

## **The Impact of Human Capital on Economic Growth: Evidence from Selected Asian Countries**

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### **Abstract**

*The aim of this paper is to find out the role of human capital in economic growth of selected Asian countries namely Pakistan, India, Bangladesh and Sri Lanka. It is based on time series data for the period 1971-2013. Ordinary least Squares (OLS) and Cointegration have been used as analytical techniques for this purpose. The results obtained through Ordinary least Squares show that human capital in form of education affects economic growth in all selected countries except India. The relationship is positive and statistically significant. Moreover, physical capital is another significant determinant of economic growth in the study area. When education is replaced by health as human capital, the OLS results demonstrate a little change showing human capital a significant determinant of economic growth but physical capital in case of India becomes insignificant. In order to avoid the doubt of spurious regression stationarity was checked by using the Augmented Dickey Fuller (ADF) test and long run relationship was analyzed by conducting Johansen Cointegration Test. The Cointegration test results confirmed the existence of long run relationship in human capital (education) and economic growth in Pakistan and Bangladesh. Moreover, there is long run association between human capital in form of health and economic growth in Pakistan, India and Bangladesh. It is therefore concluded that human capital in form of health and education is an important determinant of GDP per capita in most of selected countries. It is, therefore suggested to focus on health and education to reap the economies of sustained economic growth.*

**Key Words:** Human Capital, Economic Growth, Health, Education, South Asia

**JEL Classification:** I25, O15, O47

### **Introduction**

The story of economic growth is not new one. It is extended backward to 18<sup>th</sup> century. It is believed that the basis for economic growth was provided by the economists centuries ago. Smith (1776), Ricardo (1817), Ramsey (1928), Young (1928) and Schumpeter (1934) provided the concepts like competitive behavior, equilibrium dynamics, role of diminishing returns and per capita income (Barro and Sala-i-Martin, 2004). The legendary work of Solow (1956) and Swan (1956) opened new debate in the theory of economic growth which opened ways for other determinants of economic growth.

The revolutionary work of economists in 1980s declared human capital as an important source of economic growth. The models of Romer (1986), Lucas (1988), Barro (1991) and Becker (1993) treated human capital as important source of economic growth. In 1980s, New Growth Theories led the developing countries to discover ways for utilizing its huge human resources. A large number of indicators like school enrollment, education expenditure, literacy rate, health expenditures, life expectancy, and, Research and Development (R&D) were combined in a term "Human Capital". Becker (1993) called expenditures on education, medical care, computer trainings and experience as investments in human capital because skills and medical care are embodied in human and cannot be separated from them. Therefore this is referred to as human capital. According to Abbas (2001), there is positive relationship between human capital and economic growth

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in India. The study suggested strengthening of investments in all levels of education. It was also suggested to lay emphasis on technical education to equip the huge population with some effective skills. Khan (2012), Khattak and Khan (2012a), Khattak and Khan (2012b), Azam and Ather (2015), Khan and Khattak (2013), Khan and Zilakat (2015) and Khan *et al* (2015) insisted on investment in human capital in Pakistan to keep the economy on path of sustained economic growth.

Elaborating the significance of human capital in Sri Lanka, Hersha *et al* (2014) stated that the public goods, and distributive justice aspects of education deliver the economic justification for investment in the education sector. Similarly Sharif *et al* (2013) empirically verified the role of human resource development in economic growth of Bangladesh.

The recent economic problems in form of deficits in balance of payments, galloping inflation, and rapidly increasing foreign debt in developing countries have led to a fundamental reexamination of development strategies (Khan and Carmen, 1990). Therefore, most of developing economies tried to leave no stone unturned for optimum use of human capital. The economists are also in search of different dimensions of human. No country can imagine sustainable economic growth without huge investment in human capital (Ilhan, 2001). Among the set of developing economies of South Asia, India, Bangladesh, and Sri Lanka are emerging as rapidly growing economies.

India had a population of 111.2 million in 2008 with a population density of and literacy rate of 81 % (World Development Indicators, 2010). Abbas (2001) found positive impact of human capital on economic growth in India. Primary and secondary education significantly affects economic growth in India while the effects of higher education seemed insignificant. Education increase productivity, creativity and technological advancement which leads to accelerate the economic growth rate of a country (Ozturk, 2008). The GDP per capita growth in India has been slow in 1970s, fast in 1980s but again slow in 1990s (Pissarides, 2000). Bangladesh which got independence from Pakistan in 1971 has a population of 154038 thousands while the state of Sri Lanka consists of 21129 thousand in 2008 people.

This paper intends to explore the role of human capital in economic growth of Pakistan, India, Bangladesh and Sri Lanka. The study has used two different proxies health and education for human capital.

### **The Status of Human Capital and Economic Growth in the Study Area**

In Bangladesh, the government finances primary, secondary and higher secondary education. The higher education in Bangladesh is operated by the government through the University Grants Commission. Private sector is emerging as an important source of imparting education. The education sector in India is operated by central, state and local governments.

India took start from a very low literacy profile like Pakistan but it tried continuously to cover the deficiency. In 1981 it had a literacy rate of 53.78 percent which consists of 66.31 percent male and 40.32 percent female literacy rate. The literacy rate of Bangladesh was 35.65 percent for both sexes and 44.36 percent for male during the same period. This may be due to the reason that India became independent country in 1971 and it was still its initial period. It was able to achieve the literacy rate of 75.45 in 2009/10. India also improved its literacy profile and its literacy rate remained 81.13 percent in 2006 (World Development Indicators). The literacy rate of India and Bangladesh during 1981/2010 is given in the table. The literacy rates during different periods in India, Bangladesh and Iran are displayed in Table 1.

**Table I: Literacy Rate 15-24**

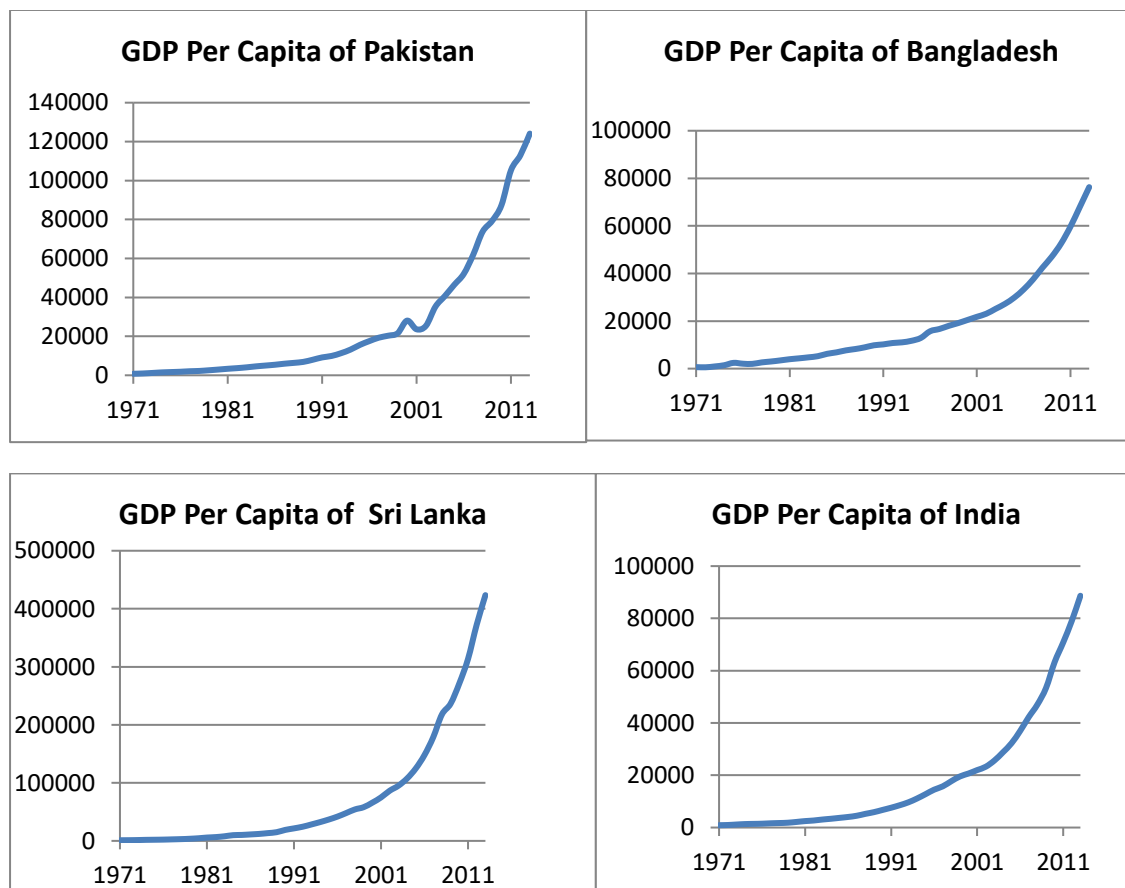
Year	India	Bangladesh	Pakistan	Srilanka
1981	53.78	35.65	34.78	91.04
1991	61.90	44.68	49.60	-
2001	76.42	63.62	30.38	95.58
2009-10		75.45	71.11	98.15
2013		81.08		

Source: World Development Indicators ( Various Issues)

### GDP Growth Rates

The economic growth history of the selected countries show that they started from very low per capita income but gradually the pace of growth rate took acceleration. The GDP per capita started rapid increase in early 1990s in all countries as evident from the Figure I. The jumps can also be seen in the graphs.

**Figure I: History of GDP Per Capita**



## Data and Methodology

### Data

The study is based on secondary data taken from World Development Indicators, covering the period, 1973-2013. Some other sources of data are Human Development Reports by United Nations Development Fund during different years and Penn World Tables

### Theoretical Framework

The theoretical framework of this paper is based on Coorey (2009) and Khan (2012). The model begins with the given equation.

$$y = A(k)^\alpha (\theta h)^\beta \quad (1)$$

$$\ln y = \ln [A(k)^\alpha (\theta h)^\beta] \quad (2)$$

$$\ln y = \ln A + \ln(k)^\alpha + \ln(\theta h)^\beta \quad (3)$$

By simplification and solving we get the following model for estimation.

$$\ln y = \beta_0 + \beta_1 \ln k + \beta_1 \ln \theta + \beta_1 \ln h + \varepsilon_i \quad (4)$$

In equation (1),

y = Economic Growth (Measured by Gross Domestic Product)

k = Physical Capital                       $\theta$  = Labour

h = Human Capital

The final equation for estimation can be written as

$$\ln y = \beta_0 + \beta_1 \ln k + \beta_1 \ln \theta + \beta_1 \ln h + \varepsilon_i$$

Economic growth in this paper has been measured by real GDP per capita<sup>1</sup> and physical capital by Gross Fixed capital. Literature shows that different proxies are used for human capital. Education is one of most widely used proxy. Romer (1989), Barro (1991), Levine and Renelt (1992), Benhabib and Spiegel (1992), Mankiw, Romer and Weil (1992), Hanushek (1995), Gemmel (1996), Krueger and Lindahl (2001), Temple (2001), Woessmann (2007), Khan (2012), and Khan and Khattak (2015), used school enrolment, literacy rate, average years of schooling and education expenditure on education as proxy for human capital. This paper uses school enrollment as proxy for human capital. Moreover,  $\theta$  shows total labour force.

In order to further confirm the role of human capital in economic growth, the proxy for human capital as education is replaced by health. The equation for estimation becomes

$$\ln y = \beta_0 + \beta_1 \ln k + \beta_1 \ln \theta + \beta_1 \ln h_h + \varepsilon_i$$

Where,  $h_h$  stands for human capital as health

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<sup>1</sup> Khan (2012), Khattak and Khan (2012), Khattak and Khan (2013), Khan and Khattak (2015), Khan et al (2015) used real GDP per Capita as a measure of economic growth.

**Estimation techniques**

In order to achieve the objectives of the study, different econometric techniques have been employed in this paper. The results were obtained by using Ordinary Least Squares (OLS), Augmented Dickey Fuller Technique and Johanson Cointegration<sup>2</sup> test.

**Results and Discussion**

This paper intends to explore the effects of human capital on economic growth of selected Asian countries. First of all the empirical results were obtained by applying the Ordinary Least Squares (OLS) method. The OLS results for Bangladesh showed that human capital in form of education (Secondary School Enrollment) affects economic growth positively and the result is statistically significant. This means that increase in school enrollment will push up the GDP Per capita of Bangladesh. The results further show physical capital a significant determinant of economic growth in Bangladesh. The results have been displayed in Table II.

Variable	Bangladesh	India	Pakistan	Srilanka
<b>LogSSE</b>	0.3778 [2.6154] (0.0126)**	0.1084 [0.5792] (0.5657)	0.5909 2.5705 (0.0141)**	0.6017 [2.5520] (0.0147)**
<b>LogGFC</b>	0.5871 [12.016] (0.0000)*	0.7879 [13.4048] (0.0000)*	0.3866 3.5570 (0.0010)*	0.2550 [2.1003] (0.0422)**
<b>LogPop</b>	-0.3094 [0.5975] (0.5536)	-.6541 [1.5696] (0.1246)	1.2097 [1.8816] (0.0674)***	8.8686 [4.9580] (0.0000)*
<b>F-Stat</b>	2556.132*	6816.9*	1834.8*	2482.34*
<b>R-Sq</b>	99.4	99.8	99.2	99.47

**Table II: OLS Results with Education as Human Capital**

However, labour proxied by population failed to show its expected role as the coefficient bears unexpected sign and the result is also insignificant. When education is replaced by health as human capital, the results remain the same. Human capital in form of health also shows positive and significant role in economic growth of Bangladesh. However the coefficient of health 0.714 is greater than coefficient of education (SSE) 0.377 which means the contribution of human capital increases when health is used as proxy for human capital. The coefficient of physical capital also remains significant and its coefficient rises from 0.587 to 0.691 showing that human capital is a significant determinant of economic growth in Bangladesh.

The OLS results for India show positive impact of human capital and physical capital on economic growth but the result is insignificant in case of the former when education is used as human capital. The significance reverses when education is replaced by health in the growth equation. However, the labour in form of population does not prove its significance irrespective of proxy for human capital. The R-Square and F-Statistic are favorable in case of India as shown in Table –II and III.

The estimation results for Pakistan show that in case of education as proxy for human capital, all the variables human capital, physical capital and labour positively and significantly affect the economic growth. The coefficient of human capital 0.591 is greater than physical capital 0.3866 which show the contribution of human capital is greater than physical capital in economy of Pakistan. R-square is 99.2 which show the fit is good. When health (Life Expectancy) is used as human capital in economic growth equation, the role of human capital remains same. In other words, health also affects economic growth of Pakistan positively and significantly. An increase in the life expectancy will bring a positive change in the economic growth of Pakistan. The results also

<sup>2</sup> See Khan (2012)

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show that physical capital and labour (Population) are also significant determinants of economic growth of Pakistan. The results have been displayed in Table-II and Table-III. The R-Square and F-Statistic are also in their due limits.

Sri Lanka is also an emerging economy with plenty of human resources. The results obtained from OLS show that Educations, Physical capital and Labour positively affect GDP Per Capital in Sri Lankan economy. The result is statistically significant. Moreover when education is replaced by health as human capital the signs of variables remain the same but human capital becomes insignificant. R-Square and F-Statistic favour the estimation results in both cases. When OLS results for Educations are compare for the selected countries, the contribution of education to economic growth seems significant in all countries except India. The coefficient of human capital in form of education is higher in Sri Lanka (0.6017) than rest of countries which means that the contribution of human capital to economic growth is greater than other selected countries. When education is replaced by health as human capital, results are changed. In case of health as human capital, the contribution of human capital in India as evident from the coefficient (1.35) is higher than rest of selected countries.

Variable	Bangladsh	India	Pakistan	Srilanka
Log health	0.7144 2.5502 (0.0148)*	1.3513 1.6496 (0.0000)*	6.4749 [1.9644] (0.0566)***	0.4488 [0.2730] (0.7863)
Log GFC	0.6916 9.9366 (0.0000)*	0.8399 16.3268 0.1071	0.5885 [4.7013] (0.0000)*	0.4131 [3.4105] (0.0015)*
Log Pop	0.2412 0.6196 0.5391	0.4330 1.1366 0.2626	2.3618 [3.6550] (0.0008)*	5.8299 [4.0341] (0.0002)*
F-Stat	2537.24*	7231.12*	1723.48*	2129.32*
R-Sq	99.4	99.8	99.2	99.3

**Table III : OLS Results with Health as Human Capital**

In order to get robust results, the idea of Granger and New bold (1974), Granger (1986), Philips (1986) and Ohanian (1988) was also considered who were of the view that regression results from non-stationary time series can be spurious and deceitful for policy recommendations. It is therefore, necessary to conduct test for unit root before analyzing the time series for long run relationship. In this paper the stationarity of the data was checked by using Augmented Dickey Fuller Test. The test was conducted by using the options ‘Intercept’ and ‘Trend and Intercept’. The results show that all the variables are non-stationary at level. When their 1<sup>st</sup> difference is taken, all the variables become stationary. The results are given in table IV.

**Table IV ADF Test Results**

Variable	Intercept but No Trend				Trend and Intercept			
	Level		1 <sup>st</sup> Difference		Level		1 <sup>st</sup> Difference	
	T-Stat	Prob	T-Stat	Prob	T-Stat	Prob	T-Stat	Prob
logGDPPCBD	-1.966[0]	0.3001	-5.5756[0]	0.0000*	-3.1505[0]	0.1084	-6.0434[0]	0.0001*
logGDPPCIndia	0.9332[0]	0.9950	-4.5685 [0]	0.0007*	0.9332[0]	0.9950	-4.5684[0]	0.0007*
logGDPPCPak	-0.6075[1]	0.8578	0.8578[0]	0.0000*	-0.6075[0]	0.8578	-6.6782[0]	0.0000*
logGDPPCSLank	-0.7433[0]	0.8244	-5.4446 [0]	0.0000*	-1.8335[0]	0.6705	-5.5172[0]	0.0003*
LogGFCIndia	-0.6067 [2]	0.8578	-3.7335 [2]	0.0073*	-2.4798[0]	0.3359	-3.7335 [1]	0.0073*
LogGFCPak	1.6445 [0]	0.4514	-4.4186 [0]	0.0010*	-2.0494[0]	0.5580	-4.7655[0]	0.0022*
LogGFCBangla	-1.5563 [0]	0.4956	-10.742 [0]	0.0000*	-2.4048[0]	0.3719	-12.955[0]	0.0000*
LogGFCsriLanka	-1.1582 [1]	0.6832	-3.602 2[0]	0.0100*	-1.7509[0]	0.7103	-5.1746[0]	0.0000*
LogSSEIndia	-0.6790 [0]	0.8408	-7.0185[0]	0.0000*	-2.7812[0]	0.2118	-4.0988[0]	0.0133**

LogSSEpak	-0.3243 [2]	0.9121	-3.2899[2]	0.0222* *	-2.4416 [2]	0.3538	-5.1467[2]	0.0000*
LogSSEBangla	-0.4596[1]	0.8888	-6.1598[0]	0.0000*	-2.5966[0]	0.2838	-6.0824	0.0000*
LogSSESrilanka								
LogPopBangla	-0.6543 [0]	0.8471	-3.7336[0]	0.0071*	-2.7882	0.2094	-3.3179	0.0776***
LogPopSrilanka	-1.7973[0]	0.3766	-13.9954	0.0000	-0.9295	0.9428	-4.5915	0.0036
LogPopIndia	1.6503 [0]	0.9994	-2.9737[0]	0.0459*	-3.0030[0]	0.1435	-2.9736 [0]	0.0459**
LogPopPak	-2.0817[0]	0.2528	-5.8967[0]	0.0000	1.5217 [0]	1.0000	-4.0820 [1]	

Source: Author's Calculations based on data from World Development Indicators (2014), Lag Selection has been made by Using Minimum AIC Criteria. \* stands for 1% level of Significance.

### Cointegration Results

In order to find the existence of any possible long run relationship and avoid the chances of spurious results Johanson Cointegration test was used. The test was conducted for each country separately. The results for Pakistan showed the existence of long run relationship between the human capital and economic growth with education as proxy for human capital. When education is replaced by health, the Cointegration results still show cointegrating equations as shown in Table V. This confirms the results of OLS and it can be concluded that the OLS results for Pakistan were not spurious. In case of India, there is no long run relationship between education and GDP per capita according to the results but health affects the same in long run. When the Johanson Cointegration test is conducted for Sri Lanka, no co-integrating relationship is found. The results for Bangladesh showed.

**Table V: Johansen Co integration Test Results**

Hypotheses		Johansen Co integration Test (Intercept no trend in CE and test VAR)			
Series: LOGGDPPAK LOGGFCPAK LOGSSEP LOGPOPPAK					
H0	H1	Max Eigen Statistic	Trace Statistic	Critical value (0.05)	Prob**
$r \leq 0$	$r > 0$	0.566152	65.19781	40.17493	0.0000*
$r \leq 1$	$r > 1$	0.366470	30.96034	24.27596	0.0062**
$r \leq 2$	$r > 2$	0.196300	12.24598	12.32090	0.0515
$r \leq 3$	$r > 3$	0.077025	3.286285	4.129906	0.0828
Series: LOGGDPPAK LOGGFCPAK LOGHEALTHPAK LOGPOPPAK					
$r \leq 0$	$r > 0$	0.592493	75.00710	47.85613	0.0000*
$r \leq 1$	$r > 1$	0.409368	38.20156	29.79707	0.0043**
$r \leq 2$	$r > 2$	0.259079	12.29431	12.51798	0.0545
$r \leq 3$	$r > 3$	0.000846	0.034692	3.841466	0.8522
Series: LOGGDPPAK LOGGFCINDIA LOGHEALTHINDIA LOGPOPINDIA					
$r \leq 0$	$r > 0$	0.822865	111.0729	54.07904	0.0000*
$r \leq 1$	$r > 1$	0.424251	40.10835	35.19275	0.0136**
$r \leq 2$	$r > 2$	0.261674	17.47294	20.26184	0.1158
$r \leq 3$	$r > 3$	0.115559	5.034781	9.164546	0.2796
Series: LOGGDPPAK LOGGFCINDIA LOGPOPINDIA LOGSSEI					
$r \leq 0$	$r > 0$	0.475898	58.02239	63.87610	0.1408
$r \leq 1$	$r > 1$	0.333746	31.53354	42.91525	0.4139
$r \leq 2$	$r > 2$	0.182557	14.88409	25.87211	0.5842
$r \leq 3$	$r > 3$	0.149093	6.619545	12.51798	0.3859

<b>Series: LOGGDPSRILANKA LOGGFCSRILKA LOGHEALTHSRILANKA LOGPOPSRILANKA</b>					
r ≤ 0	r > 0	0.363982	40.31512	47.85613	0.2114
r ≤ 1	r > 1	0.254206	21.76145	29.79707	0.3120
r ≤ 2	r > 2	0.199289	9.735898	15.49471	0.3016
r ≤ 3	r > 3	0.015091	0.623438	3.841466	0.4298
r ≤ 0	r > 0	0.510023	74.86594	63.87610	0.0045
r ≤ 1	r > 1	0.443509	45.61667	42.91525	0.0262
r ≤ 2	r > 2	0.282956	21.58641	25.87211	0.1559
r ≤ 3	r > 3	0.176243	7.949055	12.51798	0.2559
<b>Series: LOGGDPBANGLA LOGGGFCBANGLA LOGPOPBANGLA LOGSSEB</b>					
r ≤ 0	r > 0	0.709702	100.2219	54.07904	0.0000*
r ≤ 1	r > 1	0.545486	49.51121	35.19275	0.0008*
r ≤ 2	r > 2	0.267902	17.18165	20.26184	0.1259
r ≤ 3	r > 3	0.101675	4.396145	9.164546	0.3563
<b>Series: LOGGDPBANGLA LOGGGFCBANGLA LOGPOPBANGLA</b>					
r ≤ 0	r > 0	0.940290	171.2095	40.17493	0.0000*
r ≤ 1	r > 1	0.654304	55.66097	24.27596	0.0000*
r ≤ 2	r > 2	0.253998	12.11092	12.32090	0.0542
r ≤ 3	r > 3	0.002359	0.096830	4.129906	0.7981

### Conclusion and Recommendations

It can be concluded on the basis of the results of the study that human capital in form of education and health is an important determinant of economic growth in the selected countries. This relationship also prevails in long run in Pakistan and Bangladesh. Physical capital is another significant variable which affects economic growth in the study area.

It is suggested to focus on health and education sector to reap the fruits of sustained economic growth. Universal primary education should be ensured to reap

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