

## **EDUCATION, POVERTY AND ECONOMIC GROWTH IN SOUTH ASIA: A PANEL DATA ANALYSIS**

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### **ABSTRACT**

*The study investigated the linkages between education, poverty and economic growth in Bangladesh, India, Pakistan and Sri Lanka. Panel data for the period of 1995-96 to 2012-13 was used. The findings confirmed positive relationship between education and economic growth, while poverty is found to be inversely related to economic growth for these countries of South Asia. The study recommends that each sample country should adopt poverty reduction and education enhancing policies to accelerate her economic growth. To compete with other countries of the region, Pakistan has to raise her average level of education. These countries should design such policies that engage their population in a more productive uses so that the economic growth of these countries may further be enhanced.*

**Keywords:** *Growth, Education, Poverty, and Panel Data*

**Jel Classification:** *C23, I21, I32 and O40*

### **INTRODUCTION**

Education (Edu.) is very important and one of the essential factors for economic growth (econ. growth). Any country can't attain sustainable econ. growth and development without intensive and extensive investment in Edu.. Edu. broadens people's thinking about themselves and the rest of the world. It improves living standards of the people and also increases their productivity and vision. Edu. role is vital to increase economic proficiency and social uniformity by increasing the value and productivity of their labor force (LF).

Investment in Edu. and expenditures on job trainings were small in 19<sup>th</sup> century. During the second half of the 20<sup>th</sup> century, acquiring Edu. and skills have become important for an individual as well as for the nation's productivity. Economists have long been aware of the importance of Edu. in the process of econ. growth and econ. development. Smith (1776) stressed the importance of Edu. in his book entitled "An Inquiry into the Nature and Causes of the Wealth of Nations". He noted that the acquisition of Edu. and knowledge becomes fixed capital of a person. A nation cannot be well developed without investing in Edu.. Edu. is the first step in the way and process of economic development (econ. development). It is two-way process, at one side, it enhances the econ. growth and on the other hand, it reduces poverty (Pov.) by increasing the productivity. It plays a central role in the accumulation of human capital abilities and increases econ. growth through better skills and knowledge.

The significance of Edu. and human capital in the way of econ. growth has been brought out in many studies (Romer 1989, 1990; Denison, 1985; Islam, Wadood & Tariq, 1995; Afzal, Rehman, Farooq & Sarwar, 2011 and Afzal, Malik, Begum, Sarwar & Fatima, 2012). The discussion on human capital was started in the early 1960's. Human capital got importance by emergence of endogenous growth theories presented by Lucas (1988), Romer (1989, 1990) and Mankiw, Romer & Weil (1992). In case of Pakistan, Afzal, Rehman, Farooq & Sarwar (2011) and Afzal, Malik, Begum, Sarwar & Fatima (2012) explained that the Edu. is one of the major indicators of human capital. Lucas (1988) developed one of the first endogenous growth models and said that Edu. is one of the significant elements that generates the technological development in an economy. Mankiw, Romer & Weil (1992) first time included human capital in their production function. They found that the higher level of human capital leads to the higher rate of econ. growth. Denison (1985) considered Edu. as a foremost contributor to econ. growth. Economies such as Hong Kong, Korea, Singapore and Taiwan have attained extraordinary rates of econ. growth by making huge investment in Edu. (World Bank, 1993). Krugman (1994) credited much of East Asian tiger's achievement to their swift enlargement of Edu.. Barro (1991) found that schooling was closely associated with econ. growth.

Educational institutions, investments in Edu., quality Edu. and equal access to Edu. play the imperative role in the alleviation of Pov. and in enhancing the econ. growth in the country (Chaudhary & Rehman, 2009;

Santos, 2009; Moaz & Neeman, 2008). Edu. also plays a significant role in the reduction of the income discrepancies (Danacica, Belascu & Llie, 2010). Pov. is also thought to be the basic root cause of terrorism and child labor. People commit crimes because they are not capable to fulfill their basic needs of life. Edu. helps to lower the crime rate, terrorism and child labor through reducing the Pov. (Kruger & Maleckovca, 2003; Veron & Fabre, 2004).

South Asian countries like Bangladesh, India, Pakistan and Sri Lanka had failed to sustain their econ. growth due to two main reasons. Firstly, Edu. is always neglected by the higher authorities and secondly, Pov. is increased with the passage of time in South Asia. Edu. is triggering econ. growth through many factors like enhancing the employment opportunities, improving health facilities, reducing fertility rate, development of technology and source of political stability. Education reduces the Pov. rate by generating more employment opportunities. Edu. is strongly connected with Pov., as parents seem to be unwilling to send their children for Edu. due to chronic and extensive Pov.

Edu. is considered very important factor for econ. growth but the relationship between Edu. and econ. growth is not so simple and always direct (Moroto, 2000: and Afzal, Malik, Begum, Sarwar & Fatima, 2012). Many other factors may affect the relationship between Edu. and econ. growth. Pov. has become very crucial variable that directly or indirectly affects the linkages between Edu. and econ. growth.

Most of the studies have examined the linkage between Edu. and econ. growth in Pakistan and in other countries based on time series data. There exists hardly any study in empirical literature that covers the Edu. and econ. growth relationship in the presence of other variables like Pov. in panel data analysis environment. Keeping in the view the importance of Edu. for econ. growth and advantages of using panel data, this study was design to explore the relationship between Edu. and econ. growth in case of selected South Asian countries including Pakistan. Pov. is included in the model as it seems to have its impact on the relationship between Edu. and econ. growth. Physical capital (PK) and labour force (LF) are also included in the model because both variables are the very basic components of econ. growth models.

To analyze the nature of relationship among Edu., Pov., and econ. growth with the inclusion of LF and PK in case of selected South Asian developing countries is the first objectives of this research work. The second main objective of this paper is to recommend some policy options that will lead to promote Edu., accelerate econ. growth and reduce Pov. in selected countries of South Asian.

The connection among Edu., Pov. and econ. growth is affected by many other factors like terrorism, inflation, debt accumulation, political instability, rule of law, trade openness, foreign aid, fertility rate, and institutional and sociological factors. Due to limited time and data constraint, the present research work is in the context to only examine the relationship among three variables *i.e.*, econ. growth, Edu., and Pov. by including only PK and LF as supporting variables.

## **REVIEW OF LITERATURE**

Edu. and continuous process of econ. growth are considered the most important sources of high living standards of a nation. Review of studies that explores the linkages among Edu., Pov. and econ. growth is being presented:

Afzal, Rehman, Farooq & Sarwar (2011) examined the relationship between Edu. and econ. growth of Pakistan utilizing time series data for the period of 1971-72 to 2008-09. Edu. was measured through ten different indicators in their study. To examine the short-run (SR) and long-run (LR) relationships, they have applied ARDL Approach to Co-integration. To check causality, the Toda-Yamamoto (TY) causality technique was used. The findings of their study confirmed the long run relationship between Edu., PK, LF and econ. growth in Pakistan. The results of causality confirmed the bi-directional causality between Edu. and econ. growth. They recommend more investment in university Edu. that, in turn, leads to more econ. growth in Pakistan.

Chaudhary, Iqbal & Gillani (2009) investigated the causality between higher Edu. and econ. Growth for the time period of 1972-73 to 2005-06 for Pakistan. The results of their study confirm the LR relationship between Edu., PK, LF and real GDP. They find unidirectional causality that runs from real GDP to higher Edu.. Chaudhary, Iqbal & Gillani (2009) used university enrollment as a measure of higher Edu.. But the definition

of higher Edu. in Pakistan is little bit different. In Pakistan, higher Edu. includes college Edu. and university Edu.. If proper proxy of higher Edu. was used, then it may possible that higher Edu. may cause also to econ. growth.

Afzal, Farooq, Ahmad, Begum, & Quddus (2010) analyzed the SR and LR relationship between school Edu. and econ. growth in Pakistan. Time series data for the period of 1970 to 2008 was used. The SR results of ARDL approach confirmed the inverse relationships between school Edu. and econ. growth. Direct relationship was found between school Edu. and econ. growth in the LR. Inflation was found to hurt the econ. growth both in the SR as well as in the LR. Their study recommended that the reduction in inflation and Pov. was necessary to enhance the school Edu. and econ. growth for Pakistan.

Permaani (2008) explored the determinant of econ. growth in East Asian countries. He used panel data set for the period of 1965-2000. Schooling years as a measure of human capital was used. He estimated the 'Labour Augmented Solow Model'. Human capital proved itself a significant determinant of econ. growth according to the results of Permaani's study.

Francis & Iyare (2006) checked the causality between Edu. and econ. development in the Caribbean. They used 'Vector Error Correction Model (VECM)' by using time series data from 1964-65 to 1998-99. The results confirmed bidirectional causality between Edu. and income in the SR, but no causality was found between Edu. and income in the SR and LR in Barbados, Trinidad and Tobago. Their study suggested more income spending on Edu. for more econ. development.

Islam, Wadud & Islam (2007) checked causality between Edu. and econ. growth in Bangladesh by using data from 1976 to 2003. They have used multivariate approach rather than bivariate approach in their analysis. They found bidirectional causality between econ. growth and Edu. and confirmed the LR relationship between Edu. and econ. growth.

Podreca & Carmeci (2004) explored the linkage between Edu. and econ. growth. They used panel data set of five year moving average for the time span of 1960-1990 by taking 81 developed and least developed sample countries. The average year of schooling was used as proxy of Edu. Generalized Method of Movement (GMM) was applied for empirical

analysis. They found positive impact of average year of schooling on econ. growth in case of all sample countries.

Danacica, Belascu & Llie (2010) used time series data for the span of 1980-2008 to explore the causal nexus between higher Edu. and econ. growth in case of Romania. The results of their study confirmed that there was a LR relationship between higher Edu. and econ. growth. One way causality running from econ. growth to higher Edu. was also found. However, this study faced a serious drawback. They used Johansen & Juelius (1990, 1995) co-integration technique on just 28 observations and the optimal lag-length was four. The estimated results may mislead and data may face the loss of degree of freedom due to short data span.

Kakar, Khilji & Khan (2011) have examined the LR relationship between Edu. and econ. Growth for Pakistan. They used educational expenditure as a proxy of human capital and time series data for the period of 1980-2009. The results of their study confirmed the LR relationship between Edu. and econ. growth. They also found that the PK and LF helped to enhance the econ. growth with Edu.. Their study recommends that the government should make such policies that help to improve the quality of Edu. in order to accumulate human capital for econ. development.

Barro & Lee (2010) investigated the linkage between econ. growth and Edu. in case of 146 countries by utilizing large panel data set. GMM system estimator proposed by Areccano & Bovver (1995), and Blundell & Bond (1998) was applied for analysis. Average year of schooling of working age population and educational attainment of worker at different level of Edu. were used as measures of human capital. The result of their study showed that the schooling had a positive effect on econ. growth in all sample countries.

Veron & Fabre (2004) explored the effect of Pov. and educational policies on child labour, econ. growth and school attendance. Tradeoff between human capital accumulation and child labour has been found. Pov. trap may occur when parents are not choosing quality of Edu.. Further, they said that public Edu. system more easily generated Pov., while the private Edu. system improved the growth through quality of Edu. and lesser chances of Pov. trap.

Chaudhary & Rehman (2009) explored the role of Edu. in reducing the Pov. in Pakistan by using time series data from 1972 to 2007. The results of this study confirmed that the primary and middle Edu. were positively but insignificantly related to Pov., while university Edu. was negatively and significantly related to Pov.. Their results also confirm the negative but insignificant relationship of econ. growth with Pov.. This study is based on time series data but does not explore the problem of stationarity. On the other hand, the results of Autoregressive regression and correlation matrix do not support each other and multicollinearity is also seen in their model.

Rahman & Peng (2012) investigated the LR relationship between different level of Edu. and econ. growth in case of Bangladesh and China by using time series data from the period of 1980-2009. Co-integration, ECM and Granger Causality were applied for empirical analysis. Real GDP, gross enrollment at primary, secondary and tertiary levels of Edu. were the variables of their study. The findings of Rahman & Peng (2012) showed that the primary and tertiary level of Edu. have positive effect on econ. growth of Bangladesh. In case of China, secondary enrollment and tertiary enrollment had significant positive effect on econ. growth. Unidirectional causality existed from econ. growth to higher Edu. and from secondary to primary Edu. in case of Bangladesh. In China, unidirectional causality existed from primary and secondary Edu. to econ. growth and bidirectional causality between primary and secondary Edu..

Shahbaz, Iqbal & Butt (2011) explored the causality between human development and econ. growth by using large panel data set of ten Asian developing countries *i.e.*, Pakistan, Bangladesh, India, Indonesia, Malaysia, Korea, Philippines, Singapore, Sri Lanka and Thailand. The results showed homogeneous causality running from human development to econ. growth. A heterogeneous causality has found from econ. growth to human development. Only Korea and Singapore have bidirectional causality between human development and econ. growth. The causality was not found between human development and econ. growth in Bangladesh and Philippine,.

Afzal, Malik, Begum, Sarwar & Fatima (2012) for Pakistan utilized the time series data on Edu., Pov., real GDP and PK for the span of 1971-72 to 2009-10. The findings of their ARDL model confirmed positive and significant effect of PK on econ. growth both in the SR and LR. Edu.

affected the econ. growth positively and significantly only in the LR. Pov. and econ. growth were inversely related to each other only in the LR. The results of Toda-Yamamoto Augmented Granger Causality (TYAGC) Test confirmed the bidirectional causality between Edu. and econ. growth, between econ. growth and Pov. and between Pov. and Edu.. They recommended that Pov. reduction and Edu. enhancing strategies must be adopted to accelerate the process of econ. growth of the country.

Dauda (2009) examined the LR relationship between Edu. and econ. growth with inclusion of PK and LF. Johansen Cointegration and Error Correction Model (ECM) were applied for the period of 1997-2007 in case of Nigeria. Government expenditure on Edu. was used as proxy of Edu.. Empirical results confirmed the LR relationship between Edu., econ. growth and gross capital formation. The study also found that the Edu. and PK have positive and significant impact on econ. growth, but LF has insignificant impact on econ. growth. Dauda (2009) claimed that educational investment positively correlated with the econ. growth with inclusion of a PK and LF.

Babalola (2011) explored the SR and LR relationship and causality between Edu. and econ. growth using time series data from 1977-2008 in case of Nigeria. Investment in Edu. was used as a proxy variable for measuring Edu.. Johansen co-integration formulated by Johansen & Javelins (1992) for LR relationship and Grange causality test (1996) for causality were employed. He found co-integration and SR relationship between Edu. and econ. growth in Nigeria. The results of the study also showed the unidirectional causality running from econ. growth to Edu..

Solaki (2006) investigated the LR and SR relationship between human capital and econ. growth for Greece by utilizing time series data from 1961-2006. Primary, secondary and tertiary Edu. was used as a proxy of human capital. Johansen co-integration, Error Correction Model and Grange causality tests were used. He found the LR and SR relationship between Edu. and econ. growth. Higher Edu. and government expenditure on Edu. cause the econ. growth. He found that in case of primary and secondary Edu. causality running from econ. growth to Edu.. He suggested that the government should increase investment in Edu., particularly in higher Edu. for econ. growth.



Chandara (2010) examined causality between government expenditure on Edu. and econ. growth for India for the period of 1951-2009. Linear and nonlinear Granger causality tests (1969) were employed. Statistical technique constructed by Back & Brock (1992) and modified by Hoekstra & Jones (1994) was used to check causality between Edu. and econ. growth. The empirical results confirmed bi-directional causality between econ. growth and Edu..

Brempong, Paddison & Mitiku (2006) analyzed the relationship between higher Edu. and econ. growth in African countries. Panel data set for the time span of 1960-2000 was used. Enrollment at higher Edu. and educational attainment were used to measuring human capital. 'Augmented Neoclassical Growth model' of Mankiw, Romer & Weil (1992) was employed for estimation. The empirical results of their study confirmed positive significant impact of higher Edu. on econ. growth.

Hassan & Ahmed (2006) examined the relationship between Edu. and econ. growth in 39 Sub Saharan African countries. Panel data for the period of 1975-2005 was used. Primary and secondary school enrollments ratios were used as a measure of Edu.. The augmented Solow model proposed by Mankiw, Romer & Weil (1992) was applied for analysis. The result of their study reveals that the primary and secondary school enrollments ratios have positive impact on econ. growth.

Keeping in view the above discussion, the primary objective of the present research work was to examine the role of Edu. for econ. growth and vice versa with the inclusion of PK, LF and Pov. for Bangladesh, India, Pakistan and Sri Lanka. The present study differs from most of the above mentioned previous studies in the following respects: (a) this study applies more suitable econometric technique *i.e.*, Panel data analysis to check the robustness of the results. (b) the present study also used more comprehensive measures in its analysis *i.e.*, Gross Enrollment Index (GEI) for measuring Edu., Human Pov. Index (HPI) for measuring Pov. and GDP index for measuring econ. growth, while most of the previous studies on the relationship among Edu., Pov. and econ. growth have used naive measures of Edu., Pov. and econ. growth in their analysis. There exists hardly any study in literature that examined Edu. econ. growth relationship in the presence of other variables like PK, LF and Pov. using panel data approach in case of South Asian region.

## DATA SOURCES AND METHODOLOGY

The reliability of empirical results always depends upon reliable data, data frequency, data span, data sources and the methodology used in the analysis. This section includes data sources and methodology that have been used in the analysis.

### Data Sources

The present study used annual time series data from 1995-96 to 2012-13 in case of Bangladesh, India, Pakistan and Sri Lanka. The data on the variables gross domestic product per capita (GDPpc), Edu., PK, LF and Pov. have been drawn from World Development Indicators (WDI) and United Nations Development Program (UNDP).

### Methodology

To examine the relationship among econ. growth, Edu., and Pov., the 'Fixed Effects Model'(FEM) was applied to estimate the following equation:

$$GDPI_{i,j} = \gamma_0 + \gamma_1 PK_{ij} + \gamma_2 LF_{ij} + \gamma_3 Edu_{ij} + \gamma_4 HPI_{ij} + \varepsilon_{ij} \quad (\text{Model 1})$$

Where:

GDPI<sub>ij</sub> = GDP index

PK<sub>ij</sub> = Physical capital

LF<sub>ij</sub> = Labour force

Edu.<sub>ij</sub> = Education. Education was measured by two indicators i.e., Gross Enrolment Index (GEI) and Education Index (Edu.Index)

HPI<sub>ij</sub> = Human Poverty Index

E<sub>ij</sub> = Error term

### GDP Index (GDPI)

The gross domestic product (GDP) represents the market value of all final goods and services that are produced within the boundaries of a country in a year. GDP captures the overall wellbeing of an economy. The present research work used a more comprehensive measure of econ. growth *i.e.*, GDP index (GDPI), rather than using GDP or real GDP to measure econ.

growth. The present study has developed GDPI by using the 2000 UNDP methodology as:

$$GDPI = \frac{\text{Log}(GDPpc) - \text{Log}(min)}{\text{Log}(max) - \text{Log}(min)}$$

Where:

GDPpc = The GDP per capita.

max = The highest value of the GDPpc

min = The minimum of the GDPpc

In the above case, the maximum and minimum values of GDPpc are '40000' and '100', respectively.

### **Gross Enrollment Index (GEI)**

Edu. is one of the most important sources of econ. Growth and development. This study used a relatively better measure of Edu. i.e., Gross Enrollment Index (GEI). GEI was constructed by combining primary, secondary, and tertiary gross enrollment ratios (GER). GER was an indication of different levels of Edu.. The GEI was calculated by using 2000 UNDP methodology as follows:

$$GEI = \frac{GER - min}{max - min}$$

Where:

GER = The gross enrollment ratio

max = The maximum value of the GER

min = The minimum of the GER.

In this case, the maximum and the minimum values of GER are '100' and '0', respectively.

## **Education Index (Edu. Index)**

Edu. Index, a key indicator that is utilized as a proxy to measure educational development of a country. Edu.Index was constructed by using 2000 UNDP methodology. In Edu.Index, adult literacy rate (ALR) with two-thirds weighting and the combined primary, secondary, and tertiary gross enrollment ratio (GER) with one-third weighting were added together. This measure for education in case of Pakistan was already used by Afzal, Rehman, Farooq and Sarwar (2011) and Afzal, Malik, Begum, Sarwar & Fatima (2012).

Afzal, Rehman, Farooq and Sarwar (2011) constructed education index as “Education index is constructed by adding together adult literacy rate index (ALI) with two-third weightage and the combined primary, secondary, and tertiary gross enrollment ratio index (GEI) with one-third weightage. The adult literacy rate (ALR) gives an indication of the ability to read and write, while the gross enrolment ratio (GER) gives an indication of the level of education.

$$\text{Education Index} = \frac{2}{3} * ALI + \frac{1}{3} * GEI$$

$$\text{Adult Literacy Index (ALI)} = \frac{ALR - 0}{100 - 0}$$

$$\text{Gross Enrollment Index (GEI)} = \frac{GER - 0}{100 - 0}$$

where ‘0’ and ‘100’ are the minimum and maximum values of the variables adult literacy rate and gross enrollment ratio” (p. 323).

## **Physical Capital (PK)**

More savings leads to more capital that, in turn, was used for investment purposes (Solow, 1956). A significant role of PK is recognized in the process of econ. growth and hence development. PK was measured by the rate of growth of ‘gross fixed capital formation’.

### ***Labour Force (LF)***

A country's skilled LF helps in her eco. growth as well as development process. LF was measured by growth rate of population in the present research work. It is one of the important components of production function (Hall, 2000).

### ***Human Poverty Index (HPI)***

Pov. being an important variable directly or indirectly affects each of Edu. and econ. growth. This research work used a better comprehensive measure of Pov. known as 'Human Poverty Index (HPI)'. HPI is an indication of the standards of living in an economy. The data for the variable HPI has been taken from UNDP to complement the 'Human Development Index (HDI)'. HPI is considered as a better reflect of the extent of deprivation as compared to the HDI.

### **Advantages of using Panel Data**

Studies on cross sectional and time series data have faced certain problems and limitations. To avoid such limitations of each cross section and time series data, the present study utilizes panel data to analyze the trends of different cross section over time. "The advantages of using panel data can be summarized as follows: (a) they provide more efficient estimations of parameters by considering broader sources of variations, (b) they outsource more information to the analyst, and (c) they allow the study of the dynamics behavior of the parameters (d) Pooling increases the number of observations. (e) Panel data permits controlling for some types of unit heterogeneity. (f) Panel data allows testing theories that make forecasts in space and time. (g) Panel data allows to explicitly modeling dynamics. Accordingly, we use panel data to

- a) get rid of omitted variable bias
- b) make the best of the available information
- c) test theories that predict changes
- d) Test theories that predict parameter heterogeneity." (Asteriou, 2006, p. 268).

## Fixed Effects Model (FEM)

FEM was used to explore the relationship between explained and explanatory variables within an entity. FEM assumes that some factors within the entity may have impact on explained variables. FEM controls these factors by introducing dummy variables for time invariant characteristics *i.e.*, colonial origin, religion and race *etc.* Time invariant features are unique and exclusive for each cross section. It is not correlated with other individual characteristics. So, each entity is different, therefore, error and intercept terms of each entity is not correlated with others. FEM has constant slopes and different intercept term for each cross section unit. It can also be said that Fixed Effects Estimator treated the entity specific or group specific. This means that it allows the different constant for each entity. The equation of FEM is presented as follow:

$$Y_{ij} = \alpha_i + \beta X_{ij} + u_{ij}$$

Where:

Y = Dependant variable

$\alpha$  = Intercept for each cross section unit

X = Explanatory variable

i = Each cross section entity or unit

j = Time period

u = Error term or disturbance term

The validity of the variables used in FEM can be checked through performing the F-test. The hypothesis of F-test can be written as:

$$H_0 = u_1 = u_2 \dots u_{N-1} = 0$$

Baltagi (2005) said that it was simply the 'Chow test' with Restricted Residual Sum of Square (RRSS) that is obtained from OLS regression. The Unrestricted Residual Sum of Square (URSS) is obtained by Least Squares Dummy variables of 'Fixed Effects Regressions'. F-test follows the Chi square distribution. The rejection of the null hypothesis (H0) tells that the estimation of FEM is consistent and efficient. F-test is calculated by using the following formula:

$$F = \frac{\frac{RRSS - URSS}{N} - 1}{\frac{URSS}{NT - N - K}}$$

Where:

- RRSS = Restricted Residual Sum of Squares
- URSS = Unrestricted Residual Sum of Squares
- N = Number of Cross Sections
- K = Number of parameters to be estimated
- T = Time period

## EMPIRICAL RESULTS AND THEIR INTERPRETATION

This section presents empirical results and their interpretation.

### Descriptive statistics

Descriptive statistics involved transformation of raw data in to a form that would provide information to describe a set of factors in a situation. This is done through ordering and manipulation of collected raw data. At preliminary level of a research, it is of great interest to know frequently of certain phenomenon occurs, the mean, the median, the maximum and minimum values, as well as the extent of variability in the data set *i.e.*, standard deviation, and histograms of the dependent and independent variables. Descriptive statistics of the variables used in the analysis are given in Table 1.

Table 1: Descriptive statistics

	Mean	Median	Maximum	Minimum
<b>Overall (for all selected countries)</b>				
GDPI	52.85	53.00	67.00	35.00
PK	11.09	8.54	28.04	-11.96
LF	1.48	1.46	2.66	0.44
GEI	53.16	54.00	71.00	34.95
Edu.Index	59.34	54.00	87.00	38.00
HPI	31.30	33.10	46.00	17.70
<b>Bangladesh</b>				
GDPI	43.81	44.50	50.00	35.00

	<b>Mean</b>	<b>Median</b>	<b>Maximum</b>	<b>Minimum</b>
PK	8.40	8.38	12.06	1.80
LF	1.60	1.70	2.09	1.05
GEI	46.46	48.70	57.00	35.00
Edu.Index	45.56	45.00	54.00	38.00
HPI	41.21	42.50	46.00	34.90
<b>India</b>				
GDPI	54.84	56.00	62.00	45.00
PK	9.34	8.00	18.85	-0.01
LF	1.50	1.43	1.78	1.30
GEI	58.91	61.00	63.80	52.12
Edu.Index	60.78	61.00	67.00	53.00
HPI	31.05	31.30	36.90	26.50
<b>Pakistan</b>				
GDPI	51.26	52.00	56.00	46.00
PK	2.34	2.34	19.90	-11.96
LF	2.00	1.81	2.66	1.50
GEI	39.49	40.00	43.00	34.95
Edu.Index	46.15	46.00	53.00	38.00
HPI	36.77	36.30	43.00	30.00
<b>Sri Lanka</b>				
GDPI	61.21	63.00	67.00	52.00
PK	24.18	24.18	28.04	20.04
LF	89.32	92.00	1.24	44.00
GEI	67.34	68.70	71.00	62.70
Edu.Index	83.43	83.00	87.00	81.00
HPI	17.28	17.60	21.00	17.70

The descriptive statistics given in Table 1 reveals that the overall average score of GDPI is 52.85. In terms of GDPI, Bangladesh and Pakistan perform below the overall averages score, while Sri lanka and India remains above the overall average. Regarding GEI, Sri Lanka is on the top with score of 67.34. The overall average score of GEI is 53.16. Pakistan is at the lowest among the selected countries in terms of GEI score. Pakistan is in dire need to raise her average score of GEI. The mean value of HPI is 31.30. Sri Lanka performs well and got the mean HPI score of 17.28, while Bangladesh is at the top with 41.21 mean score of HPI.

The results of the extent of relationship between variables are presented in Table 2. The correlation results given in Table 2 depict the positive correlation between GEI and GDPI, between Edu.Index and GDPI with the value of 0.72 and 0.81, respectively. The correlation between PK and



GDPI is found to be 0.53, while LF is correlated with GDPI with the value of -0.54. HPI and GDPI are correlated with a value of -0.86.

F-test is the choice between ‘Fixed Effects Estimation Method (FEM)’ and ‘Pooled Ordinary Least Squares Method’ (Pooled OLS). If the value of F-test is significant then ‘Fixed Effects’ gives the better results than that of the ‘Pooled OLS’. The result of F-test, when education was measured by GEI is presented in Table 3(a) and the result of F-test, when education was measured by Edu.Index is presented in Table 3(b).

**Table 2: Cross Correlation**

	GDPI	GEI	Edu.Index	HPI	PK	LF
GDPI	1.00					
GEI	0.72	1.00				
Edu.Index	0.81	0.91	1.00			
HPI	-0.86	-0.82	-0.97	1.00		
PK	0.53	0.71	0.77	-0.71	1.00	
LF	-0.54	-0.79	-0.84	0.78	-0.69	1.00

**Table 3(a): F-Test estimates, when education is measured by GEI for specification 6**

Effects Test	Statistic	d.f.	p-value
Cross-section F	6.666	(3,56)	0.000
Cross-section Chi-square	19.542	3	0.000

**Table 3(b): F-Test, when education is measured by Edu.Index for specification 12**

Effects Test	Statistic	d.f.	p-value
Cross-section F	7.989	(3,68)	0.001
Cross-section Chi-square	22.946	3	0.000

As the value of F-test is significant in Table 3(a) and 3(b), the model 1 is estimated by applying Fixed Effects Method (FEM). The results of FEM of model 1 are present in Table 4.

The results of twelve different specifications of model 1 are presented in Table 4. Edu. is measured by its two indicators i.e., GEI and Edu.Index. Edu. was measured by GEI in first six specifications, while Edu.Index was used to measure Edu. in next six specifications. FEM is used to control the country specific differences. The positive and significant effect of PK and

Edu. on GDPI is found. PK and Edu. level of these countries may further improved to further accelerate GDPI of these countries. HPI is found to be inversely related to GDPI. This may be due to the fact that it is very hard to produce more in the presence of Pov.. Pov. seems to be very extensive in the countries being studied that, in turn, creates hindrance in the way of development of these countries. The effect of LF on GDPI is found positive but insignificant in most of the specifications including our preferred specification i.e., specification 6. It may be the outcome that the population of these countries may not seem to be much more productive. Pakistan, India and Bangladesh are the top five populous countries of the world.

The goodness of fit is well established in all twelve specifications as the value of F statistic in all specifications in Table 4 is highly significant. A large proportion of variation in GDPI is being explained by GEI or Edu.Index, PK, LF, and HPI as the value of R2 and adj.R2 ranges from 78 to 86 percent and 77 to 85 percent, respectively. The F-value increases remarkably in specifications 6 as compared to that found in the case of other specifications, so specification 6 is our preferred specification among all. The F-value consistently rejects the null hypothesis that all the added explanatory variables in different specifications are jointly equal to zero.

**Table 4: Fixed Effects Estimates of Model 1**  
*Dependent variable: Economic Growth measured by GDPI*

	1	2	3	4	5	6	7	8	9	10	11	12
GEI	0.05 (0.000)	0.005 (0.000)	0.005 (0.0167)	0.003 (0.000)	0.005 (0.012)	0.004 (0.001)	–	–	–	–	–	–
Edu.Index	–	–	–	–	–	–	0.562 (0.001)	0.567 (0.000)	0.830 (0.012)	0.229 (0.011)	0.872 (0.009)	0.558 (0.081)
PK	–	0.007 (0.100)	–	–	0.005 (0.034)	0.001 (0.007)	–	0.001 (0.007)	–	–	0.001 (0.017)	0.001 (0.035)
LF	–	–	0.015 (0.727)	–	0.014 (0.744)	0.039 (0.213)	–	–	0.052 (0.346)	–	0.058 (0.290)	0.054 (0.240)
HPI	–	–	–	-0.006 (0.006)	–	-0.007 (0.000)	–	–	–	-0.005 (0.023)	–	-0.004 (0.014)
R <sup>2</sup>	0.78	0.79	0.79	0.84	0.79	0.86	0.81	0.81	0.82	0.81	0.83	0.84
Adj. R <sup>2</sup>	0.77	0.77	0.77	0.83	0.77	0.85	0.79	0.79	0.81	0.81	0.81	0.82
F-value	65.83 (0.000)	52.46 (0.000)	52.88 (0.000)	78.12 (0.000)	43.76 (0.000)	164.93 (0.000)	74.04 (0.000)	59.23 (0.000)	65.38 (0.000)	63.59 (0.000)	55.93 (0.000)	50.69 (0.000)

## CONCLUSION AND RECOMMENDATIONS

Edu. in each and every sense is very important for accelerating econ. growth and reducing Pov.. Edu. helps in reducing Pov. and improving the socio-economic indicator of the country.

### CONCLUSION

The present research was designed to explore the linkages between education, poverty and econ. growth in selected South Asian countries by utilizing panel data for the period of 1995-96 to 2010-11. 'Fixed Effects Estimation Technique'(FEM) was applied in the analysis. The FEM has an advantage because it control for the country-specific characteristics that are time invariant. Overall *i.e.*, for all selected countries, the average score of GDPI has been found to be 52. The average GDPI score of Bangladesh and Pakistan has been found to be below than that of the overall averages score of GDPI of these countries. The average score of GDPI for Sri lank and India is found to be above than that of the overall averages score of GDPI. Pakistan is at the lowest in terms of her average GEI score. Pakistan is in dire need to raise her average score of GEI to compete with other countries of the region.

The effect of physical capital and education has been found to be positive and statistical significant on econ. growth of these countries. Poverty has significant negative effect on econ. growth, while the population has negative but insignificant effect on econ. growth of these countries. Poverty seems to be very extensive in the countries being studied. The population of these countries seems to be less productive.

### RECOMMENDATIONS

On the basis of discussions and findings, this study recommends that:

- a. Each sample country, especially Pakistan should give more priority to enhance the education level of their masses so that the econ. growth of these countries, especially the econ. growth of Pakistan may be further accelerated.
- b. The investment in education provides at least constant returns to scale and helps in achieving sustainable econ. growth. The low productivity

- growth is mainly attributed to the insufficient and low quality education of the labor force. The worker training programs should be promoted by increasing investment in education.
- c. Poverty reduction policies must be the part and parcel of every economic policy and plan of these countries. Government of these countries should make such policies that reduce poverty both in the short run and long run.
  - d. These countries should reduce their population or must introduce such policies that engage their population in a more productive uses, so that inactive population may positively contribute in the way of econ. growth and hence econ. development of these countries.
  - e. This study also recommends that the linkages among education, poverty and econ. growth by including other factors other than physical capital and labour force may further be checked and generalized.

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