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The Economic Returns to Schooling in Gilgit-Baltistan: Evidence on the Impact of Years of Education on Household Income.

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	Abstract
<p>Muhammad Bilal MPhil Economics, Department of Economics, Division of Social Sciences, University of Education, Lahore, Punjab, Pakistan. Email: bilalboto612@gmail.com</p> <p>Hafiza Sumbal Amir MPhil Economics, Department of Economics, Division of Social Sciences, University of Education, Lahore, Punjab, Pakistan. Email: sumbalamir123@gmail.com</p> <p>Mehdi Hassan MPhil Economics, School of Economics, Quaid-e-Azam Campus, University of the Punjab, Lahore, Pakistan Email hassanireal6@gmail.com</p> <p>Muhammad Bilal Goundel* Speech and Language Pathologist, CLC Learning Institute, Lahore, Punjab, Pakistan Email: muhammad.bilal5603@hotmail.com</p>	<p>This study examines the economic returns to schooling in Gilgit-Baltistan by analyzing the impact of years of education on household income. Adopting a quantitative, explanatory research design, primary data were collected from 327 households using a structured questionnaire administered through a simple purposive sampling technique. To ensure inclusivity, respondents who were unable to read the questionnaire were assisted through oral explanations in the local language. Household income, measured as total monthly income from all sources, was transformed into its natural logarithmic form to address skewness. Grounded in human capital theory and the Mincerian earnings framework, the study employs Ordinary Least Squares regression while controlling for key demographic, household, and employment-related factors. The findings reveal a strong and statistically significant positive relationship between years of schooling and household income, indicating that additional education substantially enhances household economic outcomes. The results further highlight the roles of age, household size, gender, employment status, and place of residence in shaping income levels. Overall, the study provides region-specific evidence to inform education and development policy in Gilgit-Baltistan.</p>
Keywords:	<i>Economic returns to schooling; Household income; Human capital; Education; Gilgit-Baltistan; Purposive sampling</i>



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Introduction

Education has long been recognized as a central driver of economic growth, individual productivity, and social mobility. Within the framework of human capital theory, schooling is viewed as an investment that enhances skills, knowledge, and competencies, which in turn increase labor market productivity and earnings potential (Becker, 1964). At the microeconomic level, education not only affects individual wages but also plays a critical role in shaping household income, consumption patterns, and overall economic well-being. As households often pool resources from multiple earners, the cumulative effect of educational attainment can substantially influence household-level income outcomes.

A substantial body of empirical literature documents positive returns to schooling in the form of higher earnings and improved employment prospects. Early seminal work by Mincer (1974) established a robust relationship between years of schooling and individual earnings, providing the foundation for countless studies across developed and developing economies. Subsequent research has consistently shown that each additional year of education is associated with a significant increase in income, although the magnitude of returns varies by country, labor market structure, and institutional context (Psacharopoulos & Patrinos, 2018). While much of this literature focuses on individual wages, there is growing recognition that household income represents a more comprehensive indicator of economic welfare, particularly in contexts where multiple household members contribute to total earnings.

In developing and middle-income countries, the relationship between schooling and household income is especially important due to persistent income inequality, labor market informality, and intergenerational poverty. Education is frequently promoted as a key policy instrument for poverty reduction and inclusive growth, as higher educational attainment improves access to better-paying and more stable employment opportunities (World Bank, 2018). At the household level, education can generate both direct and indirect income effects, including higher wages, improved occupational mobility, diversification of income sources, and greater resilience to economic shocks. These dynamics underscore the importance of examining returns to schooling beyond the individual and within the broader household context.

Despite extensive research on returns to education, gaps remain in understanding how years of schooling translate into household income gains, particularly when controlling for demographic and socioeconomic factors. Existing studies often rely on individual earnings as the primary outcome variable, which may underestimate the broader economic benefits of education accruing at the household level. Moreover, variations in household composition, labor force participation, and regional characteristics can mediate the schooling-income relationship, necessitating empirical analysis that explicitly accounts for these factors (Lam & Schoeni, 1993).

Against this backdrop, the present study investigates the economic returns to schooling by examining the impact of years of education on household income. Using quantitative household-level data and econometric analysis, the study aims to estimate the extent to which additional years of schooling contribute to higher household income, after controlling for key demographic and labor market characteristics. By focusing on household income rather than individual wages, this study provides a more holistic assessment of the economic benefits of education and contributes to the literature on human capital, income distribution, and education policy. The findings are expected to offer valuable insights for policymakers and stakeholders seeking to leverage educational investment as a tool for enhancing household welfare and promoting inclusive economic development. This study is significant as it provides region-specific empirical evidence on the economic returns to schooling in Gilgit-Baltistan, a geographically remote and socioeconomically marginalized region where educational access, labor market opportunities, and income generation remain structurally constrained. While education is widely promoted as a key mechanism for improving household welfare and reducing poverty, empirical evidence from Gilgit-Baltistan remains scarce, particularly at the household level. Most existing studies on returns to education are concentrated in urban or nationally aggregated contexts and primarily focus on individual wage outcomes, thereby overlooking the distinctive household income dynamics of mountainous and peripheral regions. Moreover, limited attention has been given to how years of schooling translate into household income gains in settings characterized by labor market informality, seasonal employment, and reliance on multiple income sources. By examining the impact of years of education on household income in Gilgit-Baltistan, this study addresses a critical empirical gap in the literature and contributes localized evidence to the broader human capital discourse. The findings are expected to inform regionally responsive education and development policies aimed at enhancing household economic resilience and reducing persistent income disparities in underdeveloped regions.

RESEARCH OBJECTIVES

- 1- To examine the relationship between years of schooling and household income in Gilgit-Baltistan.
- 2- To estimate the economic returns to schooling in terms of changes in household income associated with additional years of education in Gilgit-Baltistan.
- 3- To analyze the impact of years of schooling on household income after controlling for key demographic and socioeconomic characteristics of households in Gilgit-Baltistan.
- 4- To assess the extent to which differences in educational attainment contribute to variations in household income levels across households in Gilgit-Baltistan.

LITERATURE REVIEW

Education occupies a central position in economic theory as a key determinant of income, productivity, and long-term economic welfare. The dominant theoretical lens through which the relationship between education and income is examined is human capital theory, which conceptualizes schooling as an investment that enhances individuals' productive skills and competencies, thereby generating economic returns over time (Becker, 1964). From this perspective, years of schooling represent accumulated human capital that increases labor market efficiency and earning potential. While early theoretical formulations emphasized individual-level outcomes, subsequent research has increasingly acknowledged that the economic benefits of education extend to households, where income is pooled and shared among members.

The empirical foundation of returns-to-education research is largely derived from the Mincerian earnings function, which formalizes the relationship between years of schooling, labor market experience, and earnings (Mincer, 1974). This framework has been widely applied across different economic contexts and remains a benchmark model in labor and education economics. Empirical evidence consistently demonstrates that additional years of schooling are associated with higher income levels, although the magnitude of returns varies by region, institutional structure, and labor market conditions (Card, 1999; Heckman, Lochner, & Todd, 2006). These findings provide strong support for the proposition that education generates measurable economic benefits.

A substantial body of global empirical literature confirms the positive returns to schooling across both developed and developing economies. Psacharopoulos and Patrinos (2018), in their comprehensive review of global evidence, report that education continues to yield significant income returns despite changes in labor market dynamics and technological advancement. Their findings suggest that years of schooling remain a robust predictor of income, reinforcing the relevance of education as a tool for economic advancement. Similarly, Schultz (1961) emphasizes that investment in education contributes not only to individual income growth but also to broader economic development through improved productivity.



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While most empirical studies focus on individual earnings, there is growing recognition that household income provides a more comprehensive measure of economic well-being. Household-level income captures earnings from multiple members as well as non-wage sources such as self-employment, agriculture, and transfers, which are particularly important in developing regions (Deaton, 1997). Lam and Schoeni (1993) highlight the role of family background and educational attainment in shaping earnings outcomes, suggesting that education operates within a broader household context. These findings imply that estimating returns to schooling at the household level may better reflect the full economic benefits of education.

In developing economies, education is frequently promoted as a key policy instrument for poverty reduction and income mobility. The World Bank (2018) emphasizes that education enhances employability, income stability, and resilience to economic shocks, particularly among vulnerable households. Studies have shown that higher educational attainment improves access to formal-sector employment and higher-paying occupations, thereby increasing household income and reducing income volatility (Hanushek & Woessmann, 2008). These effects are especially relevant in regions characterized by labor market informality and limited employment opportunities.

Regional and contextual factors play a critical role in shaping the returns to schooling. Research indicates that returns to education can vary substantially across geographic areas due to differences in labor demand, infrastructure, and institutional capacity (Duflo, 2001; Rosenzweig & Wolpin, 2000). In remote and underdeveloped regions such as Gilgit-Baltistan, structural constraints including geographic isolation, seasonal employment, and limited industrial activity may influence how education translates into income gains. These contextual realities underscore the need for localized empirical studies that move beyond national averages.

Despite the extensive literature on returns to education, significant research gaps remain. Much of the existing evidence is based on national or urban-focused datasets and emphasizes individual wage returns, with limited attention to household income dynamics in marginalized regions. Moreover, few studies explicitly control for household-level demographic and socioeconomic factors when estimating schooling returns, potentially leading to biased estimates (Heckman et al., 2006). There is also limited empirical evidence from mountainous and peripheral regions, where household income structures differ markedly from those in urban labor markets.

Against this backdrop, the present study contributes to the literature by examining the economic returns to schooling at the household level in Gilgit-Baltistan. By focusing on years of education and their impact on household income while controlling for key demographic and socioeconomic characteristics, the study aligns with established human capital theory and empirical traditions (Becker, 1964; Mincer, 1974) while extending them to an under-researched regional context. In doing so, it provides localized, policy-relevant evidence that complements global findings on education and income (Psacharopoulos & Patrinos, 2018; World Bank, 2018) and addresses critical gaps in the existing literature.

Research Methodology

This study adopts a quantitative, explanatory research design to examine the economic returns to schooling in Gilgit-Baltistan, with a specific focus on the impact of years of education on household income. The selected population comprised 327 households, and a simple purposive sampling technique was employed for data collection. Primary data were gathered using a structured questionnaire covering demographic characteristics, educational attainment, employment status, and household income. For respondents who were unable to read or fully understand the questionnaire, the researcher orally explained each question in the local language and recorded their responses accordingly. This approach ensured inclusivity, improved response accuracy, and minimized comprehension-related bias. The household served as the unit of analysis, with years of schooling measured as the total completed years of formal education of the household head. Household income was measured as total monthly income from all sources and transformed into its natural logarithmic form to address skewness in the income distribution.

The empirical analysis was conducted using Ordinary Least Squares regression based on a log-linear model grounded in human capital theory and the Mincerian earnings framework. Years of schooling were included as the key explanatory variable, while control variables such as age of the household head, household size, gender, employment characteristics, and place of residence were incorporated to isolate the effect of education on household income. Data analysis was performed using SPSS, employing descriptive statistics and multivariate regression analysis with robust standard errors to ensure the reliability of the estimates. Ethical considerations were strictly observed throughout the study; informed consent was obtained from all participants prior to data collection, and confidentiality and anonymity of respondents were fully ensured. Participation was voluntary, and respondents were informed of their right to withdraw at any stage without any consequences.

Table 1 Demographic Characteristics of the Sample Households (N = 327)

Variable	Category	Frequency (n)	Percentage (%)
Gender of Household Head	Male	247	75.6
	Female	80	24.4
Age of Household Head (Years)	25–34	62	18.9
	35–44	100	30.7
	45–54	106	32.3
	55 and above	59	18.1
Education Level of Household Head	No formal education	46	14.1
	Primary (1–5 years)	58	17.7
	Middle (6–8 years)	52	15.9
	Secondary (9–10 years)	64	19.6
	F.A	45	13.8
	B.A	25	7.6
	M.A	20	6.1
M.Phil	10	3.1	



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Variable	Category	Frequency (n)	Percentage (%)
Place of Residence	PhD	7	2.1
	Urban	126	38.6
	Rural	201	61.4
Household Size	1–4 members	75	22.8
	5–7 members	162	49.6
	8 or more members	90	27.6
Employment Status of Household Head	Employed	175	53.5
	Self-employed	106	32.3
	Unemployed/Inactive	46	14.2

Table 1 presents the demographic characteristics of the sample households included in the study. The majority of household heads were male, indicating a male-dominated household leadership structure in the study area, while a smaller proportion of households were headed by females. In terms of age distribution, most household heads fell within the middle-age categories, particularly between 35 and 54 years, suggesting that economically active and experienced individuals constituted the largest share of the sample. This age composition is relevant for analyzing income outcomes, as earnings typically rise with experience up to a certain point in the life cycle.

Regarding educational attainment, the table shows considerable variation in years of schooling among household heads. While a notable proportion had no formal education or only primary and middle-level schooling, a substantial share had completed secondary and higher levels of education, including F.A, B.A, M.A, M.Phil, and PhD degrees. This wide educational spread provides a strong basis for examining differences in household income associated with varying levels of schooling. In terms of residential location, a larger proportion of households were located in rural areas, reflecting the predominantly rural nature of Gilgit-Baltistan. Household size was generally moderate to large, with most households comprising five to seven members, which has important implications for income distribution and dependency burdens.

Finally, the employment status of household heads indicates that more than half were employed, followed by a sizeable proportion engaged in self-employment, while a smaller share was unemployed or economically inactive. Overall, the demographic profile presented in Table 1 highlights substantial heterogeneity in age, education, residence, household size, and employment status, all of which are important control factors in assessing the economic returns to schooling in Gilgit-Baltistan.

Table 2 Descriptive Statistics of Key Variables (N = 327)

Variable	Minimum	Maximum	Mean	Std. Deviation
Years of Schooling (Household Head)	0	20	8.42	5.67
Household Monthly Income (PKR)	18,000	220,000	64,850	32,740
Log Household Income	9.80	12.30	10.94	0.56
Age of Household Head (Years)	25	68	44.6	9.8
Household Size	2	12	6.1	2.3

Table 2 reports descriptive statistics for the key continuous variables used in the empirical analysis. On average, household heads completed approximately eight years of schooling, indicating moderate educational attainment with substantial variation across households. Household income shows wide dispersion, reflecting heterogeneity in economic conditions in Gilgit-Baltistan. The natural logarithm of household income is therefore used in the regression analysis to address skewness and improve estimation efficiency. The mean age suggests a predominantly economically active population, while household size remains relatively large, consistent with regional socio-cultural norms.

Table 3 Distribution of Educational Attainment of Household Heads (N = 327)

Education Level	Frequency (n)	Percentage (%)
No Formal Education	46	14.1
Primary (1–5 years)	58	17.7
Middle (6–8 years)	52	15.9
Secondary (9–10 years)	64	19.6
F.A	45	13.8



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Education Level	Frequency (n)	Percentage (%)
B.A	25	7.6
M.A	20	6.1
M.Phil	10	3.1
PhD	7	2.1
Total	327	100.0

Table 3 presents the distribution of educational attainment among household heads. While a sizable proportion of respondents have no formal or only primary-level education, a substantial share has completed secondary and post-secondary education. The presence of higher education categories such as M.A, M.Phil, and PhD indicates meaningful educational diversity within the sample. This variation strengthens the empirical basis for estimating differential income outcomes associated with years of schooling.

Table 4 Correlation Matrix of Core Variables (N = 327)

Variable	Years of Schooling	Log Household Income	Age	Household Size
Years of Schooling	1			
Log Household Income	0.58	1		
Age	0.21	0.26	1	
Household Size	-0.31	-0.36	0.12	1

Table 4 reports the pairwise correlations among key variables. Years of schooling exhibit a strong and statistically significant positive correlation with household income, providing preliminary support for human capital theory. Household size is negatively correlated with income, suggesting higher dependency burdens in larger households. The moderate correlation coefficients indicate no serious multicollinearity concerns, supporting the suitability of the variables for regression analysis.

Table 5 OLS Regression Results: Impact of Years of Schooling on Household Income (N = 327)

Dependent Variable: Log Household Monthly Income

Variable	Coefficient	Std. Error	t-value	Sig.
Years of Schooling	0.082	0.011	7.45	0.000
Age of Household Head	0.019	0.006	3.17	0.002
Age Squared	-0.0002	0.000	-2.41	0.016
Household Size	-0.037	0.009	-4.11	0.000
Gender (Male = 1)	0.126	0.041	3.07	0.002
Employment Status (Employed = 1)	0.214	0.038	5.63	0.000
Place of Residence (Urban = 1)	0.173	0.036	4.81	0.000
Constant	8.92	0.31	28.77	0.000

Model Statistics:

$R^2 = 0.52$

Adjusted $R^2 = 0.50$

F-statistic = 46.3 ($p < 0.001$)

Table 5 presents the OLS regression estimates examining the effect of schooling on household income. Years of schooling have a positive and highly significant impact on income, indicating that each additional year of education increases household income by approximately 8.2 percent, holding other factors constant. Age exhibits a concave relationship with income, reflecting diminishing returns to experience at older ages. Household size negatively affects income, while male household heads, employment, and urban residence significantly increase household earnings. Overall, the model explains a substantial proportion of income variation.



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Table 6 Robustness Check: Alternative Schooling Specification (N = 327)

Dependent Variable: Log Household Monthly Income

Variable	Coefficient	Std. Error	Sig.
Highest Years of Schooling in Household	0.069	0.013	0.000
Control Variables	Included		
R ²	0.51		

Table 6 reports a robustness check using an alternative measure of education, namely the highest years of schooling attained within the household. The coefficient remains positive and statistically significant, confirming that the positive relationship between education and household income is robust to alternative specifications. The explanatory power of the model remains largely unchanged, reinforcing confidence in the main findings.

Summary

This study investigates the economic returns to schooling in Gilgit-Baltistan by examining the relationship between years of education and household income using a quantitative, explanatory approach. Primary data were collected from 327 households through a structured questionnaire, with oral explanations provided in the local language for respondents unable to read the instrument. Household income was measured as total monthly income and transformed into its natural logarithmic form to address skewness. The analysis was guided by human capital theory and the Mincerian earnings framework and employed Ordinary Least Squares regression while controlling for key demographic, household, and employment-related factors.

The results reveal a strong and statistically significant positive effect of years of schooling on household income, indicating that education substantially enhances economic outcomes in Gilgit-Baltistan. Additional findings show diminishing returns to experience at higher ages, a negative impact of larger household size on income, and higher earnings among male-headed, employed, and urban households. Overall, the study highlights the central role of education in improving household income and suggests that policies promoting educational access, employment opportunities, and regional equity can contribute to sustainable economic development in Gilgit-Baltistan.

Findings and Discussion

The findings of this study provide strong empirical evidence of a positive and statistically significant relationship between years of schooling and household income in Gilgit-Baltistan. The regression results indicate that each additional year of schooling of the household head leads to a meaningful increase in household income, even after controlling for demographic and household characteristics. This result is consistent with human capital theory, which argues that education enhances individuals' productivity, skills, and earning capacity, thereby translating into higher income levels (Becker, 1964; Schultz, 1961). The magnitude of the estimated return aligns with earlier evidence from developing regions, where education serves as a critical pathway for improving economic well-being and reducing poverty (Psacharopoulos & Patrinos, 2018).

The positive association between schooling and income also supports the Mincerian earnings framework, which posits a log-linear relationship between education and earnings (Mincer, 1974). In the context of Gilgit-Baltistan, this finding is particularly important, as limited industrialization and constrained labor markets mean that education often determines access to stable employment, government jobs, and non-agricultural income sources. The robustness of the schooling coefficient across alternative model specifications further confirms that education remains a key determinant of household income irrespective of how schooling is measured at the household level.

Age of the household head exhibits a positive effect on income, while the negative coefficient on age squared indicates diminishing returns to experience at older ages. This concave life-cycle earnings pattern is well documented in labor economics literature and reflects the accumulation of experience and skills up to a certain point, followed by declining productivity or labor force participation later in life (Heckman, Lochner, & Todd, 2006). The inclusion of both age and age squared strengthens the model by capturing this non-linear relationship and prevents overestimating the effect of education on income.

Household size is found to have a negative and statistically significant impact on household income, suggesting that larger households face higher dependency burdens. In regions such as Gilgit-Baltistan, where extended family systems are common, increases in household size may not be matched by proportional increases in income earners, thereby reducing average household economic resources. Similar negative effects of household size on income have been reported in studies focusing on rural and low-income settings (Deaton & Paxson, 1998).

The results also reveal significant structural disparities. Male-headed households earn higher incomes than female-headed households, reflecting gender-based inequalities in access to education, employment opportunities, and labor market rewards. This finding is consistent with previous evidence from South Asian and developing-country contexts, where socio-cultural constraints limit women's participation in higher-paying occupations (World Bank, 2020). Employment status and urban residence further emerge as strong predictors of household income, highlighting the role of stable employment and better access to markets, infrastructure, and services in enhancing the economic returns to education.

Overall, the findings suggest that while education significantly improves household income in Gilgit-Baltistan, its returns are shaped by demographic, household, and structural factors. Education alone is not sufficient; complementary policies aimed at employment generation, gender equity, and rural development are necessary to fully realize the income-enhancing potential of schooling. These results reinforce the importance of investing in education as part of a broader development strategy to promote inclusive and sustainable economic growth in the region.

Recommendations

Expand access to secondary and post-secondary education in Gilgit-Baltistan

Given the strong positive relationship between years of schooling and household income, government and regional authorities should prioritize expanding access to secondary, higher secondary, and tertiary education. Investments in school infrastructure, teacher recruitment, and scholarship programs can help increase educational attainment, particularly in remote and underserved areas, thereby enhancing long-term income prospects for households.



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Strengthen education-to-employment linkages

The significant income premium associated with employment status suggests the need for better alignment between education and labor market demand. Policymakers should promote technical and vocational education, career counseling, and skill-based training programs that equip educated individuals with market-relevant skills, facilitating the translation of schooling into stable and higher-paying employment.

Promote female education and labor market participation

The observed income gap between male-headed and female-headed households highlights persistent gender disparities. Targeted interventions, such as girls' education incentives, female scholarships, and safe employment opportunities for women, are essential to ensure that women can equally benefit from the economic returns to schooling.

Invest in rural education and economic infrastructure

Since urban households earn significantly higher incomes than rural households, policies should focus on reducing rural–urban disparities by improving access to quality education, transportation, digital connectivity, and local employment opportunities in rural areas. Such investments can increase the returns to schooling for rural households and reduce spatial income inequality.

Support adult education and lifelong learning initiatives

The concave age–income profile indicates diminishing returns to experience at older ages. Adult education, literacy programs, and skill-upgrading initiatives can help older household heads remain productive and economically active, thereby sustaining income growth over the life cycle.

Integrate family planning and social support programs with education policy

The negative effect of household size on income suggests that larger families face higher dependency burdens. Integrating family planning awareness and social protection programs with education initiatives can help households better manage resources and enhance the income benefits derived from education.

Encourage private sector participation in regional human capital development

Private sector involvement in training, apprenticeships, and internships can complement public education efforts. Partnerships between educational institutions and employers can improve job matching, reduce unemployment among educated individuals, and strengthen the economic impact of schooling.

Adopt a comprehensive, multi-sectoral development approach

While education significantly increases household income, the findings indicate that its returns are influenced by employment opportunities, gender, and location. Therefore, education policy should be implemented alongside labor market reforms, rural development strategies, and gender-inclusive economic policies to maximize the income-enhancing effects of schooling in Gilgit-Baltistan.

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