AN INVESTIGATION ON THE LINKAGES BETWEEN POVERTY AND EDUCATION: A STATISTICAL REVIEW

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KEYWORDS	ABSTRACT
Poverty Level, Education Level, Bawalnager, Pakistan	The current research aimed to examine the relationship of education and poverty (wealth index). The secondary data is utilized to find the theoretical relationships among the research variables while statistical procedures have been used to examine statistical relationships among the variables. Tor this purpose, current research utilizes the following tests likewise the correlation analysis, multiple comparison test and Chi square to examine statistical connection and to reach conclusion. In this regard, the results described that males attain more money as compare to the females and education is more critical factor for the elimination of poverty. The people who belong to middle and above standard of the education are richer than the people of who belongs to primary or below level. Moreover, the results indicate that uneducated people are suffering lowest level of poverty. Results also describe that difference of any two people who belongs to different group of the education is wide the gape of the wealth indexes (reducing the poverty level).

INTRODUCTION

It has been observed that during the last decade mostly there is scarcity of researches for the relationship education with poverty (Vasile, Comes, Ştefan & Munteanu, 2015). In a general view, poverty produces due to reduce level of the education which means that reduction of education has direct relation with poverty and at the same time if children who born in poverty cannot break the "vicious circle of poverty" and nor even exit from that particular poverty condition. The children who born in poverty are not fully ready for schooling or not even they think so, which shows a great failure in comparison to others from primary level schooling (Omoniyi, 2013). There is a question comes out that is there any way children who born into poverty can they break the "vicious circle of poverty"? Different research and social studies are being conducted on the same topic even with diverse approaches and methodologies but their conclusion was same those children who born into poverty have every chance to get education failure (Edokpolor & Egbri, 2017).

As the consequences of that education failure their chances of success in the practical life are also very low and due to that there may be situation of social elimination accelerated (Senadjki, Mohd, Bahari, & Hamat, 2017). Under the current economic situation at the world level, higher level of education can create a major difference among the poverty and a successful practical life. But surprisingly, ratio of higher education level students is getting low in Romania (Choi & Choi, 2019). It is very necessary to plan and implement the latest and effective strategies to improve the ratio of graduate level students or higher studies because the students with low level of income drop out far earlier (Senadjki et al., 2017). In the current era of life, poverty is the biggest issue in the way of world peace and high stability other than terrorism and such different highly out spoken problems facing by the world (Omoniyi, 2013; Ijaz, 2018). As per the research conduct by Sachs (2009), there are around 8 million people die every year around the world due to the extreme level poverty.

A report conducted by the "united nation development project" in 2010, there is a rough estimation of that 1.4 billion people were spending their lives in very poor conditions and among them almost 93% were belongs to South Asian, East Asian and particularly Sub-Saharan African Side. There are 3 particular conditions of poverty are being identified such as "Extreme poverty, moderate poverty and relative poverty" (Sachs, 2009; Reinert, 2019). First condition is extreme level poverty, where the household is unable to fulfill even the needs to remain alive. The people who are facing the extreme level poverty are likely more in a condition of hunger, no access at all for health care, unable to have pure water to drink and even don't have proper system of the sanitation. They are unable to educate their children and even unable to provide proper shelter for their families to live safe because they do not afford such things (Vogel, Moser, Kasperson & Dabelko 2012). But in moderate condition poverty, peoples are very hardly able to meet basic necessities to alive/live.

In the last comes relative level of poverty, where peoples are able to generate income to live just below average level of national income (Mair, Marti & Ventresca, 2012; Meyer & Peng, 2016). The countries with high level of income, people do not have easy access to cultural things, refreshments, health care qualities, higher education and other different requirements to upgrade social mobilization (Beeson, 2014). Particularly, the world bank has defined the poverty in term of figures, where they have stated that the person with 1 US Dollar income in a day will be considered as the purchasing power parity and also the standard to determine number of poor people in the whole world. Education could be the very productive tool to eliminate the poverty and to improve the economic condition. It is baseline factor on which most of social and economic efforts are being conducted. Education is basic factor to bring social and economical effectiveness, by giving the right value and compensation to human force will be result in better condition from poverty (Dent, 2016).

It is the education which improves mental approach and level of productivity of human force, which also enables countries to compete in world level market even with advance and modernized production methodologies. The basic standard of living of any country can be determine through the effective utilization of level of knowledge, polished skills, efforts to develop themselves, heath care strategies and level of education for common peoples (Roberts, 2011; Omoniyi & Omoniyi, 2014). According to Ozturk (2011), without investing on education and human resource no country can achieve their targets related to the economic improvements on a consistent basis (Okeowhor, Okoh, Baakel & Okolo, 2019). The unfair education system negatively affects per capita income and due to that poverty has increased in different countries. The literature revealed that there is the need to make sure everyone is getting the proper education, knowledge, solution oriented and the highly professional skills, which enable the society to cater the competitive advantage (Pervez, 2016).

LITERATURE REVIEW

Education and Productivity

The level of education and high productivity do have strong relation among each other (Okeowhor et al., 2019). In any country the high level of education of human resource do provide default advantage in term of high growth in output, foreign exports and indicate the buildup capacity of the system to acquire global modern and latest technology and its effective usage (Pervez, 2016). For instance, health care and proper diet, primary level and secondary level of the education all are the major factors to improve human resource productivity. Also at the rural level and urban level, secondary level of education also includes the vocational training, skills and management related capabilities, further level of education help out to understand about the fundamental science, adequate adoption

of modern technology and which to import and even development of that technology at the local level, such higher education also facilitate to build institutional mechanism of government, the national law, financial aspects and the growth of economy (Omoniyi & Omoniyi, 2014).

The empirical results also distinguish the relations at micro and macro levels. According to Behrman (1999) there are different studies suggest that at the micro level, as the year of education increased the income level increased and there is high return on investment as the level of the education get higher. As stated by Psacharopoulos (2004) that there is high return on primary level schooling in comparison to higher education like secondary and even tertiary level of education. It has been witnessed in sector of agriculture, where the education has positive impact on the productivity as the agriculturists utilize latest technology for cropping in comparison to others who utilize the traditional methodology. Highly educated farmers in Thailand are highly adoptive towards the latest technology, fertilizer and other different inputs for farming instead of lower level educated farmers who are very much reluctant to adopt modernization (Wusu & Amoo 2016). As per study of Jamison and Moock (2004) in Nepal farmers with 7 years primary schooling are able to produce wheat at high productivity in quarter of year and get 13% more production of rice as well.

Education is also playing vital role in the adoption of modern technology in industrial sector (Wusu & Amoo, 2016). It is being observed in Sri Lanka in industries of clothing and engineering that the level of skills and the level of education of the human resource have positive relation with technological modernization among industries (Deraniyagal, 2005). At the same time only education cannot change the economy. There are so many things like the quantity and quality of investment, local and international policies and different other strategies contribute towards the economy growth. The human resource development also plays an important role in development and growth of the economy (Malik, 2013). The education has critical impact on policy makers and implementers to design effective policies and to make effective investment decisions as well. The higher education level of human resource will affect level of productivity in positive way because highly educated workforce is able to innovate and implement new techniques to improve production level.

The literature further revealed that due to that everyone's productivity will be increased (Lucas, 2008; Cheong, Hill, Chung & Leong 2016). So, it is being concluded by Perotti (2008) that as level of education of an individual increased in the working force not only his/her productivity will be increased but also other to whom he/she may interact and also it can be concluded that as the average level of education of working force increased their total level of production. The education level of human resource may affect the level & growth of exports positively and due to that overall rate of exports increased, this is the another way, how the developed human resource can contribute to country's betterment (Cheong et al., 2016). The level of education and the level skills of the human resource also contribute to the situation of trade in developing countries as well. Wood (2009) has suggested that "unskilled" labor required education, technical understanding, procedural discipline which can be gained through primary and secondary schooling even in highly modernized industry.

Education and Income

There is positively seen that the higher level of education enables to gain higher income, which represent high ratio of growth at domestic and national level. If education is being considered at wider level, then the low level income may have greater opportunities gain high income by improving the level of education. For instance, there is a study conducted in 18 different countries of Latin America particularly in the year of 1990's to find out the

liaison among schooling, inequality of income and poverty, study analyzed differences in labor income in comparison to the differences in level of education over the quarter and concluded that education has clear and strong impact on income level (Psacharopoulos, 1998). There is research describe that secondary level educated labor will have increased even with 1% in effect there will be increase of income in bottom 40% about 6% and in 60% will be about 15%. Another research suggests that high level of the income division among 36 countries of world is especially based on secondary level schooling (Brîndușa & Narciza 2013).

Education also has great impact on "per capita income growth" with respect to growth of population. For instance, the research was conducted in 14 countries of Africa in the mid nineties which concluded an inverse relation among female education and the ratio of fertility almost in every country, in half countries there is the negative relation due to the primary level of education while no impact on the remaining half countries, on the other hand secondary level education also contributes the low level of fertility (Wolfe, 1997). According to the Ainsworth (1995) and Naroș & Simionescu (2018) there are 3 countries like Zimbabwe, Kenya & Botswana, where fertility rate as well as death rate of children is very low due to high level of female education. Particularly health and education are two compulsory ingredients of human resource life, which enables them to produce at their full potential and improve their life standards. In any country human resource is always required to use physical like natural, latest technology and effective skills in effective and efficient way.

As Pakistan is an under developed country is also initiated the poverty reduction strategy paper, which is the major component for improvement of human resource (Khan, 2017). It is not possible to achieve desired targets of poverty reduction or human development without engaging human resource which is heavily depend on the level of education and level of skills. Another important thing need to understand is that the critical importance of education to reduce poverty because it has direct relation with the income. It has been founded that in Pakistan, if a labor gets 1 year further education then his or her monthly income will be increased with 7.3% (Rani, 2018). Income could be improved with almost 37%, if labour able to get 10 years of education instead of no education. Their income will have increase by 3% with additional year of study mainly at primary education, there will 5% addition in income if the 1-year addition at secondary level education and at higher level education 1-year additional study will be result in 7.1% to 8.2% increase in income (Khan, 2017).

Similarly, an additional year of study at technical or vocational will increase 2.5% income of person. It is being witnessed that education can improve level of income by improving potential to productivity (Anjum, Ravan Ramzani & Nazar 2019). In Pakistan education for the family head can play very important role in the poverty reduction. If the level of education of family head improved, then there is ultimate chance the life standard of the family will be improved. Significantly, the improved level of education of the family head not only improve the productivity and income of head only but it will also have positive impact on other family members to influence them to gain education and skills improve overall productivity and to earn the better (Chen, Ramzani, Shahzad 2019). It is not only seen that the uneducated families are facing more difficulties with the poverty but also critically seen that there is high ratio of the poverty among the families' headed by the females instead of the males in developing countries (Zreen, Farrukh, Nazar, Kamran & Khalid, 2019).

The particular segment of female remains more pressurized in our society in comparison to the male population. Even the families which are headed by females are more likely to have nothing to fulfill their basic necessities to stay alive. Their life style, houses, health

care facilities, pure water to drink, proper sanitation and sewerage system remains badly in poor condition (Zreen et al., 2019). The facility of education can bring them out from this vicious cycle by improving their incomes and fulfillment of their basic necessities. In contrast, farming production may relate with only primary education level. By observing separately different sections of Pakistan like rural and urban, it can be seen that the in urban side the education level of family head has inverse relation and dependent rate may have direct relation with the poverty of that particular household. Although, in the rural side family assets division like the land and livestock hold by the family play an important role in poverty, or rich condition of that particular household (Chen, Ramzani, Shahzad, 2019).

MATERIALS AND METHODS

Formula for Calculation

Rencher and Schaalje (2008) describes that if there are more than one outcomes then one's can use the following formulas. Model with one x:

$$\text{"} y_i = \beta_0 + \beta_1 x_1 + \mathrm{€}_i; \text{"} \qquad y_i = 0, 1, 2, \ldots, n. \qquad (1)$$

"Y_i either 0 or 1, This can be expressed as"

$$\text{"} E(y_i) \qquad = \qquad P(y_i = 1) = pi, \text{"}$$
$$\text{"} 1 - E(y_i) \qquad = \qquad P(y_i = 0) = 1 - p_i \text{"} \qquad (2)$$

"The distribution is known as the Bernoulli distribution. By (2) and (3), we have"

$$\text{"} E(y_i) \qquad = \qquad p_i = \beta_0 + \beta_1 x_i. \text{"} \qquad (3)$$

We can get

$$\text{"} Var(y_i) \qquad = \qquad E[y_i - E(y_i)]^2 \text{"}$$
$$= \qquad \text{"} p_i(1 - p_i) \text{"} \qquad (4)$$

From (3) & (4),

$$\text{"} Var(y_i) \qquad = \qquad (\beta_0 + \beta_1 x_i)(1 - \beta_0 - \beta_1 x_i) \text{"},$$

Variation of each y_i depends on x_i. "This shows the violation of the assumption of constant variance, and the estimators $\hat{\beta}_0$ and $\hat{\beta}_1$ computed. For the solution of optimal estimators of b_0 and b_1,"

$$\text{"} \hat{\beta} \qquad = \qquad (XV^{-1}X)^{-1}X\,V^{-1}y \text{"}$$

"Since $0 \leq p_i \leq 1$. For fitting (4) by using generalized least squares for $\hat{p}_i$"

$$\text{"} \hat{p}_i \qquad = \qquad \hat{\beta}_0 + \hat{\beta}_1 x_i, \text{"}$$

"The value of $\hat{p}_i$ may be less than 0 or greater than 1 for a number of values of x_i. Model for $E(y_i)$ is restricted between 0 and 1. For this situation the best way is the logistic regression model."

$$p_{i=}E^{(yi)} = \frac{e^{\beta_0 + \beta_1 x_1}}{1 + e^{\beta_0 + \beta_1 x_1}} = \frac{1}{1 + e^{-\beta_0 - \beta_1 x_1}} \qquad (5)$$

When we use simple transformation (5) is

$$\text{"}\ln(pi/(1 - pi)) \qquad = \qquad \beta_0 + \beta_1 x_1 \text{"} \qquad (6)$$

The Chi-Square Test

"Chi square test is a test which was originally proposed by the Pearson in 1900, and it provided one of the earlier methods of statistical inference. Let the random variable X_t be $n(\mu_i, \sigma_i^2)$, $i = 1,2,\ldots, n$, and let $X_1, X_2, .., X_n$ be mutually stochastically independent. Thus the joint p.d.f of these variables is"

$$\text{``} \frac{1}{\sigma 1 \sigma 2 \dots \sigma n \, (2\pi)^{n/2}} \; \exp\left[-1/2\left(\sum_i^n \frac{xi - \mu i}{\sigma i}\right)^2\right]\text{''} \qquad \text{``}-\infty < x_i < \infty\text{''}.$$

Methods for Conducting Research

Secondary data is used for analysis. This data is adopted from federal Bureau of statistic. Different tests were utilized for explaining relationship of education poverty elimination (wealth index). This research uses the correlation analysis; multiple comparison test and Chi square are used for data analysis. Correlation is utilized to examine the dependence of education with poverty elimination for significant relationship p value must be ≤ 0.05. If this happens then we can san say this value is significant value.

DATA ANALYSIS

Binary Logistic Regression

Logistic Regression is used on categorical dependent variable. "Labeling the individual with codes 1 if wealth index is above or equal average otherwise labeled as zero". Logistic regression model is used 4 times by considering gender, area, age and education.

Demographics	Model				
	Personal Characteristics				
	(1)	(2)	(3)	(4)	(5)
Gender	–0.002	–0.011	–0.002	0.043***	0.0322
	(0.004)	(0.006)	(0.004)	(0.007)	(0.008)
Area	–0.450***	–0.433***	–0.367***	–0.457***	–0.365***
	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)
Age	"–0.001***"	"–0.001***"	"–0.001***"	"0.001***"	"–0.001***"
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Education (Base: None)				
"Primary"			–0.154***		–0.168***
			(0.007)		(0.012)
"Middle"			–0.295***		–0.278***
			(0.008)		(0.014)
"Secondary"			–0.387***		–0.396***
			(0.007)		(0.020)
"Higher"			–0.764***		–0.556***
			(0.011)		(0.012)
"Observations"	"26,452"	"18,482"	"26,434"	"16,178"	"16,065"
"Pseudo R Square"	"0.17"	"0.17"	"0.28"	"0.18"	"0.28"

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

The descriptive power of this model 1 is "17%" while in age, gender and the area are considering as descriptive variables. The values of p indicate that the entire explanatory variables are in acceptable range in model 1. In metropolitan area low poverty is seen as compare to rural area. When the education is considering as "explanatory variable and no education is taken as base category", then results indicates that explanatory power of model is twenty-eight percent this indicates poverty level is decreased by due to increase of education level. This means that education level has significant negative relationship with poverty.

Poverty and Education Level

The education level which is informal or formal is more critical factor which has great influence for dropping level of poverty. Education level is further divided into following categories to better explain the education level of the respondents and further to obtain results likewise primary education, no education, middle education, matriculation, and intermediate:

H$_0$: "On Average Poverty of Different Household with respect to Education are same"

ANOVA					
Wealth Index Score					
	Sum of Squares	Df	Mean Square	F	P
"Between Groups"	"5980.325"	6	"1196.065"	"2.313E3"	0.0000
"Within Groups"	"13676.571"	"26446"	"0.517"		
"Total"	"19656.896"	"26451"			

Null hypothesis of poverty level is rejected regarding every level of education because p-value (0.000) in above table is very less. This means that educational level is significant for decreasing poverty level. Current research further applies the pair wise assessment with the help of L.S.D (least significant difference)

"(I) EHH"	"(J) EHH"	MD (I-J)"	SE	p	95% Confidence Interval	
					LB	UB
No Education	"Primary"	"-.44107*"	".01338"	0.0000	"-.4673"	"-.4148"
	"Middle"	"-.70010*"	".01472"	0.0000	"-.7290"	"-.6712"
	"Secondary"	"-.95152*"	".01283"	0.0000	"-.9767"	"-.9264"
	"Higher"	"-1.46473*"	".01750"	0.0000	"-1.4990"	"-1.4304"
	"madrasa/nsc"	"-2.46250*"	".16961"	0.0000	"-2.7949"	"-2.1301"
"Primary"	"None"	".44107*"	".01338"	0.0000	".4148"	".4673"
	"Middle"	"-.25903*"	".01793"	0.0000	"-.2942"	"-.2239"
	"Secondary"	"-.51045*"	.01642	0.0000	"-.5426"	"-.4783"
	"Higher"	"-1.02366*"	".02028"	0.0000	"-1.0634"	"-.9839"
	"madrasa/nsc"	"-2.02143*"	".16992'	0.0000	"-2.3545"	"-1.6884"
"middle"	"None"	".70010*"	".01472"	0.0000	".6712"	".7290"
	"Primary"	".25903*"	".01793"	0.0000	".2239"	".2942"
	"Secondary"	"-.25142*"	".01753"	0.0000	"-.2858"	"-.2171"
	"madrasa/nsc"	"-1.76240*"	".17003"	0.0000	"-2.0957"	"-1.4291"
"Secondary"	"None"	".95152*"	".01283"	0.0000	".9264"	".9767"
	Primary	".51045*"	".01642"	0.0000	".4783"	".5426"
	Middle	".25142*"	".01753"	0.0000	".2171"	".2858"
	Higher	"-.51321*"	".01992"	0.0000	"-.5523"	"-.4742"
	"madrasa/nsc"	"-1.51098*"	".16988"	0.0000	"-1.8439"	"-1.1780"
"Higher"	"None"	"1.46473*"	".01750"	0.0000	"1.4304"	"1.4990"
	"Primary"	"1.02366*"	".02028"	0.0000	".9839"	"1.0634"
	"Secondary"	".51321*"	".01992"	0.0000	".4742"	".5523"
	"madrasa/nsc"	"-.99777*"	".17029"	0.0000	"-1.3316"	"-.6640"
"madrasa/nsc"	"None"	"2.46250*"	".16961"	0.0000	"2.1301"	"2.7949"
	"Primary"	"2.02143*"	".16992"	0.0000	"1.6884"	"2.3545"
	"Middle"	"1.76240*"	".17003"	0.0000	"1.4291"	"2.0957"
	"Secondary"	"1.51098*"	".16988"	0.0000	"1.1780"	"1.8439"
	"Higher"	.99777*	".17029"	0.0000	".6640"	"1.3316"

*: Significant Difference (EHH: Education of Household Head, MD: Mean Difference, SE: Standard Error, LB: Lower Bound & UB: Upper Bound)

Education level is subdivided into the five sub categories. The comparison is done in ten pairs about level of poverty. All the p-values describe that there is the viable difference in

each pair. Following descriptive table and graph also describes the analysis of the wealth index (poverty level).

"Descriptive Statistics"		
"Education of Household Head"	"Mean"	"N"
"None"	"-0.85"	"13937"
"Primary"	"-0.42"	"3643"
"Middle"	"-0.17"	"2880"
"Secondary"	"0.19"	"4053"
"Higher"	"0.70"	"1921"
"madrasa/nsc"	"0.15"	"18"

Above table clearly explain that there is significant relationship between the poverty level and educational level of head of house hold. It also indicates that poverty level is towards the negative side and this level is gradually decreased. From the secondary level this level is jump toward positive side. At matriculation level this level is highest place. Amazingly, literature persons of madrasas are also fall at positive side of poverty level. This means that these people are also enjoying their lives and spent their lives in good conditions. Low literacy level is main cause of poverty. Pakistani people are spending almost 0.8% of GNP in 1980s, this was just raised till 2.3% of GNP till 1990s and still this rate is round about 4.0% in FY 2014-18 (Zreen et al., 2019). Pakistan is much behind in this regard from the other countries of in this region such as Bangladesh, India, Sri Linka and China (Karplus & Hirschhausen, 2019; Rama, 2019; Hewawasam & Matsui, 2019). Thus, it is very critical for Pakistan to increase the literacy level of public for reducing the poverty level by increasing the educational level in Pakistan.

CONCLUSION

The present study was aimed at investigating the linkages between the poverty and the education. The results of the study provide significant information about the connection between the poverty and the education. In this regard, different models have been used to explore the association between the research issues under study. Model no 1 describes that all explanatory components are very viable in municipal area as compare to rural area. Males attain more money as compare to females. Model 3, explains that education is more critical factor for elimination of poverty. People who belong to middle and above standard of education are richer than people of who belongs to primary or below level. Moreover, results indicate that uneducated people are suffering lowest level of poverty. Results also describe that difference of any two people who belongs to different group of education is wide the gape of the wealth indexes (reducing the poverty level). The results might be helpful for the policy makers in obtaining the suitable information about the linkages between the poverty and education. Similarly, the study might also be helpful for the future researcher in further exploring the above mentioned concepts.

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