

Measuring Educational Returns and Productivity in Pakistan

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Abstract

Since the era of Adam Smith, education has been recognized as pivotal for economic growth and individual development; however, its effectiveness depends on aligning the quality of education with labor market demands. In Pakistan, policymakers must ensure that educated people do not increase the pool of the unemployed labor force while designing the policies for education expansion. The present study has estimated the returns to education in Pakistan using the labor force survey 2020-21. Study finds that education has a strong positive impact on earnings. It has been found that returns to education vary based on the level and type of education. Specialized fields like engineering, computer science, and medicine offer the highest returns, while fundamental and technical education at the primary, secondary, and intermediate levels portray relatively low or insignificant returns. The executives (756,917) and professionals (493,735) enjoy higher earnings, whereas agriculture workers (248,109) and unskilled workers (188,659) are at the bottom. Executives in Punjab earn the highest earning (807,988), followed by Sindh (722,349), Baluchistan (703,191), and KP (626,538). Professionals in Sindh earn the highest earning (581,120), followed by Baluchistan (565,595), Punjab (472,167), and KP (438,330).

Keywords: Education, Rate of Return, Labor Force.

Introduction

Education has been recognised as a factor in determining earning since classical economists (Adam Smith 1776; Marshall 1890). The value of education in labour have increased many folds and now education plays very fundamental role in labour markets of modern era (Li et al., 2024). The human capital theory recognizes education as an investment of present resources to get returns in future (Chiswick, 2003). Because on labour market workers get their wages based on knowledge, skill and competencies that have been acquired during their life (Black, et al. 2023). Like other investments, rate of return on investing in education is the wages and other financial benefits or earnings. Different studies conducted across various countries confirmed that well educated human capital earn higher and work in prestigious organizations in comparison to less educated labour force (Chevalier et al., 2004). Similarly, they also face less unemployment (Card, 1999; Altindag 2022).

Since, 1950's human capital theory has been used to estimate rate of returns in education. It asserts that investments in education increases future productivity. The earnings premium generated by education indicates that productivity is positively correlated with education. Therefore, people with high education gets higher earnings. However, it has been argued that well educated people get higher wages not because of their productivity, but higher education

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is a certificate that worker is likely to be more productive. Therefore, it has been a challenge for the policymaker to ensure quality of education along with quantity.

During 20th century expansion of education (200% increase in higher education enrolment worldwide) has been recognized as major societal change that has changed the entire development paradigm (Schofer & Meyer, 2005). However, labour markets in many regions are not able to develop in the same pace. Hence, supply of highly educated people increased but demand remains stagnant and highly educated younger cohorts face lower earnings in comparison to older counterparts (Haim et al., 2019). This situation referred as “Education Inflation” (Collin, 1979) or “Over Education” (Sicherman, 1991).

In Pakistan enrolment in higher education surged after the establishment of Higher Education Commission (HEC) in 2002. HEC has awarded many scholarships resultantly enrolment in higher education increased much more than in any other level of education. On the other hand, Pakistan is also facing a demographic transition, and has more young people, and it is expected that increase in young population will continue till 2050 (Najam & Bari, 2017). Education expansion coupled with demographic changes instead of yielding opportunities; created various problems. Because economic growth remains unsustainable with non-developed labour markets, so people are forced to adjust with jobs below their educational abilities (Sial et al., 2019).

Hence in Pakistan it becomes very crucial to analyse whether increase in human capital is yielding significant returns. It also ranking of returns to education at different categories and types of education will assist the policy makers in designing evidence-based education policy wherein they can promote that kind of education that is needed in our labour markets.

Literature Review

Zhang et al. (2005) calculated the rate of returns of education in China and found that rate of returns has increased from 4.7 in 1988 to 11.5% in 1999. Psacharopoulos, (1994) concluded that in 1990's world average rate returns rate was 10.1% and in Asia it was 9.6%. Later, Psacharopoulos and Patrinos's (2002) updated the results, and it emerged that world average rates are 10% whereas for Asia it is 9.5%. In a very recent study Patrinos and Psacharopoulos (2020) concluded that 9% may be considered as benchmark world average rate of return to education. Campos and Jolliffe (2003) concluded that in Hungary returns to schooling has increased to 11.2% in 1998 from 6.4 percent in 1986. Li et al. (2005) found that in rural China the return to education are 10%. Asadullah (2006) finds that rate of returns on education in Bangladesh was 7% and concluded that it increases with the level of education. Cheidvasser and Benitez-Silva (2007) are of the view that in Russia, returns to education are very low i.e. below 5%, and even after reforms there is no significant improvement.

Gustafsson and Li (2000) finds that in China college education yields higher returns in comparison to schooling. Uwaifo (2008) concludes that rate of returns on education is 7.5% in Nigeria and these low returns are mainly because of low returns at primary and secondary education levels. Trostel (2006) found that the marginal rate of return is increasing at low level of education and decreasing at higher levels. Dutta (2006) also supported these results and found that in India returns to education are u-shaped regarding different education levels. Bahl and Sharma (2020) also found similar results that with the level of education, returns to education increase. It has also been found that workers with degrees of graduation or above earn the highest returns. However, Newhouse and Suryadarma (2011) were unable to find any significant difference between rate of returns for formal and vocational education.

Trostel et al (2002) calculated that global average rate of return to education were 5% for men and 6% for women. In case of China Magnani and Zhu (2012) found higher returns of education for women in comparison to the male counterparts. However, Ren and Miller (2012) found that returns for males are higher than female.

Yang and Gao (2018) and Coady and Dizioli (2018) comes to the similar conclusion that education results in increasing wage inequity and well-educated workers get higher wages. Chuang and Lai (2017) confirmed that in Taiwan education has helped the workers belonging to low-income strata to improve wages and come out of their disadvantageous position. Broecke et al. (2017) conclude that instead of education, skills play a more crucial role in determining wage inequality.

Nasir and Nazli (2000) calculated that in Pakistan, on average a private school graduate can earn 31% more than a public-school graduate and returns to education are 7%. Akbari et al. (2000) found that the marginal rate of return to education was 7.2%. Jamal et al. (2003) estimated that returns to education are higher for higher-secondary and tertiary education, which is graduation and post-graduation.

Nazli (2004) found that the returns to education declines as experience lengthens. On the other hand, at different levels of education, returns to experience rose as the level of education was improved. Hyder (2007) concluded that individuals with primary education have a rate to return to education of only 1.56 percent while it is 37.7 percent for an individual who has done post-graduation. Malik and Awan (2016) also confirmed that experience via skill enhancement results in increased wages. Sial et al. (2018) show that within-group earning inequality is higher for workers with tertiary education than with secondary and primary education.

In summary, the studies confirm that returns to education range from 2.5 percent to 12 percent in different studies.

Data and Methodology

The present study has calculated the returns to different level of education in Pakistan by using Pakistan Labour Force Survey (LFS) 2020-21. The survey offers detailed insights into various aspects of the labour force, including employment, wages, migration, and work environment conditions.

Returns on education refer to the percentage increase in earnings associated with additional years of education. The framework of Mincer earning function is a widely used method to estimate rate of returns for education, this method involves estimation of wage equations. According to the Mincer (1958, 1974) wages function, in which individuals' wages (logged) depend on education, and characteristics like region, occupation, gender etc. The functional form of the Mincer Earnings Function can be written as:

$$\ln(W_i) = \beta_0 + \beta_1 S_i + \beta_2 X_i + \epsilon_i \text{-----1}$$

Where:

W_i : Earnings (e.g., hourly wage or annual income) of individual

S_i : Years of schooling or education level of individual

X_i : Other control variables (e.g., experience, gender, marital status, location)

β_1 : The coefficient representing the returns to education

ϵ_i : Error term

Descriptive Analysis

Descriptive statistics regarding variables of the present study are summarised in table 1. Furthermore, tables 2 & 3 provide province wise annual earning at different educational levels and different professional types.

Table 1: Variables and their means (Standard Deviations in parenthesis)

Variable	KP	Punjab	Sindh	Baluchistan	National level
Age	35.7 (15.8)	36.4 (15.9)	35.1 (17.9)	34.1 (17.1)	35.8 18.5
Wage (Annual)	252,630 (263,852)	280,952 (293,375)	249,025 (251,733)	301,471 (387,244)	286,034 (291,032)
Region (Rural)	0.840 (0.321)	0.630 (0.432)	0.491 (0.494)	0.725 (0.379)	0.639 (0.434)
Region (Urban)	0.155 (0.322)	0.369 (0.432)	0.509 (0.494)	0.275 (0.379)	0.361 (0.439)
Sex (Female)	0.117 (0.321)	0.276 (0.447)	0.067 (0.250)	0.006 (0.079)	0.157 (0.361)
Sex (Male)	0.882 (0.321)	0.723 (0.447)	0.932 (0.250)	0.994 (0.079)	0.843 (0.367)
Sex (Transgender)	--	--	--	--	0.00001 (0.00314)

Results in table 1 reveals that workers in the province of Punjab are relatively older in comparison to workers living in other provinces. In Punjab average age was 36 years whereas the lowest age is reported in Baluchistan i.e. 34 years. At national level as well among all provinces, the average age is consistent, ranging from 34.1 to 36.4 years. However standard deviation at national level and in Sindh is high.

Surprisingly, it emerged that highest earning are in Baluchistan i.e. PKR 301,471 per annum it was above the national average of PKR 286,034 per annum. In Punjab earning are close to national average but in Sindh and KP earning are relatively lower than national average. While the average wage in Baluchistan is highest among provinces with extremely high standard deviation. It suggests that wage distribution is very skewed, with both very high and very low earners. This pattern of high variance in earning is common in all other provinces, reflecting unequal wage distribution and existence of underemployment, wage inequalities and skewed economic opportunities.

It has also been revealed that 63.9% of population lives in rural areas in Pakistan. KP and Baluchistan, have the highest rural populations. Sindh has a relatively balanced rural-urban distribution, while Punjab has a somewhat more urbanized population. The variation in rural-urban distribution is more pronounced in Punjab and Sindh, showing regional differences in urbanization.

Majority of workers are male in every province, especially in Baluchistan and Sindh, where males are overwhelmingly above 90%. The national average aligns with this male-dominated trend. Punjab has the highest proportion of female labour force.

Table 2: Profession wise earnings

Earnings					
Nature of Work	KP	Punjab	Sindh	Baluchistan	National Level
Unskilled workers	194,275	188,000	180,773	224,707	188,659
Executives	626,538	807,988	722,349	703,191	756,917
Professionals	438,330	472,167	581,120	565,595	493,735
Technicians and Operators	297,793	309,187	314,904	350,480	310,945
Clerks	389,720	383,407	432,771	443,814	405,482
Services	270,754	273,947	246,912	306,043	268,670
Agriculture workers	189,952	284,406	178,724	276,915	248,109

Table 2 summarizes the wage distribution of different professional types. It suggests that earning follow a clear hierarchy based on skill level, responsibility, and demand. The executives (756,917) and professionals (493,735) enjoy high earning whereas agriculture workers (248,109), and unskilled workers (188,659) are at the bottom. It indicates that earning increases with the level of skill, education, and responsibility required for the job. Executives and professionals, who require advanced education and decision-making skills, earn significantly more than unskilled workers. Sectors like agriculture and services, which are labour-intensive and have lower barriers to entry, tend to offer lower earnings. There are regional variations within each profession. Unskilled workers in Baluchistan earn the highest earning (224,707), followed by KP (194,275), Punjab (188,000), and Sindh (180,773). However, executives in Punjab earn the highest earning (807,988), followed by Sindh (722,349), Baluchistan (703,191), and KP (626,538). Professionals in Sindh earn the highest earning (581,120), followed by Baluchistan (565,595), Punjab (472,167), and KP (438,330). It indicates that there are significant regional disparities in earning across different job categories. For example, Baluchistan tends to offer higher earning for unskilled workers, technicians, clerks, and services, while Punjab leads in earning for executives and agriculture workers. The agriculture and services show more variability in earning across regions.

Table 3: Education wise Earnings

	Earning				
Education	KP	Punjab	Sindh	Baluchistan	National Level
No Education	201,647	207,777	169,979	253,950	200,573
Primary or middle without Technical Education	231,081	261,352	214,615	291,140	246,908
Primary or Middle with Technical Education	255,589	261,130	208,396	317,645	258,027
Secondary without Technical Education	286,998	337,126	281,701	344,928	315,611
Secondary with Technical Education	287,862	318,666	250,380	226,009	306,636
Intermediate without Technical Education	283,760	388,163	343,657	417,517	358,161
Intermediate with Technical Education	330,247	367,162	368,908	394,170	359,921
Engineering and Computer	708,844	864,419	1,012,570	816,127	900,559
MBBS	1,290,102	1,033,573	918,112	1,401,138	1,068,982
MA/MSc	436,851	558,129	575,011	607,862	544,770
MPhil	696,879	737,933	734,400	928,542	735,525
PhD	366,856	1,356,895	1,598,165	1,235,492	1,359,472

Table 3 reveals that individuals with higher education (e.g., MBBS, MPhil, PhD, and Engineering degrees) earn significantly more in comparison to those with lower educational levels. Engineering and MBBS degrees stand out as the highest-paying fields across the provinces. Across the various education categories, technical education tends to result in higher earning than non-technical education. For example, individuals with secondary education (with technical education) in KP earn higher wages than those without technical education. However, this trend varies by province. There are distinct regional disparities in wage distribution. Punjab tends to have higher earning for those with middle or secondary education, while Baluchistan

tends to offer higher earning for individuals with higher education degrees (e.g., MBBS, MPhil). KP offers the lowest earning for most of the categories. It has a particularly low wage for those with no education and for primary or middle education (both with and without technical education). However, its wages for secondary education with technical education are relatively higher than other provinces.

Punjab offers the highest earnings for individuals with primary or middle education, secondary education and for those with MA/MSc degrees. It also has second-highest wage for engineering and computer graduates. However, its wage for MBBS and MPhil holders is relatively lower as compared to Baluchistan.

Sindh also offers lower earning in most categories, except in higher education. However, it offers the highest earning for MBBS and engineering/computer graduates. Baluchistan stands out as having the highest earning for primary or middle, secondary and intermediate level education. Its earning for MPhil is also the highest across all regions, but for PhDs, it's slightly lower than Punjab.

Empirical Analysis

The estimation of Mincer equation (equation 1) is presented in table 4. It summarises the impact of independent variables, including region, sex, age, level of education, and nature of work on earnings.

Table 4: Estimation of Mincer Equation

	Coefficient	Standard Error	t statistic
Constant	11.60	0.01	1470.67
Region			
Rural	Base Category		
Urban	0.12	0.01	22.48
Sex of Residence			
Female	Base Category		
Male	0.04	0.01	6.01
transgender	0.55	0.31	1.75
Age			
15-24			
25-44	0.23	0.01	38.87
45-59	0.43	0.01	58.53
60+	0.40	0.01	32.57
Level of Education			
No Education	Base Category		
Primary or middle without Technical Education	0.27	0.22	1.25
Primary or Middle with Technical Education	0.22	0.16	1.41
Secondary without Technical Education	0.44	0.02	21.19
Secondary with Technical Education	0.37	0.04	9.67
Intermediate without Technical Education	0.51	0.03	17.55
Intermediate with Technical Education	0.50	0.05	9.36
Engineering and Computer	1.42	0.10	14.04
MBBS	1.59	0.10	15.62
MA/MSc	0.81	0.03	26.42
MPhil	1.02	0.09	11.88
PhD	1.52	0.17	9.18

Nature of Work			
Unskilled workers	Base Category		
Executives	0.64	0.02	38.63
Professionals	0.21	0.01	30.49
Technicians and Operators	-0.02	0.01	-1.40
Clerks	0.29	0.01	22.40
Services	0.07	0.01	12.36
Agriculture workers	-0.07	0.01	-9.28
Number of obs	129,234		
F Statistics	323.34		
Prob of F Statistics	0.00000		
R-squared	0.3359		

Males earn more in comparison to female counter parts (the base category) indicating an earning wage gap in favour of males. Due to limited observations earning of transgender are not significantly different from female.

Individuals aged 25-44 earn more than those aged 15-24 (the base category) because of young age, experience and career progression. Earnings of age bracket 45-59 further supports that earnings increase with age and experience. Coefficient for age 60+ is also significant, suggesting that even at older ages, earnings remain higher compared to the youngest age group, though the increase is slightly less than for the 45-59 age group.

Study finds that education has a strong positive impact on earnings, with higher levels of education generally results in higher earning. However, Primary or middle education (with or without technical education) do not earn significantly different from no education (the base category). However, for the rest of educational level earning are significantly higher than those of having no education. Coefficient of households having engineering and Computer-related education is 1.42 with a highly significant t-statistic reflects the high demand for engineering in the labour market. Individuals with an MBBS degree have a coefficient of 1.59 with significant t statistics. This is the highest wage premium among all education levels, reflecting the higher value placed on medical professionals. The coefficient of PhD degree holder is also high i.e.1.52.

The nature of work also significantly impacts earning, with certain occupations commanding higher earning than others. Executives significantly more than unskilled workers (the base category), with a highly significant t-statistic. This reflects the higher earning associated with managerial and leadership roles. Technicians and Operators earn less than unskilled workers, but this difference is not statistically significant (t-statistic = -1.40). This suggests that, on average, technicians and Operators do not earn significantly more than unskilled workers. However, agriculture workers earn significantly less than unskilled workers. It suggests that agricultural work is associated with lower earnings compared to unskilled work in other sectors.

Conclusion and Recommendations

Education is recognised one of the important tools for enhancing individual as well as national development and prosperity. However, its effectiveness depends on alignment among quality of education and labour market demands. In Pakistan it is very crucial that education should not only needs to be expanded but should also be equipped with relevant skills, technical training and innovation. Only then true potential of education, as a driver of economic and social development, can be reaped. The study has estimated the returns to education in Pakistan by applying Mincer equation based on the data of Labour Force Data 2020-21.

It has been found that earnings of the urban labour force are higher than the rural labour force. Similarly, male workers/professionals earn more than female counterparts, indicating a gender wage gap. Older individuals (25 and above) earn more than younger ones, reflecting the impact of experience and career progression.

The returns to education in Pakistan vary significantly depending on the level and type of education. Specialized fields like engineering, computer science, and medicine offer highest returns, while basic education and technical education provide relatively low returns. The findings highlight the importance of investing in higher education and improving the quality and relevance of technical education to enhance earning potential and drive economic growth in Pakistan.

The highest returns are associated with specialized fields like engineering, computer sciences, and medicine (MBBS). These fields require advanced technical knowledge and skills, which are in high demand in the labour market. Higher returns reflect the scarcity of qualified professionals in these areas and the critical role they play in economic development. Research-oriented degrees (MPhil, PhD) also offer higher returns than simple graduation and master's degrees. The executives (756,917) and professionals (493,735) enjoy higher earnings whereas agriculture workers (248,109), and unskilled workers (188,659) are at the bottom. Executives in Punjab earn the highest earning (807,988), followed by Sindh (722,349), Baluchistan (703,191), and KP (626,538). Professionals in Sindh earn the highest earning (581,120), followed by Baluchistan (565,595), Punjab (472,167), and KP (438,330).

The returns to primary and secondary education are relatively low, suggesting that basic education alone is not sufficient to enhance earning potentials in Pakistan. However, it is noteworthy that primary and secondary education provide foundational skills that are essential for higher education.

The study highlights the importance of investing in higher education, particularly in engineering, computer science, and medicine. These fields offer the highest returns and are likely to drive economic growth and innovation.

The relatively low returns associated with technical education at the primary, secondary, and intermediate levels suggest a need to improve the quality and relevance of technical education programs and align technical education with the demands of the labor market.

High returns for MPhil and PhD level education highlight the importance of investing in research and development. It could be helpful in building a knowledge-based economy and drive long-term economic growth.

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