the theoretical and empirical review on the importance and determinants of female education.

Theoretical Review

Women's education and economic growth have contributed to the reduction of fertility rate and in the improvement of child health but these outcomes are not consistent with the expansion of opportunities for women in the labor market. The promotion of women's education is a dominant strategy for development therefore, the influences of women's schooling are chiefly central for policy-makers (Schultz, 2002). Human capital is a dominant

factor of production having a significant impact on economic growth because it is a stock of productive skills of humans with distinctive abilities. Expenditures incurred on education, health, and job training are examples of investments in human capital. Education is considered as the most productive kind of investment, it is even worthwhile investment than investment in physical capital. In order to produce goods and services, the human capital theory depicts that the learning capacity of a person can have comparable value with other complementary resources (Lucas 1990). Becker (1993) suggested that more schooling years raise returns and productivity chiefly by delivering skills, knowledge, and a mean of investigating problems. Economic theory explains that goods or services purchase by people are either for consumption or investment. Generally, when a consumer consumes goods or takes services, he gets utility but people get an education, they gain additive utility as they participate in different events at the university, make friends at college, join a social sorority or fraternity and learn to become independent. Education is viewed as an investment and consumptive service that lasts for a long time with significant effects on economic growth. Education gives non-market benefits as well as market benefits even after the retirement age. A person who has an education earns more income that affects his and society living standard (Hansen & Weisbrod, 1969).

Empirical Review

Different socio-economic factors and macroeconomic variables have been identified by different studies that significantly affect women's enrollment. Dhanraj & Mahambare, (2019) explored that there is lower participation of rural women in different types of employment in India. The reason behind that is culture causing discouragement of female participation. The cultural aspect of the joint family system insists women to opt for agricultural employment but hinders the rural women to adopt non-farm employment. The probability of rural women belong to a joint family system and working in the non-farm sector is lower than the women living in the nuclear family system. The lives of women in Pakistan are governed by ancestral society. Such societies do not give women equal rights. Pakistan is one of those countries which has the largest gender gap and discrimination between man and women in all aspects of life (Ashraf & Ali, 2018). Rural women are far away from acquiring education due to social and economic barriers in India. Some of the reasons are economic problems, home-related problems, institutional problems, and societal issues. Biased behavior of people plays a role as barriers especially in rural areas when female steps forward for higher education (Salvan, 2017). Mustafa et al. (2016) found that people do not prefer women's education in Pakistan and hence, they are failed to build a strong society. There are certain serious challenges in Pakistan behind the lower literacy rate of women in rural areas such as early marriages, domestic violence, acidic attacks and murders for family honor. Noury & Speciale (2016) studied that Taliban group was an ethnic group so culture mattered a lot in this group which ultimately affects the education of females. The effect of Taliban was captured in form of early marriages and higher fertility rate because women were not allowed to work and get an education so, they were forced to get married in early age.

Hostile attitudes have been adopted towards a female and male-dominated society has taken place in Pakistan. Sons are preferred over daughters because the male has a productive role in daily life matters (Shaukat & Pell, 2015). In Pakistan, the dropout rate of girls is high in rural areas. Rural women are confronting different issues i.e. poverty and gender disparity to acquire education. Another traditional constraint in rural areas is the unsatisfactory facilities for women because people are not willing to send their women to acquire education in co-education-based institutions (Ashraf et al., 2015). Few factors like household wealth, ownership of the house, and livestock have a significant small role in the enrollment. The enrolment decision is found negatively influenced by school distance and time required to get access to public transport. Similarly, there is lower school enrollment in the provinces having higher poverty incidence (Jamal, 2014). Salik (2014) discussed that investment on the boys is considered as a good investment with high returns that discriminates girls from boys which results in less enrollment of rural girls. Gender discrimination is everywhere in Pakistan, especially in rural areas. Poverty, domestic work, early marriages, and no awareness to parents about higher education lead to lower female enrollment in higher education. Joseph (2014) illustrated that the caste, number of siblings, health, types of institutions where women study, encouragement of parents, and parental income have been proved as important determinants of a woman's higher education. Furthermore, the employment decisions of women are influenced by the education of the mother, female aspiration, marital status, and parental income.

Women do a lot of domestic work at home for which they are not paid but their opportunity cost of domestic work is much higher. Women are considered responsible for looking after children and collecting firewood or water. Therefore, they are less likely to be enrolled in school (Bradshaw et al., 2013). The results show the complete dependence of 10 to 14 years' girls on government schools. This recommends private schools are impossible for women in rural regions. Another mediating factor for less enrollment of girls is income level of household: even richer

households seem to support state-funded schools for women. (Sathar et al., 2013). Developing countries cannot be benefited from globalization until they have a better and increasing trend of female education. Human capital has been proved as an essential determinant to sustain development and ease poverty in this modern age of life. (Bilal & Imran, 2012). The dominance of discrimination, forefather practices, and regulations have weakened our institutions. The school distance and restricted curriculum which are supply-side constraints have a significant negative impact on the rural female enrollment in higher secondary school while family income, education expenditures, boy preference over a girl, early marriages, and parent's education from demand constraints have negative effect on female enrollment (Yaqoob, 2012).

Data and Methodology

To achieve research objectives, this study targets three provinces of Pakistan named Sindh, Punjab and Khyber Pakhtunkhwa. The secondary data has been used obtained from Pakistan Rural Household Panel Survey (PRHPS) conducted by International Food Policy Research Institute (IFPRI) and Innovative Development Solution (IDS) in 2013-14. In Pakistan, the aim of this survey was to offer a basis for quantitative analysis to recognize and address priorities for economic development and policy. Pakistan Rural Household Panel Survey 2013-14 has data of 2018 rural households. The Pakistan Rural Household Panel Survey 2013-14 did not contain any information about the province of Balochistan due to war and security reasons during the survey. The econometric model carries binary dependent variable for the enrollment of females assigning a value of 1 if a female is "enrolled" and assigning a value of 0 if a female "never enrolled" or has been "dropped from school" (Hannum, 2005). On the other side, the model carries dummy variables as well as continuous variables as explanatory variables. The sample size for estimation of the econometric model is 2137 females aged 5-18. The logit model for the girls' school enrollment status is shown as:

$$z_i = \varphi_0 + \sum_{i=1}^{35} \varphi_i m_i + \varepsilon_i \quad z_i = (0,1) \quad (1)$$

Where explanatory variables are denoted by m_i and the dependent variable is denoted by z_i . The analysis is based on cross-section data that's why variables have subscript i . The parameters of the model are denoted by φ_i and ε_i represents the error term of the model. The econometric model deals with binary dependent variables assigning a value of one if the female is enrolled and zero if the female is not enrolled. Since the target variable is categorical and regressors are categorical as well as continuous variables, so limited or binary choice regression model will be estimated. The reason behind using the binary choice model is to identify the association between the probability of being enrolled and the characteristics of a female. A general form of the binary choice model is shown in equation (2):

$$\rho_i = P(z_i = 1) = f(\varphi_0 + \varphi_1 m_{1i} + \varphi_2 m_{2i} + \varphi_3 m_{3i} + \dots \dots \varphi_k m_{ki}) \quad (2)$$

Where; $i = 1,2,3, \dots, n$

f = cumulative density function

φ_k = Parameters associated with k th explanatory variable

m_{ki} = k th explanatory variables for i th female

ρ_i = probability of being enrolled for i th female

z_i = Binary dependent variable for i th female

The mathematical expression for logistic model is shown in equation (3):

$$\rho_i = \vartheta(m'_i \varphi) = \frac{1}{1+e^{-(m'_i \varphi)}} \quad (3)$$

Where $m'_i \varphi = \varphi_0 + \varphi_1 m_{1i} + \varphi_2 m_{2i} + \varphi_3 m_{3i} + \dots \dots \varphi_k m_{ki}$ and logistic cumulative distribution function is represented by $\vartheta(m'_i \varphi)$ in equation (3). The model has quantitative as well as categorical explanatory variables. For a continuous explanatory variable say m_j , it should hold following:

$$\frac{\partial P(z_i = 1 | m_i)}{\partial m_j} = \varphi_j \cdot f(m'_i \varphi) \quad (4)$$

Where the marginal impact has been calculated by taking first derivative and $f(m'_i\varphi)$ represents density function corresponding to cumulative distribution function $\vartheta(m'_i\varphi)$. The cumulative distribution function is a monotonic function stating that it increases in its entire range. So, the second term in equation (4) always remains positive due to the chain rule of derivative. Consequently, whenever partial derivative is taken with respect to particular explanatory variable, equality between the signs of partial derivative and the parameter of the model appears. An odd ratio is defined as the ratio of two probabilities such as probability of a favorable outcome (being enrolled in school) to the probability of an unfavorable outcome (not being enrolled in school). The odds ratios for logit model are shown below in equation (5).

$$Odd = \frac{\rho_i}{(1-\rho_i)} = \frac{\left(\frac{1}{1+e^{-(m'_i\varphi)}}\right)}{\left(\frac{e^{-(m'_i\varphi)}}{1+e^{-(m'_i\varphi)}}\right)} = e^{(m'_i\varphi)} \quad (5)$$

Where the odd ratio's interpretation is provided by the exponential function. By holding other factors constant, odd ratio is expected to change by $e^{(\varphi_j)}$ if m_j changes by one unit as it is shown in equation (6).

$$OR_j = \frac{\text{odds for } (m_{j+1})}{\text{odds for } m_j} = \frac{e^{(\varphi_0 + \varphi_1 m_{1i} + \varphi_2 m_{2i} + \dots + \varphi_j (m_{j+1}) + \dots + \varphi_k m_{ki})}}{e^{(\varphi_0 + \varphi_1 m_{1i} + \varphi_2 m_{2i} + \dots + \varphi_j m_{3j} + \dots + \varphi_k m_{ki})}} = e^{(\varphi_j)} \quad (6)$$

The explanatory variables of the logit model are classified on the basis of household and family characteristics, female characteristics and parental or household head's characteristics (Jeffery, 2007; Deng et al., 2014; Maitra, 2010; Buchmann & Hannum, 2001; Carneiro & Heckman, 2002; Becker & Lewis, 1973; Zhang et al., 2007; Kurosaki et al., 2006). Many studies concluded that consumption expenditures of a household are a good measure of materialistic welfare than the income of a household. The consumption of a household can capture the permanent income that's why consumption depicts the true welfare of the household. It also considers the welfare gain through the illegal sources of income. The income of a household may mislead about welfare because total earnings by the members of a household can fluctuate over time but consumption remains smoother (Sajid & Khan, 2016). In developing countries, income is not considered a good measure of a household's welfare because a lot of goods and services are produced and consumed by a household itself (Meyer & Sullivan, 2003). Furthermore, people do not report the correct income of the household due to tax imposition but they report consumption relatively better. Another reason for using consumption as the proxy for a household's welfare is demonstrating the true standard of living of a household because it incorporates the current income as well as other financing sources such as household credit, gifts or financial assistance, and household savings (Meyer et al., 2003). In the same way, households do not spend their all income and save some money which does not increase the welfare of the household. Therefore, analysis utilizes the per adult monthly expenditures to calculate the headcount poverty which is the proxy for the economic status or welfare of the household.¹ The headcount poverty is calculated by following the cost of basic needs CBN approach. The CBN approach takes into account the monthly per adult food expenditures required to take 2350 calories per day and monthly per adult expenditures to satisfy basic needs (health, education, shelter and clothes etc.) in a household (Farooq & Younais, 2018). In Pakistan, the estimated poverty line based on HIES dataset was Rs. 3030 per adult monthly expenditures in 2013-14 and it has been utilized to calculate the incidence of headcount poverty² (Amjad et al., 2018). If per adult monthly expenditures are greater than Rs 3030, female belongs to non-poor household and if per adult monthly expenditures are less than the Rs 3030, female belongs to poor household. By following earlier studies, asset index has been constructed and utilized as the proxy for a household's economic status (Sajid & Khan, 2016). The different assets owned by a household used to construct the asset index. The Pakistan Rural Household Panel Survey has the information on the more than 70 assets of a household i.e. watch ownership, water pump, energy saver, spade, beds, sofa set, armiores, guns, suitcases, T.V set, bicycle, motorcycle, mobile, refrigerator, car, fan, iron etc. The value of each asset was measured in rupees and this value has been considered for each asset to construct the asset index. The Principal component analysis (PCA) is one of the appropriate and good methods to construct an index (Filmer & Pritchett, 2001). The types and description of the response and explanatory variables for the logit model is shown in table 1.

¹ Arif et al. (1999) considered income-based poverty line to investigate the relationship between poverty and primary school enrollment

² Malik et al. (2014) used Rs. 1742 as poverty line for the year 2010-11.

Table 1: Description of Variables

Dependent Variable		
Variable Name	Type	Description of the Variable
Female Enrollment	Categorical	0=If Female is not enrolled or left the school 1=If Female is currently enrolled
Explanatory Variables		
<i>Female Characteristics</i>		
Age of Female	Continuous	The age of the female is measured in years
Age square of Female	Continuous	The square of female age is taken to capture the non-linearity in the model.
Farm worker	Categorical	The female worked at own agriculture farm or livestock in a year (1=Yes 0=No)
Child/Adopted child (Ref: Other relative)	Categorical	The female's relationship with the household head is measured by generating dummy variable (1=Child/Adopted child 0=Other relative)
Sister/Sister in law (Ref: Other relative)	Categorical	The female's relationship with the household head is measured by generating dummy variable (1=Sister/Sister in law 0=Other relative)
Grandchild (Ref: Other relative)	Categorical	The female's relationship with the household head is measured by generating dummy variable (1=Grandchild 0=Other relative)
Niece (Ref: Other relative)	Categorical	The female's relationship with the household head is measured by generating dummy variable (1= Niece 0=Other relative)
Domestic worker	Continuous	The time spent by female on the different tasks at home is measured in average hours per day in a year i.e. these tasks include cleaning, cooking, water collection, wood collection, washing clothes and family care etc.
<i>Demographic and Household Characteristics</i>		
Punjab (Ref: KPK)	Categorical	The province female belongs to (1=Punjab 0=else)
Sindh (Ref: KPK)	Categorical	The religion of female (1=Sindh 0=else)
Muslim (Ref: Non-Muslim)	Categorical	The religion of female (1=Muslim 0=Non-Muslim)
Punjabi (Ref: Shina/Hazarwal/Saraiki)	Categorical	The dummy variable is generated for the ethnicity of female (1=Punjabi 0=else)
Pakhtoon (Ref: Shina/Hazarwal/Saraiki)	Categorical	The dummy variable is generated for the ethnicity of female (1=Pakhtoon 0=else)
Balochi (Ref: Shina/Hazarwal/Saraiki)	Categorical	The dummy variable is generated for the ethnicity of female (1=Balochi 0=else)
Sidhi (Ref: Shina/Hazarwal/Saraiki)	Categorical	The dummy variable is generated for the ethnicity of female (1=Sindhi 0=else)
Social Safety Net	Categorical	Any member of the female's household who is getting any kind of financial assistance such as BISP, education scholarships, Zakat etc. The dummy variable represents the status of the household whether getting any financial assistance or not. (1=Yes 0=No)
Household Saving	Continuous	The household savings is yearly measured and logarithm is taken to interpret it conveniently.
Head count poverty	Categorical	The poverty illustrates whether female belongs to poor household or non-poor household. If the monthly per adult expenditures are greater than the threshold monthly expenditures set by the poverty line (Rs. 3030) based on cost of basic needs approach, then female belongs to non-poor household and if the case is converse of it, female belongs to poor household (1=Poor 0=Non-Poor).
Asset index	Continuous	An index is constructed for the assets of the households with the help of Principal Component analysis.
Per adult household expenditures	Continuous	Yearly per adult household expenditures are obtained by dividing the total household expenditures except education expenditures on number of adult members in a household. The logarithm is taken to make the interpretation convenient.
Children (0-4-years)	Continuous	The number of children aged 0-4 year residing in household of the female.
Male siblings (5-15 years)	Continuous	The number of male members aged 5-15 year residing in the household of female.
Male siblings (15 years above)	Continuous	The number of male members aged 16 or above year residing in the household of female.
Female siblings (5-15 years age)	Continuous	The number of female members aged 5-15 year residing in the household of female.
Female siblings (15 years above)	Continuous	The number of female members aged 16 or above year residing in the household of female.

Cont.

Table 1: Description of Variables (Cont.)

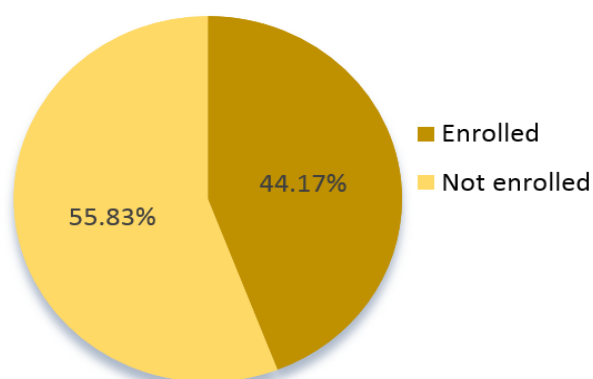
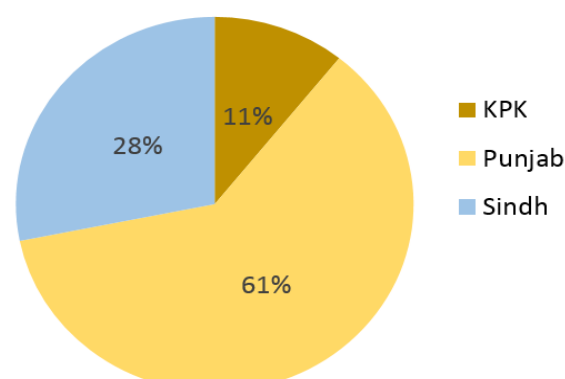
Variable Name	Explanatory Variables	
	Type	Description of the Variable
<i>Parental and Household Head Characteristics</i>		
Household head employment status	Categorical	The employment status of the household head is measured by binary variable. (1=Employed 0=Unemployed)
Age of Household head	Continuous	The age of the household head is measured in years.
Gender of Household Head	Categorical	The gender of the household head is (1=Male 0=Female)
Mother Prim_Education (Ref: Never enrolled)	Categorical	The female's mother who has primary or less than primary education is measured by introducing dummy variable. The female's mother having education equivalent to katchi-Pacci, class 1, class 2, class 3, class 4 and class 5 is considered in the category of the primary education (1=Primary education 0=else)
Mother Second_Education (Ref: Never enrolled)	Categorical	The female's mother who has secondary or above but more than primary education is measured by introducing dummy variable. The female's mother having education equivalent to class 6, class 7, class 8, class 9, class 10, madrassa or higher education is considered in the category of the secondary education (1=Secondary education 0=else)
Father Prim_Education (Ref: Never enrolled)	Categorical	The female's father who has primary or less than primary education is measured by introducing dummy variable. The female's father having education equivalent to katchi-Pacci, class 1, class 2, class 3, class 4 and class 5 is considered in the category of the primary education (1=Primary education 0=else)
Father Second_Education (Ref: Never enrolled)	Categorical	The female's father who has secondary or above but more than primary education is measured by introducing dummy variable. The female's father having education equivalent to class 6, class 7, class 8, class 9, class 10, madrassa or higher education is considered in the category of the secondary education (1=Secondary education or above 0=else)
Teacher gender1	Categorical	The perception of household head about the female's teacher gender at primary level of education (1=Matters 0=Does not matter)
Teacher gender2	Categorical	The perception of household head about the female's teacher gender at secondary or higher level of education (1=Matters 0=Does not matter)
Gender inequality	Categorical	The parents of the female prefer boy education over the education of girls. Their perception about gender inequality is captured by the binary variable (1= Yes 0=No) ³

Results and Discussion

For quality research, care and planning are required for research design to collect data but it the post-analysis which ensures the quality of this research (Best, 1981). Practically, samples of datasets are drawn from large populations in various formats that's why a straightforward and meaningful description of the dataset cannot be expected. The analysis of the characteristics of collected data plays a vital role to pursue the research aims of a study. The meaning of this analysis is to categorize, classify and summarize data to answer the questions of the research study. Classification and categorization of data help to tabulate and arrange the big dataset into interpretable and comprehensible forms (Youngman, 1979). The descriptive analysis also helps to confine generalization to an observed and particular group of people. The mean and standard deviations for the categorical variables are not of much importance but the descriptive statistics such as mean, standard deviation, minimum and maximum values for all continuous variables are shown with the help of summary statistics (Shaukat, javed, & Imran, 2020).

The sample size for the estimation of the econometric model consists of 2133 girls having age 5-18 years. This sample is drawn from three provinces of Pakistan named as Punjab, Sindh and KPK. Out of the total sample, 61 percent of girls belong to Punjab, 28 percent of girls belong to Sindh and 11 percent girls belong to KPK as shown in figure 4. Figure 3 illustrates the enrollment status of the girls, showing that 55.83 percent of girls of the total sample are enrolled in the schools whereas 44.17 percent of girls are not enrolled in the school.

³ Ref stands for the reference or benchmark category of the categorical variables

Figure 3: School Enrollment Status of 5-18 years Girls**Figure 4: Region wise Percentage of 5-18 years Girls in Estimation Sample**

Source: Authors construction based on Pakistan Rural Household Panel Survey 2013-14

Table 2: Summary Statistics

Variables	Female School Enrollment Status							
	Not enrolled (N=1192)				Enrolled (N=941)			
	Mean	S. D	Min	Max	Mean	S. D	Min	Max
Age of Girl	12.32	4.27	5	18	10.03	3.38	5	18
Household Head Age	47.98	11.24	20	89	48.14	12.09	20	89
Domestic work	2.71	2.97	0	19.98	0.8	1.43	0	11.98
Household Saving	8395	82124	0	2300000	18754	99388	0	1020000
Household Assets	-0.57	2.05	-2.65	19.31	0.72	2.73	-2.51	19.31
Household per Adult Expenditures	68344	61086	8727	985975	84985	96851	6644	985975
Female sibling (15 years above)	1.89	1.36	0	9	2.06	1.23	0	9
Female sibling (5-15 years)	2.06	1.32	0	8	2.03	1.37	0	8
Male sibling (15 years above)	1.34	1.25	0	7	1.17	1.05	0	6
Male sibling (5-15 years)	1.8	1.3	0	8	1.87	1.51	0	11
Children (0-4 years)	0.82	1.11	0	7	0.87	1.13	0	7

Source: Authors construction based on Pakistan Rural Household Panel Survey 2013-14

Table 2 provides the summary statistics for the continuous explanatory variables of the logit model. The mean age of the non-enrolled girl is greater than the mean age of the enrolled girl by two years. On average, the non-enrolled girls work 2.71 hours per day at home as compared to enrolled girls who do 0.8 hours per day. The mean household savings and household asset index of non-enrolled girls is significantly lower than the enrolled girls. The mean number of female siblings above 15-year-old for enrolled girls is greater than the mean female siblings above 15 years old for non-enrolled girls. The mean number of female siblings 5-15 years old for enrolled girls is slightly lower than the mean number of female siblings 5-15-year-old for non-enrolled girls. The average number of male siblings 15 years above for enrolled girls is less than the average number of male siblings 15 years above for non-enrolled girls. Lastly, the mean number of male children 5-15-year-old for enrolled girls is greater than the mean number of male children 5-15-year-old for non-enrolled girls. Before the estimation of the logistic regression model, it is better to check the correlation among the continuous explanatory variables of the model to avoid multicollinearity.

Table 3: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Girl age	1										
(2) Household head age	0.219	1									
(3) Domestic work	0.539	0.069	1								
(4) Asset index	0.058	0.148	-0.12	1							
(5) Female siblings 5_15 years	-0.3	-0.07	-0.15	0.07	1						
(6) Female siblings 15 years above	0.283	0.191	-0.02	0.43	0.05	1					
(7) Male siblings 5_15 years	-0.03	-0.05	0.035	0.05	0.05	0.113	1				
(8) Male siblings 15 years above	0.126	0.112	0.013	0.38	0.13	0.572	0.07	1			
(9) Children 0_4 years	-0.23	-0.03	-0.12	0.25	0.28	0.277	0.14	0.25	1		
(10) Per adult household expenditures	-0.1	-0.04	-0.07	0.21	0.09	-0.1	0.05	-0.15	-0	1	
(11) Household Saving	0.018	0.03	-0.01	0.3	0.07	0.056	0.06	0.09	0.049	0.09	1

Note: Numbers in parenthesis ordered in columns represent the variables ordered in rows

The correlation matrix for the continuous variables is shown in table 3. It can be observed that there is no serial correlation among the explanatory variables hence, the chances of multicollinearity in model estimation are negligible.

Table 4: Logit Model Estimates for School Enrollment Status of 5-18 years Girls

Explanatory Variables	Coef.	Robust St. Er.	Odd Ratio
<i>Female Characteristics</i>			
Age of female	0.86***	0.105	2.36
Age square of female	-0.046***	0.005	0.96
Farm worker (Ref: non-participant)	-0.503***	0.171	0.61
Child/Adopted child (Ref: Other relative)	0.892***	0.308	2.44
Sister/Sister in law (Ref: Other relative)	1.025*	0.56	2.79
Grandchild (Ref: Other relative)	1.095***	0.364	2.99
Niece (Ref: Other relative)	2.081***	0.54	8.01
Domestic worker	-0.255***	0.042	0.78
<i>Demographic and Household Characteristics</i>			
Punjab (Ref: KPK)	-1.414***	0.286	0.24
Sindh (Ref: KPK)	-3.557***	0.562	0.03
Muslim (Ref: Non-Muslim)	0.721**	0.338	2.06
Punjabi (Ref: Shina/Hazarwal/Saraiki)	0.944***	0.154	2.57
Pakhtoon (Ref: Shina/Hazarwal/Saraiki)	-0.6*	0.318	0.55
Balochi (Ref: Shina/Hazarwal/Saraiki)	1.003*	0.558	2.73
Sindhi (Ref: Shina/Hazarwal/Saraiki)	0.918*	0.489	2.5
Social safety net (Ref: Non-beneficiary)	0.561***	0.122	1.75
Ln HH savings	0.095**	0.04	1.1
Head count poverty (Ref: Non-Poor)	-0.389***	0.144	0.68
Asset index	0.116***	0.042	1.12
Ln per adult expenditures	0.389*	0.236	1.48
Children_0_4yrs	-0.165***	0.06	0.85
Msibling_5_15yrs	-0.234***	0.056	0.79
Msibling_15yrs_above	0.102*	0.061	1.11
Fsibling_5_15yrs	-0.205***	0.052	0.82
Fsibling_15yrs_above	0.021	0.067	1.02

Cont.

Table 4: Logit Model Estimates for School Enrollment Status of 5-18 years Girls (Cont.)

Explanatory Variables	Coef.	Robust St. Er.	Odd Ratio
<i>Parental and Household Head characteristics</i>			
HH employment status (Ref: Unemployed)	0.037	0.203	1.04
HH age	0.011*	0.006	1.01
HH gender (Ref: Female)	-0.665**	0.31	0.51
Mother primary Edu (Ref: Never enrolled)	0.145	0.28	1.16
Mother secondary Edu (Ref: Never enrolled)	0.287	0.551	1.33
Father primary Edu (Ref: Never enrolled)	0.713***	0.227	2.04
Father secondary Edu (Ref: Never enrolled)	0.629*	0.377	1.88
Teacher gen primary (Ref: Doesn't matter)	-0.06	0.226	0.94
Teacher gen secondary (Ref: Doesn't matter)	-0.671**	0.285	0.51
Boy preference over girl (Ref: No)	-0.492***	0.133	0.61
Reference Categories			
Constant	-3.867***	1.468	0.02
Mean dependent var	0.442	SD dependent var	0.497
Pseudo r-squared	0.359	Number of obs	2133
Chi-square	537.695	Prob > chi2	0.000
Akaike crit. (AIC)	1950.497	Bayesian crit. (BIC)	2154.481

*** $p < .01$, ** $p < .05$, * $p < .1$

Table 4 illustrates the estimates of logit regression for determining the girl's school enrollment status. The results are discussed in separate paragraphs representing each category of characteristics.

Female Characteristics: The results show that a girl's age significantly affects the girl's school enrollment status. By holding other variables constant, if age increases by one year, a girl is 2.36 times more likely to be enrolled. Arif et al. (1999) concluded that the age of the girl significantly and positively affects the enrollment status. The girls who work at their agricultural farms are 39.5 percent less likely to get enrolled at school than the girls who do not work at farms. The domestic work done by girls at home has a significant effect on the girls' school enrollment status. The girls work involved in domestic work are 22.5 percent less likely to be enrolled as domestic work done by a girl increases by one hour per day. In rural areas of Pakistan, study results also show that girls are engaged in their own farm and domestic work rather at the cost of leaving school temporarily or permanently (Rafiq and Mohy-ud-din, 2018; Iddrisu, 2014). The co-efficient of girl's age squared is negative and significant showing that initially as age increases, the likelihood of girls' enrollment increases, it reaches a maximum, and then begins to fall as discussed in earlier studies (Khan and Ali, 2003). The four dummy variables for the girl's relationship with household head show that own child or adopted child of the household head is 2.44 times, sister or sister in law is 2.78 times, the grandchild is 2.99 times and niece is 8.01 times more likely to be enrolled in comparison to any other relative of the household head.

Demographic and Household Characteristics: The location of a girl with respect to provinces significantly affects the school enrollment status of girls. If a girl belongs to Punjab, she is 75.7 percent less likely to be enrolled as compared to a girl who belongs to Khyber Pakhtunkhwa. If a girl belongs to Sindh, she is 97.1 percent less likely to be enrolled in comparison to Khyber Pakhtunkhwa. The girls from Sindh have a minimum probability of being enrolled as compared to the rest of the provinces. The co-efficient of a girl's religion also has a significant impact on the girl's school enrollment status. A Muslim girl is 2.05 time more likely to be enrolled as compared to Christian or Hindu girl. The dummy variables for ethnicities illustrate that the Punjabi girls are 2.57 times, Pakhtoon girls are 0.54 times, Balochi girls are 2.72 times and Sindhi girls are 2.5 times more likely to be enrolled as compared to the common benchmark category of Shina or Saraiki or Hazarwal girls. The girls who belong to beneficiary households of the social safety net are 1.75 times more likely to be enrolled than the girls who belong to non-beneficiary households. The household savings have a positive and significant impact on the girls' school enrollment status. If there is a one percent change in the household savings, the household's girls are 9 percent more likely to be enrolled. Deng et al.

(2014) discussed the positive impact of liquid assets such as household savings and treasury bills etc. on the girls' enrollment status. The assets of the household also play a significant role in determining the school enrollment status of the girls. Holding other variables constant, the girls are 12.3 percent more likely to get enrolled if there is a one-unit change in the asset index. Deng et al. (2012) explained that household assets and per capita expenditures represent the household resources which increases the probability of female enrollment. The per adult total expenditures of household and headcount poverty based on expenditures both are indicators of household economic status. The headcount poverty of a household illustrates that a girl who belongs to a poor household is 32.2 percent less likely to get enrolled as compared to a girl who belongs to a non-poor household whereas the girls are 47.6 percent more likely to get enrolled if there is one percent increase in per adult household expenditures. The earlier studies demonstrated similar findings of head count poverty and household income or expenditures in relation to girls' school enrollment status (Sajid & Khan, 2016; Chaudhury, 2006; Arif et al., 1999). Arif et al. (1999) utilized household income than household expenditures as a determinant of female enrollment because data for household expenditures were not available but the study favored using a variable of household expenditures as it provides reliable results. The girls are 15.2 percent less likely to get enrolled if the number of children aged 0-4 increases by one. More the children 0-4 years, girls have to look after them at home that is why girls are less likely to be enrolled (Iddrisu, 2014; Khan & Ali, 2003). A girl is 18.5 percent less likely to be enrolled in school if the number of female siblings aged 5-15 years increase by one whereas she is 20.9 percent less likely to get enrolled if the number of male siblings aged 5-15 years increases by one. The girls are 10.8 percent more likely to get enrolled if her male siblings aged above 15-years increase by one. The 5-15 years' age group of male and female children has a larger contribution to household expenditures either they are enrolled in school or not. If they are enrolled, more financial resources are required for basic needs and education. On the other hand, if they are not enrolled still, they require financial resources for basic needs. A male sibling above 15-year age is considered as adult population and they are part of the labor force. Therefore, their earnings increase the financial resources or economic status of a household and these financial resources reduce a girl's financial constraints and allow her to get enrolled (Khan & Ali, 2003). The number of female siblings above 15-year age in a household have no influence on the girl's school enrollment status. The reason for no influence might be the marriages of the girls after the age of 15 years because they would not be longer part of the family as discussed in earlier studies (Parveen, 2008; Yaqoob, 2014).

Parental and Household head characteristics: A girl is 1.01 times more likely to be enrolled when the household head's age increases by one year. A household head with older age may have older siblings or family members who can support the household financially. The gender of the household head has a significant coefficient stating that if the household head is male, a female is 48.6 percent less likely to be enrolled than a girl having a female household head. The possible reason behind this is sending girls to school in rural areas is considered a threat to the honor of the family. Ali & Khan (2003) stated that girls are less likely to be enrolled in schools if the gender of the household head is male in Pakistan. The dummy variable capturing parent perception about teacher gender at the primary level of education showing whether teacher gender matters or not is found insignificant. It is widely believed that a girl in primary education has aged less than 9 years and she is considered as a child hence; parents have no threat to family honor if the gender of the teacher is male and they do not expect sexual harassment at the primary level of education. On the other hand, the parent's perception about the teacher's gender at the secondary level of education has a statistically significant impact showing that the girls are 48.9 percent less likely to be enrolled whose parents take into account the matter of teacher's gender. The girl's age in secondary school is considered as adult age that's why teacher gender matters for a parent in secondary education. The parents who prefer boy's education or discriminate between boys and girls, their girls are 38.8 percent less likely to be enrolled in school. Yaqoob (2012) also concluded similar results that preference of boy education over girl education is a constraint for the female enrollment. The employment status of the household head and mother's education has no significant influence on the girl's school enrollment status. Few studies found that there is no relationship between household head's employment status and girls' enrollment (Iddrisu, 2014; Khan & Ali, 2003). discussed that there is no relationship between a girl's enrollment and her mother's education but for a boy's enrollment. The literature also supports the argument that mother education has no relationship with girls' school enrollment (Thomas et al., 1991; Handa, 1996; Deng et al., 2014). A girl whose father has primary education is 2.04 times more likely to get enrolled and a girl whose father has secondary education is 1.87 times more likely to be enrolled as compared to the girls with no father's education. Sajid & Khan (2016) also had similar findings of the study regarding father's education and girls' school enrollment.

Conclusion and Recommendations

The education is the basic right and need of human being. The sustainable social and economic development is only possible by providing education to the girls. The aim of this study is to explore the determinants of girls' school

enrollment status at household level in Pakistan. In this study, the dataset of 2142 girls aged 5-18 years has been obtained from Pakistan Rural Household Panel Survey 2014. The logistic regression model is employed to find the determinants of girls' school enrollment status. The estimates of the logistic regression prove that the household economic status measured by household expenditures, household assets, and household savings have positive and significant effects on the girls' school enrollment while head count poverty has negative and significant effect on girls' enrollment status. The results also show that parents prefer boys' education over the girls' education and teacher gender matters for them therefore, both negatively affect the girls school enrollment. The number of children aged 0-4 years, number of male and female siblings aged 5-15 years influence the girls school enrollment negatively whereas male and female sibling aged 15 years above influence the girls school enrollment positively. The father education, girls age and beneficiary households of social safety net also have positive and significant impact on the girls' school enrollment status. Keeping in view the findings, there are few significant factors that demand some insights from policy makers. The government should consider the measures to reduce poverty to increase the girls' enrollment in rural areas. In rural areas, girls' enrollment is often delayed. Therefore, the government should offer pre-schooling facilities so that girls could be enrolled in very early age. The government should give incentives to the rural households to encourage savings. The government should also increase social safety net programs for rural households so that girls' enrollment could be better. The ministry of education of each province should give a platform in rural areas which can aware and deliver the importance of girl's education to their parents so that parents could equally prefer boys and girl's education. In rural areas, only female teaching staff should be hire for girls' school so that matter of teacher gender could be resolved for parents. The less numbers of siblings aged below 16 years result in more girl's enrollment in rural areas so Government should make sure the services of Pakistan population welfare department to get desired outcomes of population in rural areas. All the recommendation and suggestions discussed above could have comparatively better outcomes for Sindh and Punjab governments than KPK because the estimations show comparatively greater marginal effects for them.

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