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Demand for secondary schooling in Pakistan: A cross income group analysis

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ABSTRACT

Secondary education for all is one of the UN's attainable goals. Many countries, including Pakistan, are struggling to achieve this target. Earlier research has attempted to analyze the determinants of secondary schooling by taking the total income of households. However, households of different income groups respond differently to varying socio-economic factors. This study attempts to identify the household-level socio-economic determinants of secondary schooling across different income groups in Pakistan. It utilizes national survey data from the Pakistan Social and Living Standards Measurement (PSLM) Survey 2019-20. We selected households from the dataset that had at least one member of secondary school age (13-20 years). Households that enrolled a secondary school-age member in school or whose member achieved secondary schooling were categorized as having demand for secondary schooling. Furthermore, instead of taking the total income of households, study takes six categories of income. The results of logit estimation show that demand for secondary schooling increases across successive income groups, indicating secondary schooling is a normal commodity. The proportion of male school-going age members and having a female head increase the likelihood of demand for secondary schooling. The study recommends that policies to increase enrollment at the secondary level may focus more on lower-income groups and on the education of females.

Contribution/ Originality: This study takes six income categories of households and analyzes the effect of these categories on the demand for secondary schooling. Furthermore, it divides households into six categories and analyzes the impact of socio-economic factors on the decision to demand for secondary schooling separately.

1. INTRODUCTION

Education is considered a way out of the vicious circle of poverty. It helps in determining the productivity level of an individual. Highly educated people tend to be more productive in comparison to their counterparts (Kampelmann, Rycx, Saks, & Tojerow, 2018). The pioneering studies focusing on human capital identify investment in education as the major factor of higher production (Schultz, 1961). An investment in an additional year of schooling constructs human capital and causes an increase in efficiency; therefore, an additional year in school results in increased income for an individual (Card, 2018). Similarly, differences in the training of labor force participants are the major factor of differences in personal income distribution (Becker, 1962, 1964; Mincer, 1958). We find many examples in our daily lives supporting this notion. For instance, the salary of a college lecturer, with the same working hours, is much higher than that of a primary school teacher. This difference is the result of the difference in the qualifications of the two workers. The data from the Pakistan Social and Living Standard

Measurement Survey (2019-20) shows that the income level of people is associated with their level of education. Table 1 presents the average yearly wages of people with different qualification levels.

Table 1. Average yearly income of individuals and their education level.

Sr.#	Education level	Average yearly income (PKR)
1	Primary	134,780
2	Secondary	210,118
3	Higher secondary	228,420
4	Bachelors	372,107

Endogenous growth theories put enormous emphasis on education in determining the growth of a country (Abbas & Mujahid-Mukhtar, 2000; Barro, 1991; Idrees & Khan, 2020). Evidence shows that investment in four-year college education increased the number of patents registered (a measure of innovation), which in turn increased real per capita income (Aghion, Boustan, Hoxby, & Vandenbussche, 2009). Recognizing the significance of education, policymakers have taken a deep interest in policies to enhance the educational profile of countries. Resultantly, developing countries started formulating policies to increase education levels in the 1970s. These policies included increasing the compulsory schooling level, introducing mathematics, abolishing lower technical schools, and extending secondary from two to three years (Psacharopoulos, 1982).

1.1. Education System in Pakistan

The education system of Pakistan is divided into three tiers: elementary education, secondary education and tertiary education (Saeed, 2007). Elementary education is further subdivided into three categories: pre-primary (kindergarten), primary (grades 1-5) and middle school (grades 6-8). Secondary education is further subdivided into lower secondary (grades 9-10) and higher secondary (grades 11-12) (NEMIS, 2022). For ease of understanding, we will use the term secondary education to refer to lower secondary (grades 9-10) throughout this study. Degree colleges and universities provide tertiary education, which encompasses education beyond grade 12. Schooling is free and compulsory up to grade 10 for children from five to sixteen years old. However, the law is not implemented in its true spirit, which results in people not sending their children to school (Ashfaq, 2018). High-performing students at the secondary level choose the subjects that are considered difficult, whereas low-performing students choose the subjects they consider less difficult (Dellar, 1994).

1.2. Secondary Education in Pakistan

Secondary education plays a pivotal role in the life of an individual, as it paves the way for his or her future career. Students get a chance to choose the field of their choice at the higher secondary level depending upon their performance at the secondary level in Pakistan. High scoring students opt for prestigious fields such as medical, engineering and IT while low-performing students have to opt for vocational training or arts and humanities subjects at the higher secondary level. Along with working as a feeder to higher education, secondary schooling also provides a middle-level workforce to the economy (Qaiser, 2022).

After Pakistan's inception, the objectives for secondary education in the First Five Year Plan (1955-60) included the provision of improved courses on mathematics and science, the addition of subjects related to agriculture, teaching, social welfare, commerce and industry, increasing the number of schools, the introduction of vocational agriculture, commercial and industrial arts, upgrading primary schools and introducing multipurpose schools. These objectives were set keeping in mind the situation of the country which gained its independence recently and relied heavily on agriculture.

The First Five-Year Plan could not bring significant change to the secondary school system. The second five-year plan (1960-65), however, achieved some targets in terms of provision of facilities at the secondary level,

curriculum improvement, introduction of science subjects and on-the-job training of teachers. The Third Five-Year Plan was not a success due to the war with India. During the Fourth Five-Year Plan, secondary education was made free and all the private schools at the primary, middle, secondary, higher secondary and college levels were nationalized. The Sixth Five Year Plan emphasized increasing enrolment at the secondary level and providing technical education. The seventh five-year plan (1988-93) reversed the policy of nationalization of schools and the sector was opened to private schools. Except for the second five-year plan, the majority of plans could not achieve their targets (Parveen, 2008).

In 2000, the United Nations made education a target in its Millennium Development Declaration and envisioned achieving primary education for all children until 2015. However, Pakistan could not achieve the Millennium Development Goals (MDGs) in 2015. These unachieved goals have become an integral part of the Sustainable Development Goals (SDGs) achievable until 2030. Furthermore, the target of primary education has been revised and the Sustainable Development Goals (SDGs) aim at achieving secondary education for all children until 2030.

Owing to this importance, secondary education was made compulsory in the constitution of Pakistan in 2010. Under the law, the state is obligated to provide free education to all children (Bibi, 2018). Therefore, the government establishes public schools at the primary, middle and secondary levels. On the other hand, owing to the high demand for schooling, the private sector also realizes the opportunity to provide services and earn profit in the education sector. The situation of enrolment, supply of schools and teachers at different education levels in Pakistan is provided in Table 2.

Table 2. Enrolment, number of schools and number of teachers in Pakistan (Number in thousands).

Year	Primary			Middle			Secondary		
	Enrolment	Number of schools	Number of teachers	Enrolment	Number of schools	Number of teachers	Enrolment	Number of schools	Number of teachers
2010-11	18.063	156	441	5.644	42	335	2.630	25	453
2011-12	18.677	155	427	6.020	42	351	2.753	29	459
2012-13	18.790	160	429	6.188	42	363	2.898	30	490
2013-14	19.441	158	420	6.461	43	365	3.109	31	501
2014-15	19.847	166	431	6.582	45	381	3.501	31	514
2015-16	21.551	165	445	6.922	46	394	3.653	32	530
2016-17	21.686	169	475	6.996	49	455	3.583	32	561
2017-18	22.931	173	522	7.362	47	448	3.861	31	563
2018-19	23.588	180	495	7.634	47	449	3.969	32	567
2019-20	23.758	180	485	7.869	47	443	4.015	32	567
2020-21	24.351	180	477	8.415	47	434	4.360	34	592
2021-22	24.950	183	477	8756	47	430	4.549	35	599

Source: Economic survey of Pakistan 2022-23.

Enrolment, the number of schools and the number of teachers are increasing in Pakistan. Primary enrolment during 2021-22 has increased by 38%, at the middle level by 55% and at the secondary level by 73% as compared to enrolment in 2010-11. Access to school significantly affects the decision to enroll female children at the primary level in rural areas of Pakistan. The provision of primary schools in rural areas significantly increases the likelihood of female children enrolling in school. However, the addition of a primary school in a village that already has a public school does not have a significant impact on enrolment (Lioyd, Mete, & Sathar, 2005).

Similarly, the number of schools and teachers has increased over the past decade. Although the number of teachers at secondary level is higher than the number of teachers at primary level, but the enrolment at secondary

level has remained low. One of the reasons for low enrollment is a lower willingness to pay for education in rural areas. Children from poor families in rural areas face higher opportunity costs and their families tend to have a low willingness to pay for education (Saqib, 2004). On the other hand, in urban areas, the income of household, the head's occupation, the head's education, the periodicity of the head's earnings and households dominated by a men play an important role in a child's schooling (Hamid, 1993).

Despite all the efforts to increase the number of schools, the universal education level, the number of teachers, and the training of teachers, the performance of Pakistan in educational indicators is not promising. Total enrolment at secondary level stands at 45% of gross. The country ranks second in terms of out-of-school children (OOSC), with 44% of children (22.8 million) aged five to sixteen not attending school (NEMIS, 2018). Further breakdown of the age bracket reveals that 22% of OOSC belong to the age group of five to nine years. Whereas, 50% of OOSC belong to the age bracket of 10 to 14 years. Similarly, only 25.7 million children were enrolled at the primary level, 8.3 million children were enrolled at the lower secondary level and 4.5 million children were enrolled at the secondary level during 2020-21.

Furthermore, the completion rate at the primary, middle and secondary levels stood at 67%, 47% and 23% respectively. This also indicates that the secondary level has remained neglected at the national level. These statistics reveal that despite being a signatory to the SDGs, Pakistan lags far behind in achieving quality secondary education for all children.

Private schools are considered to provide quality education. Therefore, people in urban areas prefer to enroll their children in private schools. The increase in demand for private schooling in Pakistan after 2000 is leading to higher competition among private schools (Bau, 2017). This increase in competition calls for analyzing the factors involved in a household's decision to educate its children. Many studies, including Safarzyńska (2013) and Idrees and Khan (2020), have analyzed the socio-economic determinants of demand for education. They investigated the overall impact of income on demand for education. However, the response of households to different factors varies according to their income group. For example, sending a child to a school at distance may not be a problem for a rich family due to the availability of transportation. At the same time, it may be an obstacle for poor families. Therefore, it is important to know how different factors affect the decisions of households from different income groups. Additionally, such analysis is important in determining whether secondary education is considered a normal commodity or an inferior commodity.

In this context, it is important for policymakers as well as educational institutions to know the socio-economic factors affecting the decision of households to enroll children in school from different income levels.

The present study attempts to identify the socio-economic factors involved at the household level in determining a household's decision to enroll children in secondary school. Similarly, the study also attempts to identify whether secondary education is considered a normal commodity or an inferior commodity among Pakistanis. For this purpose, we define six categories of income and consider it a categorical variable in our estimation. Furthermore, Pakistan's cultural values and behavior of people align with those of neighboring countries like India, Bangladesh, Sri Lanka, Nepal and Bhutan. So, the results of Pakistan can be generalized to these countries, which have a large proportion of the world population. This study will also be helpful for educational institutions to increase enrolment at the secondary level. The study proceeds as follows: After the introduction, literature review is provided in Section 2. The research focus and methodology are discussed in Section 3. Section 4 presents estimation results and discussion. Section 5, finally, concludes the study.

2. LITERATURE REVIEW

The pioneering studies focusing on human capital identify investment in education as the major factor of higher production (Schultz, 1961). Mincer (1958) identified differences in training of labor force participants the major factor of differences in personal income distribution. Becker (1962) considered schooling and on job training the

main factors of determining the wage of an individual. Furthermore, Becker (1964) accounted the impact of varying cultures and political regimes and showed that education and skills positively affect the earnings. These studies explored the role of education in economic growth. Hence, the developing countries started formulating policies to increase the education level during 1970s. These policies required understanding the determinants of social demand for education. Psacharopoulos (1982) utilized the individual data of lower secondary students and showed that socioeconomic characteristics such as age, family income, school grades and school type have a significant impact on the decision to enroll in upper secondary education. Kodde (1986) showed that demand for education increases with increase in risk for future earnings.

Stiglitz (1974) tried to determine the equilibrium level of education under private, public and mixed systems by considering education a public consumption commodity, private consumption commodity, private capital. He found that equilibrium level did not occur on efficient provision level. In public provision, the education was found to be undersupplied and in private system there were excessive expenditures on education. Bishop (1977) showed that expanding student aid program, relaxing admission policies and increasing the number of public colleges in areas where they did not previously exist, could increase the enrollment.

Khattak, Khan, Khan, and Tariq (2012) attempted to identify the household characteristics affecting the demand for higher education in the province of Khyber Pakhtunkhwa, Pakistan. They found that age of person, being married, access to institutions, parental education, awareness and family income are the major determinants of higher education. Similarly, Hamid (1993) analyzed the determinants of schooling in urban areas of Pakistan. She showed that income of household, head's occupation, head's education, periodicity of head's earning and household dominated by a male play important role in child's schooling. Furthermore, economically constrained parents from Pakistan and India tend to favor male education (Aslam & Atherton, 2014). Because, male children live with their parents and participate in family income after completing their education. Whereas, females are expected to leave the house of parents after marriage and don't contribute into the family income of their parents.

Lioyd et al. (2005) found that provision of a public school in village significantly affects household's decision to enroll female child in primary school. However, addition of a primary school in a village that already has a public school does not have significant impact on enrolment. Khan and Ali (2003) showed the existence of gender parity in schooling of children. The education of household head positively affects the schooling decision of children. However, mother's education has higher positive impact on schooling of children. Children from larger families are more likely to attend school but the sibling size decreases the chances of attending school.

Burney and Irfan (1991) studied the impact of parental characteristics and supply of schools on enrolment of children in Pakistan. They showed that household total income, parental education and land ownership have a positive impact on household's decision to invest in human capital. Idrees and Khan (2020) provided empirical analysis of socio-economic factors in demand for education at household level. They considered a categorical dependent variable comprising the ratio of enrolment at household level. They showed that head's education, educated earners and male proportion in household have a positive impact on demand for education at household level.

Baluch and Shahid (2008) attempted to analyze the determinants of enrollment in primary school in Lahore, Pakistan. The logit estimates of primary data showed that family size, expenditure on education, dwelling ownership, literacy ration and dependency ration of household have positive effect on the decision to enroll child in primary. They showed that access to school did not play significant effect on child's attending the school.

Hashmi, Zafar, and Ahmad (2008) attempted to identify the determinants of educational attainment for rural girls of Jhang, Pakistan. They showed that parental higher education, distance from school, residential status of household, gender biased behavior of head and attitude of head towards female education play positive effect in attainment of female education.

Lodhi, Tsegai, and Gerber (2011) analyzed the determinants of child's participation in education and different activities such as secular schooling, religious education, child labor, a combination of child labor and secular schooling, and inactivity (including leisure). They showed that parental perception significantly affects the engagement of child in secular schooling, religious education and child labor. Furthermore, female children were more likely to engage in child labor and low probability to engage in secular schooling in rural areas. Similarly, parents were more likely to send male children to school as compared to female children.

Safarzyńska (2013) examined the socio-economic determinants of demand for private tutoring in Poland by utilizing samples of secondary school students from national survey data of PISA. She found that decision of parents to demand for private tutoring is sensitive to student's gender.

Liu and Bray (2020) analyzed the determinants of demand for private tutoring in China. They utilized national survey data of China Family Panel Studies and employed Hurdle model to examine the factors shaping a household's decision. They found that there aren't significant gender differences in the demand for private tutoring. Household income, urban region, parental education and expected future education level of student have significant positive effect.

Different studies used various methods to measure the demand. Idrees and Khan (2020) used a different measure as compared to earlier studies by taking the proportion of school going members to total number of school age members. They analyzed the socio-economic factors determining the demand for schooling at household level by taking the percentage of members enrolled in school or have attained a specific schooling. They categorized households into five categories depending on the percentage of children having demand for education and employed multinomial logit estimation. However, modeling of demand in this manner has limited practical implication in which a household may choose between selecting a specific proportion of its school age member to get education. Although, gender bias may exist in a household when it comes to educating its children.

The literature has mainly focused on overall effect of household income on the decision to enroll children at school. The decision to enroll children at secondary school by households of different income groups has remained neglected largely. Clearly, there is a significant difference for demand of secondary schooling by poor and rich households. Therefore, this study will analyze the factors affecting demand for secondary school for households from different income groups.

3. RESEARCH FOCUS AND METHODOLOGY

3.1. Research Question

The present study measures the demand for secondary schooling by observing the revealed behavior of households. If a household had enrolled its secondary school-going-age member into secondary school or he/she had attained secondary schooling, then the household is considered to have demand for secondary schooling. This study addresses two questions;

1) Do households consider secondary schooling as a normal commodity?
2) How does female headship affect a household's demand for secondary schooling?
3) How these characteristics have different effect across income groups?

We focus on demographic characteristics as well as supply side characteristics.

3.2. Data Source

In this study, the data of Pakistan Social and Living Standard Measurement (PSLM) Survey 2019-20 has been utilized. PSLM has been designed to provide information on social and economic indicators at provincial and district levels. PSLM was used for the monitoring of six out of sixteen targets and 15 out of 17 indicators of the Millennium Development Goals (MDGs) adopted by Pakistan. However, after the introduction of Sustainable Development Goals (SDGs) by the United Nations, the PSLM is being used for monitoring the SDGs.

PSLM covers all urban and rural areas of Pakistan. It provides information on education, health, access to basic services and income and expenditure at the individual as well as household level. It had adopted two-stage stratified sample design for the collection of data. The survey covered 876,355 individuals out of 160,654 households from across Pakistan. The survey took villages and enumeration blocks in urban as well as rural areas as Primary Sampling Units (PSUs). Furthermore, the Probability Proportional to Size (PPS) method was used for selection of sample PSUs from strata. The survey considered households in the sample PSUs as Secondary Sampling Units (SSUs). Further, 16 households from rural PSUs and 12 households from urban PSUs were selected using systematic sampling technique with a random start. The collection of data for PSLM 2019-20 started in October 2019 and was completed in March 2020.

The current study is an attempt to explore the role of socio-economic factors in shaping the decision of households to enroll children in secondary school (ten years of education). Specifically, the effect of household's region, head's education, mother's education, average education of elders, distance from school, gender of head, age of head, proportion of male members in household and income group of households will be analyzed. Further, the study divides the households according to the income group to which they belong. Then we analyze the effect of these variables to better understand their impact on each income category.

For the said purpose, a total of 76,695 households with at least one member of age between 13 and 20 years were selected from the PSLM 2019-20 survey. This age bracket was identified as "secondary school age" after analyzing the PSLM data. The data revealed that around 97.4% of children who were enrolled in secondary school belonged to this age bracket. Furthermore, the household was considered to have demand for secondary if it had enrolled at least one member of target age group in secondary class.

Table 2. Distribution of income groups.

Group number	Income group name	Income range	Average exchange rate=155.6	Yearly income
1	Lower lower	<$1.25	<194.5	<70,020
2	Lower	<$1.25-$2	194.5-311.5	70,020-112,140
3	Lower middle	$2 -$4	311.2-622.4	112,140-224,064
4	Middle middle	$4-$10	622.4-1,556	224,064-560,160
5	Upper middle	$10-$20	1,556-3,112	560,160-1,120,320
6	Upper	>$20	3,112>	1,120,320>

Durr-e-Nayab (2011) has estimated middle income class for Pakistan. Current study utilizes the income classes defined in the said study. Average exchange rate for the period of October 2019 to March 2020, when the field enumeration of PSLM was carried out, was utilized for conversion of US$ into Pak Rupee. The income groups from lower income to high income have been classified as in Table 3.

3.3. Estimation

This study depends upon the social demand model which is based on individual demand for education. This approach emphasizes more on demographic projections than any other model (Psacharopoulos, 1987). Therefore, we employ different demographic variables and analyze their impact on demand for secondary schooling. To answer our research questions, we employ logit estimation as our dependent variable takes the form of dichotomous variable having values of 0 and 1. Following econometric model has been identified involving household as well as community level variables.

$$Y_i = \beta_0 + \beta_i X_i + \mu_i \qquad (1)$$

Where: Y_i is the vector of dummy dependent variable with Y_i= 1 if household demands for secondary schooling, 0 otherwise

and X_i is the vector of independent variables. These variables include urban region, household size, male proportion of target age group, head's education, mother's education, education of elders, distance from school, female head, age of head, age of head 40 plus and income groups. These variables are defined as follows;

$Urban\ Region_i$= 1 if household lives in urban region, 0 otherwise

Household Size_i = Total Number of members in household

$MaleProp_i$ =Total number of male members of target age group divided by household size

Head'sEducation_i = Household head's highest level of education obtained (years of schooling)

$\text{Mother'sEducation}_i$ = Highest level of education obtained by head's spouse

$Education\ of Elders_i$ = Average of highest level of education obtained by members of age above 20 years

$\text{Distance from School}_i$ = Category for distance of house from secondary school (1, 2, 3, 4, 5) were

1= 0-0.5 km

2= 0.5-1 km

3=1-2 km

4= 2-5 km

5= 5 km>

Female Head_i = 1 if head of household is a female, 0 otherwise

$Age\ of\ Head_i$= Age of household head in years at the time of survey

$Age\ of\ Head40Plus_i$= 1 if age of head is 40 years plus, 0 otherwise

$IncomeGroup_i$= Income group of households (1, 2, 3, 4, 5 or 6) as defined in Table 6.

μ_i= Error term

Our dependent variable is a dummy, and this type of specification for dependent variable poses two major problems. First, predicted values of the dependent variable through OLS, which represent the probability of a household to demand education, may exceed the probability limit of 0-1. Thus, leaving the meaningless interpretation of the predicted values. Second, due to the dichotomous values of the dependent variable, variance-covariance matrix of the error term may no longer remain an identity matrix, thus creating a problem of heteroscedasticity.

To handle these problems, we employ the maximum likelihood estimation method to estimate the parameters involved. As the maximum likelihood ensures the bounded values of probability to lie in the 0-1 range, it also ensures the asymptotic efficiency and consistency of the parameters. Therefore, following Pohlmann and Leitner (2003) we transform our model into logit specification. So, our dependent variable in logit specification takes the form of Equation 2.

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_i X_i + \mu_i \qquad (2)$$

Here $P_i$can be represented as follows

$$P_i = E(Y = 1|X_i) = \frac{1}{1+e^{-(\beta_0+\beta_i X_i)}} \qquad (3)$$

The term in parenthesis in Equation 2 is simply log of odds ratio in favor of secondary or the ratio of probability of having demand for secondary to the probability that it will not have demand. The variable X_i in Equation 3 is the vector of all independent variables and the coefficient β_i is the vector of all independent variables involved in Equation 2. But in our analyses, we are interested in finding out the marginal effect of any explanatory variable. This marginal effect can be computed by differentiating the Equation 3 with respect toX_i.

$$\frac{\partial P}{\partial X_i} = \beta_i(1-P)P \qquad (4)$$

Here β_i is the vector for maximum likelihood estimates of explanatory variables through logit estimation.

For model evaluation, the study will first check the overall significance of each model. Hosmer and Lemshow (2000) has suggested Likelihood Ratio (LR) test for testing significance of multiple logistic regression models. The test can be performed through Equation 5.

$$G = -2\ln[\frac{(likelihood\ without\ variable)}{(likelihood\ with\ variable)}] \quad (5)$$

The statistic G has a Chi-square distribution. The P-value for the test can be given by $P[\chi^2(d.f) > G] = P$. The null hypothesis in LR test assumes that all coefficients are equal to zero. The rejection of null hypothesis will show that at least one coefficient of the model is non-zero.

Furthermore, in order to test the significance of individual coefficients in models, we employ Wald test. The Wald-test is given by Equation 6. The statistics under Wald test follow normal distribution with a null hypothesis that the individual coefficient is equal to zero.

$$W_j = \hat{\beta}_j / \widehat{SE}(\hat{\beta}_j) \quad (6)$$

However, it is also accepted fact that in practice, model choice mainly depends on subject matter information and purpose of the analysis. Model selection solely based on statistical rules is rare (Chakrabarti & Ghosh, 2011). Therefore, we will be combining the model selection criteria of BIC with our domain knowledge and prior literature.

Furthermore, the model selection will be based on Pseudo R-square. Hemmert, Schons, Wieseke, and Schimmelpfennig (2018) has proposed to evaluate the models in categorical dependent variable regression by comparing their Pseudo R-squares. We will also base our model selection on Pseudo R-square.

Table 4. Summary statistics of variables involved.

Variable	Total number	Mean	Standard deviation
Number of observations	76,695		
Urban region	22,923		
Household size	76,695	6.4	2.79
Household head's education	39,867	8.8	3.37
Mother's education	19,062	8.4	3.28
Education of elders (Average)	49,836	8.7	2.99
Distance from school	27,120	2.94	1.33
Female head	6,850		
Age of head	76,589	47.41	11.86
Age of head 40 plus	61,109		
Male proportion of target age group in household	76,695	0.1724	0.1498
Income group 1 (Lower lower income)	47,919		
2 (Lower income)	15,841		
3 (Lower middle income)	9,994		
4 (Middle middle income)	2,480		
5 (Upper middle income)	337		
6 (Upper income)	110		

3.4. Summary Statistics

This study intends to analyze the effect of socio-economic variables on the demand for secondary education. Before proceeding towards the results, it is better to explore the variables in order to have a better understanding of preliminary behavior of the variables. Table 4 presents the summary of statistics for variables involved in the study.

Out of the sample of 76,695, around 30% (22,923) households belonged to urban regions. A typical household consisted of 6.4 members on average. A total of 39,867 households reported to have head with some level of education, averaging 8.8 years with a standard deviation of 3.37. Similarly, 19,062 households had mothers with some level of education averaging 8.4 years of schooling. There are 49,836 households in which elders have gained

some schooling with an average of 8.7 years. The distance from secondary school for 27,120 households averaged in the range of 1-2 kilometers. Out of the sample, 6,850 households had a female head. The age of the head averaged 47.41 years for 76,589 households, whereas there were 61,109 (79.8%) households with a head having age of above 40 years. On average, there were 17.24% males in the target age group in a household. Households in higher income-group usually have more tendency to educate their children. This is clear from Table 5 as the proportion of households having demand for secondary schooling is increasing with income level. On the other hand, the proportion of households not demanding secondary education is decreasing for successive income group.

Table 5. Distribution of households having demand for secondary schooling (Percent).

Income group	Demand	Don't demand
Group 1	38.6	61.4
Group 2	53.5	46.5
Group 3	63.5	36.5
Group 4	71.9	28.1
Group 5	73.6	26.4
Group 6	74.5	25.5

Majority of households in Pakistan are headed by males. Only a small proportion of households is run by female heads. Table 6 presents the proportion of households headed by females.

Table 6. Distribution of households by gender of head (Percent).

Income group	Female head	Male head
Group 1	5.62	56.84
Group 2	1.81	18.87
Group 3	1.18	11.87
Group 4	0.29	2.95
Group 5	0.04	0.40
Group 6	0.01	0.13

The correlation matrix of independent variables is provided in Table 7. A majority of variables have significant association with each other. Only the variable of distance from school has insignificant correlation with income groups, household head's education, mother's education and education of elders. Similarly, female head has insignificant with income groups and average education of elders.

Table 7. Correlation matrix of independent variables.

Sr. #	Variable	1	2	3	4	5	6	7	8	9	10	11
1	Income groups	1										
2	Urban region	0.183 (0.000)	1									
3	Household size	-0.222 (0.000)	-0.088 (0.000)	1								
4	Male proportion of target age group in household	0.083 (0.000)	0.027 (0.000)	-0.180 (0.000)	1							
5	Household head's education	0.320 (0.000)	0.190 (0.000)	-0.055 (0.000)	0.016 (0.002)	1						
6	Mother's education	0.328 (0.000)	0.256 (0.000)	-0.110 (0.000)	0.035 (0.000)	0.445 (0.000)	1					
7	Education of elders (Average)	0.321 (0.000)	0.190 (0.000)	-0.056 (0.000)	0.008 (0.071)	0.882 (0.000)	0.786 (0.000)	1				
8	Distance from school	0.005 (0.417)	-0.182 (0.000)	0.012 (0.048)	0.033 (0.000)	-0.002 (0.767)	0.011 (0.273)	-0.002 (0.794)	1			
9	Female head	-0.001 (0.690)	-0.033 (0.000)	-0.128 (0.000)	0.049 (0.000)	-0.051 (0.000)	0.020 (0.005)	-0.001 (0.797)	-0.025 (0.000)	1		
10	Age of head	0.080 (0.000)	0.012 (0.001)	0.227 (0.000)	-0.011 (0.003)	0.019 (0.000)	0.056 (0.000)	0.045 (0.000)	0.004 (0.536)	-0.058 (0.000)	1	
11	Age of head 40 plus	0.079 (0.000)	0.050 (0.000)	0.144 (0.000)	0.082 (0.000)	0.060 (0.000)	0.089 (0.000)	0.068 (0.000)	-0.019 (0.002)	-0.051 (0.000)	0.700 (0.000)	1

Note: P-values in parenthesis.

4. RESULTS AND DISCUSSIONS

This section presents the results of estimations based on the methodology defined in Section 3. We have presented the marginal effects of the logit estimates for ease of interpretation. For model building, study uses purposeful selection of variables, as proposed by Bursac, Gauss, Williams, and Hosmer (2008), instead of step wise deterministic method of model building. As the deterministic method of model selection is useful in cases where outcomes being studied are relatively new and important covariates are not well understood. However, in the case of demand for secondary schooling, there are multiple studies that have outlined important covariates involved at household level. A total of five models were estimated to analyze the demand for secondary education. We employed LR test and Wald test for selection of final model.

4.1. Model Selection and Analysis

The first model contained income group, urban region, household size, male proportion of target age group members, head's education, mother's education, distance from school, female head and age of head. The probability value for the LR test is given by prob>Chi2 in Table 8. The LR test reveals that the null hypothesis of all coefficients being equal to zero has been rejected as the prob>Chi2 is less than our significance level of 0.05. Therefore, we reject the null hypothesis and conclude that at least one variable has a non-zero coefficient. In order to identify insignificant variables, we employ the Wald test on each coefficient. The variables that have insignificant coefficients will be dropped to avoid overfitting in our model. The probability value for the Wald test is provided in parenthesis for each coefficient in Table 8.

It may be noted that the coefficients of income groups 4, 5 and 6 are insignificant. However, this is our main variable, and we don't drop it from our models. Among other variables, urban region, distance from school, and female head are insignificant as their P-value for the Wald test is greater than our significance level of 0.05. Therefore, we fail to reject our null hypothesis of the coefficient of these variables being equal to zero. The Pseudo R-square, represented by Pseudo R2 in Table 8, has a value of 0.087 in Model 1.

In Model 2, we drop household size as it has a negligible coefficient value and retaining it may result in overfitting the model. Additionally, Ravallion and Wodon (2000) have also shown the insignificant impact of household size on demand for education. Furthermore, household head's education has a very small coefficient; therefore, we drop it from our model but retain mother's education. The LR test revealed that the model is significant at a significance level of 0.05, as the value of prob>Chi2 is less than the significance level of 0.05. Therefore, we conclude that at least one variable in Model 2 is significantly different from zero. Individual coefficients have been tested by applying the Wald test. It may be noted that income categories higher than lower middle income are insignificant. Similarly, urban region and distance from school are also insignificant. The value of Pseudo R-square has declined to 0.077, showing a lesser fitness of the model with the data.

In Model 3, the study introduces additional variables, 'Average Education of Elders' and 'Head's Education', and drops female head. The variable of head's age has been replaced with age of head 40 plus. The overall model is significant at a significance level of 0.05. However, head's education has become insignificant. The variable of head's age 40 plus is significant. The Pseudo R-square has shown improvement and reached 0.087.

Model 4 drops the head's education, which was insignificant in the earlier model. It includes the variable of female head dropped earlier. The results show that the overall model is significant, and all the variables, except income group of upper income, are significant. However, the goodness of fit has declined from 0.087 to 0.08. Therefore, we try another model to see if it reduces the overfit of Model 4.

Model 5 eliminates the variable 'Distance from School' as the correlation of this variable with five out of 11 variables in the correlation matrix is insignificant. The result shows that the overall model is significant. The coefficients of all variables, except the income group of upper income, are significant. Furthermore, the goodness of

fit represented by Pseudo R-square has also improved from 0.08 to 0.13. This shows that this model is a better fit for our data as compared to earlier models. Therefore, we will use this model for interpretation.

Table 8. Results of logit estimation of demand for secondary schooling (Marginal effects).

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Income groups relative to group 1 (Lower lower income)					
2 (Lower income)	0.019 (0.033)	0.020 (0.013)	0.027 (0.000)	0.025 (0.000)	0.038 (0.000)
3 (Lower middle income)	0.025 (0.011)	0.024 (0.011)	0.037 (0.000)	0.038 (0.000)	0.072 (0.000)
4 (Middle middle income)	0.019 (0.249)	0.024 (0.114)	0.050 (0.000)	0.050 (0.000)	0.097 (0.000)
5 (Upper middle income)	0.047 (0.160)	0.050 (0.146)	0.053 (0.097)	0.062 (0.047)	0.121 (0.000)
6 (Upper income)	-0.051 (0.493)	-0.051 (0.505)	-0.026 (0.697)	-0.002 (0.744)	0.095 (0.065)
Urban region	-0.006 (0.425)	-0.005 (0.482)	0.020 (0.000)	0.024 (0.000)	0.077 (0.000)
Male proportion of target age group members	0.341 (0.000)	0.332 (0.000)	0.415 (0.000)	0.439 (0.000)	0.632 (0.000)
Head's education	0.006 (0.000)		0.002 (0.152)		
Mother's education	0.006 (0.000)	0.009 (0.000)			
Education of elders (Average)			0.012 (0.000)	0.016 (0.000)	0.040 (0.000)
Distance from school	-0.004 (0.176)	-0.004 (0.101)	-0.009 (0.000)	-0.010 (0.000)	
Female head	0.033 (0.180)	-0.032 (0.029)		0.067 (0.000)	0.097 (0.000)
Age of head	0.006 (0.000)	0.005 (0.000)			
Age of head 40 plus			0.119 (0.000)	0.107 (0.000)	0.180 (0.000)
Household size	0.010 (0.000)				
Number of observations	8173	9251	17358	20877	49790
LR chi2	514.0	530.6	1335.6	1527.3	8654.3
Prob>Chi2	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.087	0.077	0.087	0.080	0.128

Note: P>|z| in parenthesis.

Table 8 presents the marginal effects of independent variables on household's demand for secondary education. The results show that higher income levels significantly increase the demand for secondary schooling, which shows that secondary schooling is considered a normal commodity among households in Pakistan. The coefficient of income elasticity increases for successive income groups. This result validates our first research question about the normality of secondary schooling. On average, households from lower income group are 3.8 percent more likely to demand secondary schooling as compared to lower lower income group. The magnitude of the coefficient increases for successive income groups, with upper middle income households being 12 percent more likely to demand secondary schooling as compared to lower lower income group households. Households from lower-income groups have a higher opportunity cost of educating a child. In a country like Pakistan, where child labor is a common phenomenon, poor families put their children to work at an early age. If poor families choose to educate a child, they have to forgo the income earned by that child. On the other hand, rich families have lower opportunity cost for educating a child. Therefore, they tend to have higher demand as compared to poor families. These results are consistent with Hamid (1993) where she has shown poverty to be a detriment to school attainment.

Our second research question relates to the headship of female and its impact on the decision to demand secondary schooling. Literature has shown that households headed by females place more emphasize on the education of children as compared to households headed by males. Chudgar (2011) found that households headed by females tend to focus more on the education of children as compared to their counterparts. Our results also show that the likelihood of demand for secondary schooling is higher by 9.7 percent for households headed by females as compared to their counterparts. This may be the result of the non-bias behavior of female heads towards the education of female children. Similarly, young females, may also have better bargaining power in households headed by females which may increase the chances of demand for secondary education.

It can be observed that urban region has a significant positive effect on demand for secondary education. The results show that a household in an urban region is 7.7 percent more likely to demand secondary education as compared to a household in rural region. This may be the result of access to secondary schools in urban areas. Usually, there are more educational institutes in urban areas as compared to rural areas. Therefore, people in urban areas find it easier to enroll their children in school. Our result is in line with the expected outcome of a positive association between urban region and demand for secondary schooling. This result is also in line with Qureshi (2012) where they have shown a positive impact of urban region on demand for schooling.

In Pakistan, where male children are preferred due to their contribution to the household economy, it is expected that an increase in the male proportion of the target age group will lead to an increase in demand for secondary schooling. Atif et al. (2016). The results show that it has a strong positive and significant effect on household's demand for secondary education. The demand for secondary schooling increases by 63 percent with an increase of 100 percent in the male proportion of target age group members. This indicates that people place more weight on the education of male members as compared to female members. These findings are also supported by Qureshi (2012) who showed that being female decreases the likelihood of being enrolled at school.

Educated families tend to give higher weight to the education of their children. Our results show that the average education of elders increases the likelihood of demand for secondary schooling. With an average increase in one year of schooling for elders, the chances of demand for secondary school increase by 4 percent. This low impact may be due to the lower schooling years of elders. As indicated in the summary statistics, the average years spent in school by elders stood at 8.7. However, if they have obtained higher schooling, they might have motivated younger household members to enroll in school (Mukhopadhyay & Sahoo, 2016).

A household head's age also significantly affects the demand for secondary education. A household with a head of 40 years plus is 18 percent more likely to demand secondary schooling as compared to a household with a head below 40 years of age. With a higher age, it is possible that a head may be earning more. Therefore, they choose to educate their children. Similarly, higher age is also an indication of more experience in life. These results are also in line with Ullah and Hussain (2022) who have shown that age of household head has a positive relationship with demand for education.

4.2. Income Group Specific Analysis

In order to answer our third question, we further dive into analyzing the effect of household characteristics on demand for secondary. Here we have divided our sample into six groups according to the income groups defined earlier. We have employed Model 5 on these income groups as it avoids overfit to the data. Table 9 presents the results of logit estimations for each group. The LR test reveals that the models of all groups are significant at 0.05 level of significance. Furthermore, the Wald test also shows that majority of coefficients are significantly different from zero. Finally, the Pseudo R-square indicated by Pseudo R2 also has value greater than 0.1 which indicates that the models are good fit to the data.

Table 9. Logit estimates of income group specific demand for secondary (Marginal effects).

Variable	Lower lower income (1)	Lower income (2)	Lower middle income (3)	Middle middle income (4)	Upper middle income (5)	Upper income (6)
Urban region	0.078 (0.000)	0.081 (0.000)	0.067 (0.000)	0.058 (0.001)	0.139 (0.001)	-0.082 (0.351)
Male proportion of target age group	0.765 (0.000)	0.575 (0.000)	0.405 (0.000)	0.382 (0.000)	0.324 (0.031)	0.809 (0.011)
Education of elders (Average)	0.040 (0.000)	0.041 (0.000)	0.041 (0.000)	0.027 (0.000)	0.020 (0.001)	0.030 (0.018)
Female head	0.111 (0.000)	0.085 (0.000)	0.078 (0.000)	0.100 (0.005)	0.069 (0.436)	---
Age of head 40 plus	0.178 (0.000)	0.191 (0.000)	0.181 (0.000)	0.156 (0.000)	0.255 (0.000)	0.153 (0.146)
Number of observations	27530	11634	8105	2128	295	91
LR chi2	4025.1	1559.3	1174.8	242.1	52.9	16.0
Prob > Chi2	0.000	0.000	0.000	0.000	0.000	0.003
Pseudo R2	0.106	0.102	0.120	0.107	0.177	0.159

Note: --- variable omitted due to low observations.

It can be observed that urban region has significant effect on the decision of households belonging to all income groups except income group 6. The coefficient of urban region is having highest value for upper middle-income group. These results are supported by Qureshi (2012) where they have shown a positive impact of urban region on demand for schooling.

Male proportion of target age group in a household also has significant effect on the decision of households. It may be noted that income group 1 and 6 have the highest magnitude of coefficient. With an increase of 100 percent in male proportion of target age members, the households of income group 1 and 6 become 76% and 80% more likely, respectively, to demand for secondary schooling. On the other hand, the magnitude declines for income groups 2,3,4 and 5. This may be the result of high priority given to the education of boys as compare to education of girls. The lowest income group may choose to prefer education of boys over education of girls due to former's contribution in household income even after getting married. Whereas, females leave the house of parents after marriage and don't contribute in the income of family. Therefore, while making choice between educating a boy or a girl, parents prefer boys. However, the reason of preference for education of boys among high income families may need to be explored. These results are also supported by Qureshi (2012).

Average education of elders has a unique characteristic. It has significant positive effect in determining the decision of households from all income groups. However, the magnitude of coefficient is strong for first three income groups. This shows that having educated elders is more effective in increasing the likelihood to demand secondary schooling among households of income groups 1,2 and 3.

Having a female head also increases the likelihood of household's demand for secondary education. However, its effect on decision of households from income groups 5 is insignificant. As indicated in Table 6, majority of households have males as their head. Female heads are very rare and are found mostly among households of lower income group. This may indicate that females don't become head of household by choice. They may become head if there is no male member in the household. This situation may be a representative of tough time for that household. Therefore, females from lower income groups choose to educate their children so that their miseries and hardships may end after getting education.

Age of head above forty years has strong positive effect on the decision of households from all income groups except income group 6. This may show that heads who are over forty years of age are more cognizant of importance of secondary education. This result is also supported by our earlier estimates and with Ullah and Hussain (2022).

5. CONCLUSION

All United Nations member states adopted the Sustainable Development Goals in 2015. Target 4.1 of the SDGs aims to provide free, equitable and quality primary and secondary education for all boys and girls. However, Pakistan is lagging far behind in ensuring the completion of secondary education for its population. This study attempted to explore the role of different socio-economic variables in determining a household's decision to enroll its members in secondary school. The results show that the urban region, education level of elders in household, having a female head, having a mature head, distance from secondary school and male proportion of the target age group increase the likelihood of having demand for secondary education in a household. Furthermore, the results also reveal that secondary education is considered a normal commodity among Pakistani households, as its demand increases with a rise in household income. In light of these results, it is recommended that policies targeting lower income-groups may be introduced to increase the enrollment at the secondary education level. In this regard, the policy of mid-day meal adopted in India may also be adopted in Pakistan. The adoption of such a policy will not only increase enrollment, but it will also mitigate classroom hunger. Similarly, policies may be introduced to increase the education profile of females, which will also increase secondary enrolment. Mature heads tend to have demand for secondary education. However, there is a need to introduce policies which may increase awareness of secondary education among heads of below 40 years of age.

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