The Impact of Human Capital on Economic Growth in the SADC Region

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Abstract

This paper analyzed the impact of human capital on economic growth in Southern African Development Community (SADC). GDP per capita was linked to health and educational capital while taking into account the role of labour force and physical capital. The study used panel data from thirteen SADC countries for the growth periods 1990 - 1995, 1995-2000 and 2000-2005. The findings show that education capital had a positive statistically significant effect on GDP per capita whilst health capital had a positive but statistically insignificant effect. Making quality education accessible to all is recommended to policy makers.

Keywords: *Economic growth, health capital, education capital, labour force*

1.0 Introduction

In 1997, the United Nations defined human capital as productive wealth embodied in labour, skills and knowledge (UN, 2009). Human capital includes knowledge and skills acquired partly through education, and also their strength and vitality, which are dependent on their health. Human capital theory focuses on health and education as inputs to economic production. Education affects the effectiveness of labour and the level of technical progress which in turn affect economic growth of a country. Similarly, improved health status is also vital for sustained economic growth since health workers are usually productive. Despite this, traditional economic theory gives more emphasis on physical capital accumulation as the most robust source of economic growth, at least in the short-run, with exogenous technical progress being the long-run determinant of growth.

Bloom and Canning (2000) assert that educated and health people live more years and have higher incentives to invest in their abilities since the present values of their human capital formation are higher. Without a labour force with some minimum levels of education and health status, a country is incapable of maintaining a state of continuous growth (Lopez-Casasnovas, *et al*., 2005). Realising that countries in the SADC region have abundant labour resources and are more labour intensive, there should be a higher value accorded to having a healthier and educated workforce to maximize production. It is upon such bases that this study seeks to find out if health and education capitals have an impact on the economic growth of the SADC region.

1.1 Health and the SADC Region

The health status in the region has not been good over the years. According to the 2009 United Nations Economic Commission for Africa Report (UN, 2009), the HIV/AIDS pandemic, together with other health problems such as tuberculosis, malaria and cholera, have placed SADC region countries at risk of increased mortality rates, a skewed demographic profile, a growing number of orphaned and vulnerable children, and the internal displacement of people. In this paper, health status as a component of human capital is proxied by infant mortality (IMR) which is the probability of dying before first birthday expressed per 1000 live births. It is a commonly used indicator of the availability, utilization and effectiveness of health care because it offers an indication of health status of a population through those most susceptible to deterioration (MacDonald and Roberts, 2004). Additionally, mortality rates are accurate, easily comparable and the data is readily available across countries over several time points (WHO, 2009). Figure 1 shows the trends in average IMR from 1990 to 2005.

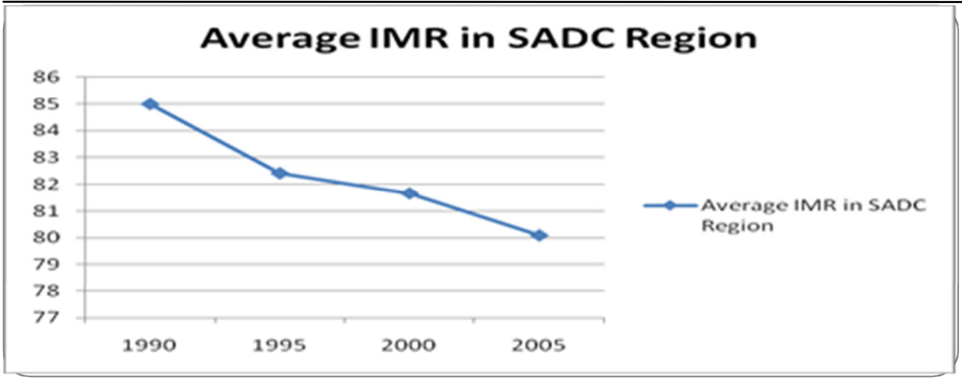


Figure 1: Trends in Infant Mortality Rate (IMF), (per 1,000 live births) in the SADC

Source: World Bank Development Indicators, 2008.

In Figure 1, the regional average IMR in the SADC region has been on a declining trend. This decrease in trend may suggest a slight improvement in health. As Bloom and Canning (2000) have shown, healthier individuals might affect the economy in four ways: they might be more productive at work; they may spend more time in the labor force, as less healthy people take sickness absence or retire early; they may invest more in their own education, which will increase their productivity; and lastly, they may save more in expectation of a longer life.

1.2 Education and the SADC Region

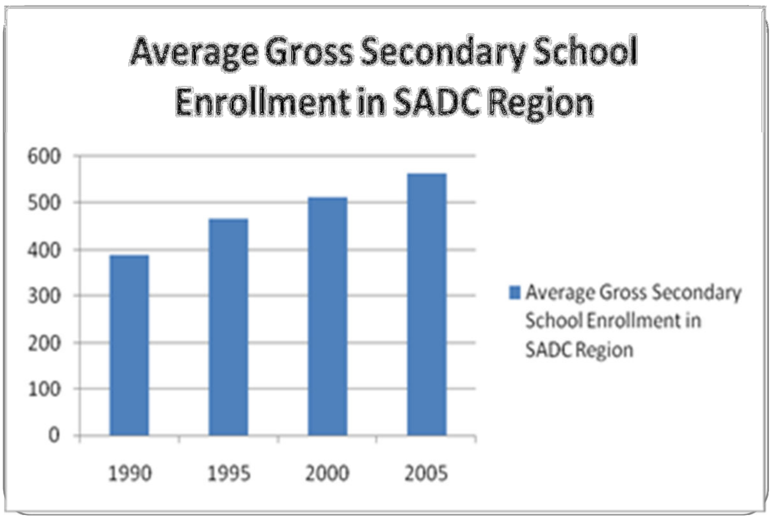
Over the years, the SADC region has been trying to improve the education sector. As Table 1 shows for the SADC region, average expenditure on education sector has been increasing over the years since 1990. In addition, Figure 2 shows an increasing trend in secondary school enrolment in the SADC region over the same period. Given the levels of increase in education expenditure and secondary school enrolment in the SADC, this study verifies whether such trends play a role in influencing the trend of economic growth.

Table 1: Average Education Expenditure as a Percentage of GNP in SADC Region

Years	1990	1995	2000	2005
Average Educational Expenditure (% of GNI)	4.16	4.42	4.44	4.93

Source: World Bank Development Indicators, 2008.

Figure 2 Trends in Secondary School Enrolment in SADC Region



Source: World Bank Development Indicators, 2008.

Economic growth literature has focused on physical capital and resource endowments as main sources of economic growths (Lucas, 1988). As time progressed in the late 20th century, most economists have come to recognize that it is human resources of a nation, not its capital nor its material resources that ultimately determine the character and pace of its economic and social development (Psacharopoulos and Woodhall, 1997). Capital and natural resources are passive factors of production, human beings are the active agencies who accumulate capital, exploit natural resources, build social, economic and political organization, and carry forward national development. Many of the studies done to verify the human capital theory however have focused on developed countries (Arora, 2001; Malik, 2006; Rivera and Currais, 2003).

2.0 Literature Review

According to Lynn (2003) and Romer (2001), the 1956 Solow Neo-Classical Growth model forms the basic analysis of economic growth. It focuses on four variables: output (Y), capital (K), labour (L) and knowledge (A). The Solow model thus adds to the traditional growth equation a third variable - technology which is considered as exogenous. The production function takes the form:

$$Y_t = F(K_t, A_t L_t) \quad (1)$$

Where, t denotes time. In the Solow model, population growth and rate of technical progress are constant. Given the above model specifications, per capita production depends mainly on capital per effective labour ratio k. The accumulation of capital per effective labour ratio is given by:

$$\overset{*}{k}_t = \frac{\overset{*}{K}_t}{A_t L_t} - \frac{K_t}{[A_t L_t]^2}\left[A_t \overset{*}{L}_t + L_t + \overset{*}{A}_t \right] = \frac{\overset{*}{K}_t}{A_t L_t} - \frac{K_t}{A_t L_t}\frac{\overset{*}{L}_t}{L_t} - \frac{K_t}{A_t L_t}\frac{\overset{*}{A}_t}{A_t} \quad (2)$$

Which can be written as:

$$\overset{*}{k}_t = s\frac{Y_t}{A_t L_t} - \delta k_t - nk_t - gk_t \quad (3)$$

$$\overset{*}{k}_t = sf(k_t) - (n + g + \delta)k_t \quad (4)$$

Equation (4) is the *Solow Growth Equation* which states that the rate of change in capital stock per unit of effective labour is the difference between actual investment per unit of effective labour, sf(k) and the break even investment,(n+g+∂)k. When $\overset{*}{k}_t = 0$, it implies that $sf(k_t) = (n + g + \partial)k_t$ If actual investment per unit of effective labour, $sf(k_t)$ is greater than $(n+g+\partial)k_t$ it means that capital per unit of effective labour is rising. If $sf(k_t)$ is less than $(n+g+\partial)k_t$, it means that capital per unit of effective labour is falling.

There has been previous empirical research also. Aghion et al. (2009) examined the causal impact of education on economic growth in USA using education investments. They used a multi-state endogenous growth model in which they found that high quality education fosters technological innovation. The proposition from the model used is that innovation makes intensive use of highly educated workers. Benhabib and Spiegel (1994) investigated the role of Human Capital in economic development using aggregate cross-country data. The finding was that growth rate of human capital measured by the number of years of education of the working population does not significantly explain the growth rates of per capita output.

In an investigation of the impact of health and human productivity on long term economic growth, Arora (2001) examined the growth paths of ten industrialized countries over the course of 100 to 125 years. The results indicated that positive improvements in health increased the countries' pace of growth almost by 30 to 40 percent and changed the slope of growth paths of the countries. Haldar (2008) looked at causality between socio-economic status of health, income, and health expenditure in India's 15 large states using longitudinal data from 1980 to 2005. The results varied across the states with some states showing causality from income to health expenditure and others from health expenditure to income. In an attempt to find the effect of health on economic growth, Bloom et al. (2001) employed a production function model approach to economic growth with work experience and health as components of human capital. They used panel data of 102 countries observed every 10 years from 1960 to 1990. The finding was that good health significantly impact aggregate output.

It should be noted that these studies have not been extensively done for developing countries like those of the Sub-Saharan Africa. In addition, the empirical literature shows that there is no obvious or clear-cut relationship between economic growth and health and education statuses. Considering that the SADC region faces a lot of health and education related challenges (Naidu and Roberts, 2004), it is important to analyze the relationship between health and educational capital and per capita gross domestic income in the SADC region.

3.0 Methodology

To analyze the impact of changes in health and educational components of human capital on economic growth, the Neo-Classical Theory of Sources of Growth was adopted. Given Y= F (K, L, F, A), where K, L, F and A represent capital, labour, natural resources and technology respectively. The first step was to take the derivative of Y with respect to each input variable and then differentiate with respect to time.

$$\dot{Y} \equiv \frac{\partial Y}{\partial t} = MPK * \dot{K} + MPL * \dot{L} + MPF * \dot{F} + MPA * \dot{A} \quad (5)$$

Dividing both sides of equation (5) by Y generates growth rate as:

$$g_y = \frac{\dot{Y}}{Y} = \frac{\partial Y}{Y\partial t} = \frac{MPK * K}{Y}\frac{\dot{K}}{K} = \frac{MPL * L}{Y}\frac{\dot{L}}{L} + \frac{MPF * F}{Y}\frac{\dot{F}}{F} + \frac{MPA * A}{Y}\frac{\dot{A}}{A} \quad (6)$$

Equation 6 shows that the income shares of each factor of production depend on its marginal productivity. Let *r, w, v* and *u* represent the price or marginal productivities of capital, labour, natural resources and technology respectively and also let $\frac{\dot{K}}{K}$, $\frac{\dot{L}}{L}$, $\frac{\dot{F}}{F}$, $\frac{\dot{A}}{A}$ be substituted with growth variables of g_K, g_L, g_F and g_A respectively to get:

$$g_Y = \frac{rK}{Y} g_K + \frac{wL}{Y} g_L + \frac{vF}{Y} g_F + \frac{uA}{Y} g_A \quad (7)$$

Which is equivalent to

$$g_Y = S_{KY} g_K + S_{LY} g_L + S_{FY} g_F + S_{AY} g_A \quad (8)$$

In equation (8), there are two elements for a factor of production to contribute to economic growth: the income share, for instance S_{KY}, and the growth rate of that input g_K. The more productive a factor of production is, the higher its contribution to overall economic growth. The income shares in equation (8) can be transformed into elasticities to get

$$g_Y = \varepsilon_{YK} g_K + \varepsilon_{YL} g_L + \varepsilon_{YF} g_F + \varepsilon_{YA} g_A \quad (9)$$

Equation (9) shows the responsiveness of output to each factor of production, that is, the elasticity. Using such an approach of accounting for sources of economic growth, health and educational components of human capital are specified in a pooled regression model of the form:

$$g_{Yit} = \beta + \varepsilon_{YK} g_{Kit} + \varepsilon_{YL} g_{Lit} + \varepsilon_{YH} g_{Hit} + \varepsilon_{YE} g_{Eit} + \mu_{it} \quad (10)$$

By looking at the growth rates rather than levels in the regressors, the model is appropriate because variable growth rates in SADC are easily comparable than the variable levels. The specification of the growth model is also vital for developing and evaluating policies because the model coefficients are elasticities. Panel data for 13 countries of the SADC region for real per capita GDP, physical capital formation, labour force, infant mortality are from World Bank Development Indicators (2008). Secondary education enrolment data is taken from the UNESCO database (2009). The growth rates for the variables were found by calculating the average changes in the variables for every six year period starting from 1990 to 1995; 1995 to 2000, and 2000 to 2005. The data

4.0 Results of the Analysis

4.1 Descriptive Analysis of the Data

Table 2 provides summaries of descriptive statistics of the variables used in the study.

Table 2 Descriptive statistics of variables in the growth form from 1990-2005 in the SADC

Growth Period	Variable	Mean	Standard deviation	Minimum	Maximum
1990-1995	GGDPC	-0.0325	0.1624	-0.4256	0.2090
1990-1995	GGPCF	0.0635	0.3855	-0.4391	0.7411
1990-1995	GLF	0.1501	0.0584	0.0380	0.2214
1990-1995	GHC	-0.0115	0.0983	-0.1200	0.2456
1990-1995	GEC	0.1892	0.2527	-0.2220	0.7140
1995-2000	GGDPC	0.0666	0.1512	-0.2674	0.3520
1995-2000	GGPCF	0.1188	0.5398	-0.7189	1.1696
1995-2000	GLF	0.1260	0.0326	0.0642	0.1731
1995-2000	GHC	0.0170	0.1973	-0.1939	0.4800
1995-2000	GEC	0.1417	0.4627	-0.2800	1.5833
2000-2005	GGDPC	0.0931	0.1547	-0.2675	0.3377
2000-2005	GGPCF	1.1608	1.5716	-0.4279	5.8052
2000-2005	GLF	0.1013	0.0401	0.0283	0.1780
2000-2005	GHC	-0.0208	0.1343	-0.1803	0.1895
2000-2005	GEC	0.2428	0.3445	-0.0968	1.1667

Source: Authors' own computations

In Table 2, GGDPC is Growth in GDP per Capita; GLF is Growth in Labour Force; GGPCF is Growth in Gross Physical Capital Formation; GHC is Growth in Health Capital; GEC is Growth in Educational Capital. For the period between 1990 and 1995, educational capital has the highest average growth rate of 18.92%, followed by labour force with about 15%. Growth in physical capital formation was also positive with a rate of 6.35%. GDP per capita growth is however negative and the lowest with a rate of -3.25%. Growth in health capital over the same period shows a negative growth rate of -1.15%. Between the years 1995 and 2000, education capital and labour force remain the highest growth rate variables with a rate of 14.17% and 12.6% respectively. Per capita GDP growth is now positive with a rate of 6.66%. Growth in health capital over the same period is also, like GGDPC, positive this time with a rate of 1.7%. Another noticeable thing is that GGDPC, GPCF and GHC registered higher rates of growth in the period 1995 to 2000 than in the period from 1990 to 1995. On the other hand, rates of growth in GLF and GEC decreased between the two periods.

From 2000 to 2005, GGPCF registered the highest rate of growth of about 116.08%. Growths in education capital and labour force are still positive and high with actual rates of about 24.28% and 10.13% respectively. Growth in GDP per capita over the period is positive at 9.31% whilst growth in health capital is negative with a rate of 2.08%. Basing on standard deviations and minimum and maximum values, most of the variables depict little variability suggesting a certain level of stability of growth in the variables across the panel during periods 1990-1995, 1995-2000 and 2000-2005. GGPCF demonstrates the highest level of variability in the three growth periods among the set of variables with a standard deviation of 38.55%, 53.98%, 157.16% respectively followed by GEC and then GGDPC. Variables with the least variability are GLF and GHC.

4.2 Random Effects Model Results for GDP per Capita Growth

To determine whether to use a fixed effects model or a random effects model, a Hausman test was conducted and a p-value of 0.7366 suggested that the random model was appropriate for the data. The results of the random effects model are presented in Table 3. Under the null hypothesis of a joint statistical significance of the model, a p-value of 0.0007 for the Wald statistic indicates that the model is jointly statistically significant. Though R^2 is only 0.3194, it is high enough to verify that regressors explain the regressand.

Table 3 Estimation Results for OLS-RE with Growth in GDP per capita

Coefficient Term	Explanatory Variable	Coefficient Estimates
GGPCF	Growth in Gross Physical Capital Formation	0.0376 (0.065)
GLF	Growth in Labour Force	-1.3945 (0.003)*
GHC	Growth in Health Capital;	0.0750 (0.639)
GEC	Growth in Educational Capital	0.1429 (0.029)*
N=39 observations from 13 countries		
*p<0.05, R-sq: within = 0.3194, Prob > chi2 = 0.0007		

As can be seen from Table 3 the coefficient for the GGPCF of the SADC region (ε_{YK}) is 0.0376 and is statistically insignificant at 5% significance level. Since 0.0376 is the elasticity of GDP per capita to gross physical capital formation in the SADC, it means that per capita GDP grows by about 0.038% if physical capital formation grows by 1% *ceteris paribus*. This result is consistent with the traditional production function theory because capital formation impacts on production and ultimately growth in GDP per capita. Though GGPCF is insignificant, it does not mean that physical capital formation does not have an important role in explaining GDP, rather it means that from the period 1990 to 2005, the growth in GPCF has not been high enough to explain growth in GDP per capita.

The results show that growth in labour force (GLF) has a negative coefficient (elasticity) of -1.3945 and is statistically significant at 5% significance level. This implies that a 1% increase in labour force causes a decrease in GDP per capita by about 1.39%. This is against the conventional production function theory which states that growth in labour force impacts positively GDP per capita growth. An explanation for this could be that population (i.e. the GDP per capita denominator) and subsequently the labour force has been growing faster than GDP so that the ration GDP per capita tends to decrease over time. Another explanation could be that the production function of the SADC region in the period under study is experiencing diminishing returns to labour force.

It is also observed that the coefficient of growth in health capital (GHC) is 0.0750 though statistically insignificant at 5% level of significance. Since growth in health capital is proxied by changes in IMR, it means that an increase in infant mortality by 1% leads to an increase in GDP per capita by about 0.075%. Whilst labour force growth decreases GDP per capita, a decrease in health capital growth has the opposite but complementing effect of increasing it. This is because of the fact that as health capital deteriorates, the population component in the GDP per capita denominator decreases and this leads to an increase in the whole GDP per capita ration. The elasticity of GDP per capita to educational capital is 0.1429 and statistically significant at 5%. This is in line with the conventional thinking that education has a positive impact on output.

4.3 Random Effects Model Estimation with GDP

To check whether population growth rate encompassed in growth in GDP per capita influenced the estimation results in Table 3, the regressand was changed from growth in per capita GDP to just growth in GDP. The results of this new model are presented in Table 4.

Table 4 Results with Growth in GDP per Capita replaced with Growth in GDP

Coefficient Term	Explanatory Variable	Coefficient Estimates
GGPCF	Growth in Gross Physical Capital Formation	0.2158 (0.000)*
GLF	Growth in Labour Force	-2.2605 (0.039)*
GHC	Growth in Health Capital;	-0.2251 (0.548)
GEC	Growth in Educational Capital	0.1126 (0.462)
N=39 observations from 13 countries, *p<0.05		

The results in Table 4 show that growth in gross physical capital formation was significant and positively related to growth in GDP with a positive elasticity of 0.2158. This result was different from the earlier model in Table 3 where GGPCF was now significant and had a higher elasticity. This shows that the population growth rate was higher than growth in GDP and consequently diminished the rate of GDP per capita growth.

Growth in labour force was statistically significant with a negative coefficient. The difference however was that, the elasticity of -2.2605 in Table 3 was greater than -1.3945 in the previous model. This is an indication that population growth rate had a role to play in both the growth in labour force and per capita GDP. The impact of labour force growth on GDP per capita was offset by population growth. Growth in health capital had a negative coefficient of -0.2251. Though this elasticity was insignificant, it was in line with conventional human capital theory that a decline in health capital is negatively related to growth of output. The change in the sign of the coefficient from positive in the first model to negative in the second model verified that population growth rate had a role to play in the model for GDP per capita. The coefficient of growth in education capital was still positive but insignificant. The elasticity had slightly decreased from 0.1429 to 0.1126 in the second model. This may be because of little or poor direct relationship between education and population growth in the SADC. A comparison of the model for growth in GDP (GGDP) and model for growth in GDP per capita (GGDPC) shows that population growth rate had a significant role to play on the results of the relationship between GDP per capita and the explanatory variables in the latter model.

5.0 Discussion of Results

The results of the regression model for the SADC region show that growth in infant mortality rate has a positive but statistically insignificant effect on growth in real per GDP. This surprising positive relationship was attributed to the fact that population in the SADC was growing at a faster pace than GDP. In addition, as health capital deteriorates the effect of population growth in GDP per capita ratio is reduced. On the contrary, the regression model for growth in GDP indicates that IMR has an insignificant and negative impact. This is in line with conventional thinking that as health status of a nation decreases, people become less productive at work, spend little time in labour force and earn and save a little and these negatively impact GDP growth.

The results also indicate that growth in educational capital has a positive and statistically significant impact on growth in real per capita GDP. This may be attributed to the 'ripple effect' provided by education through a series of positive growth-promoting externalities. Education increases productivity of labour and the level of technical progress which positively affect economic growth. Growth in labour force was negative and statistically significant in both regression models. The negative relationship may be due to higher rates of growth in labour force as compared to growth in GDP. The negative relationship may also be an indication that output production functions for SADC are experiencing diminishing returns to labour force. For both models, growth in physical capital formation had a positive impact on both GDP and GDP per capita. The result was however only statistically significant in the regression model with GDP. It can be concluded therefore that growth in health capital does not impact GDP per capita but growth in educational capital positively affects GDP per capita in the SADC.

6.0 Conclusion and Recommendations

The results show that the educational component of human capital was significant in influencing economic growth in SADC region. It follows therefore that there must be a commitment in policy making to provide quality education that meets the skill-demand needs of the region. Although the Millennium Development Goals have placed much focus on primary education, it should be known to SADC policy makers that most of the technologies imported in the SADC region require a minimum high level education like secondary school education to enable productivity. One of the major findings of the study was that growth in labour force is significant in influencing growth in GDP per capita though negatively. Labour force in SADC was growing faster than was necessary to influence GDP growth positively. Providing high quality education to this faster growing labour force would help check the diminishing returns of GDP to labour. Apart from secondary enrolment, it is important to note that all levels of education must be of high quality and accessible to all. Lastly, given that health is not a major determining factor of economic growth in the SADC region whilst education is, it implies that education capital is more productive than health capital in SADC. It is therefore recommended that in devising policies aimed at promoting economic growth, SADC policy makers should take the differences in productivity into consideration when allocating resources between the sectors of health and education.

References

Acemoglu, D. and Zilibotti F. (1999). 'Productivity Differences'. *NBER Working Paper*, No. 6879 Massachusetts Institute of Technology.

Aghion, P. Boustan, L. Hoxby, C. and Vandenbussche, J. (2009). 'The Causal Impact of Education on Economic Growth: Evidence from U.S.' *Brookings Papers on Economic Activity*. Spring 2009: Conference Draft.

Appleton, S. and Teal, F. (1998). 'Human Capital and Economic Development'. *Background Paper for the 1998 African Development Report*. Centre for the Study of African Economies: Oxford University.

Appleyard, D. R., and Field, A. J. (1992). International Economics. IRWIN: Boston.

Arora, S. (2001). 'Health, Human Productivity and Long Term Economic Growth,' *The Journal of Economic History*, 61 (3).

Barro, R. (1996) 'Determinants of Economic Growth: A cross country Empirical Study,' *NBER Working Paper*, No. 8587.

Benhabib, Jess & Spiegel, Mark, M. (1994). 'The Role Of Human Capital In Economic Development. Evidence From Aggregate Cross-Country Data', *Journal of Monetary Economics,* 34:143-173.

Bloom, D. and Canning, D (2000). ' The Health and Wealth of Nations,' *Science* 228, pp 1207-9

Bloom, D., Canning, D. and Sevilla, J. (2001). 'The effect of health on Economic Growth: Theory and Evidence,' *NBER Working Paper*, No. 8587.

Bloom, D., Canning, D and Chan, K. (2005). 'Higher Education and Economic Development in Africa.' *World Bank (AFTHD) Paper*. Harvard University.

Cameron, R. (1989). A Concise Economic History of the World from Palaeolithic Times to the Present New York. Oxford University Press.

Currais and Rivera (2003). 'The Effect of Health Investment on Growth: A Causality Analysis,' *International Advances in Economic Research,* 9(4) pp 312-323.

Grossman, M. (1972). 'On the Concept of Health Capital and the Demand for Health'. *Journal of Political Economy* 80: 223–250.

Gujarati, D. (2003). Basic Econometrics (4^{th} ed.) McGraw-Hill-Irwin: New York.

Haldar, S. (2008). ' Effect of Health Human Capital Expenditure on Economic Growth in India: A State Level Study'. *Asia-Pacific Social Science Review* 8:2 (2008), pp. 79-97.

Leandro Prados de la Escosura and Joan R. Rosés (2009). 'Human Capital and Economic Growth in Spain: 1850-2000'. *Working Paper in Economic History*: Universidad Carlos III Madrid.

Lopez-Casasnovas, Guillem, Joan Costa-Font, and Ivan Planas (2005), 'Diversity and regional inequalities in the Spanish system of health care services', *Health Economics*, 14(S1):221-235.

Lucas, R.E. (1988). 'On the Mechanics of Economic Development'. *Journal of Monetary Economics, 22*, pp.3-42.

Lynn S.R. (2003). Economic Development: Theory and Practice for a Divided World. Prentice Hall: Upper Saddle River, New Jersey.

McDonald S. and Roberts J. (2004). AIDS and Economic Growth: A Human Capital Approach. Department of Economics: Sheffield University.

Malik, G. (2006). 'An Examination of the Relationship between Health and Economic Growth,' *ICREIR Working Paper*, No. 185.

Mankiw, N.G., Romer, D. and Weil, D.N., (1992). 'A Contribution to the Empirics of Economic Growth'. *Quarterly Journal of Economics,* 107, 407-437.

Naidu S. and Roberts B. (2004). 'Confronting the Region: a profile of Southern Africa'. *Human Sciences Research Council Paper*. South Africa.

Ngwalangwa, L. (2008). 'Health and Real Per Capita Gross Domestic Product in Sub Saharan Africa.' *Economics Department Thesis Paper*. University of Malawi Chancellor College.

Psacharopoulos, G and Woodhall, M. (1997). Education for Development: An Analysis of Investment Choice. New York: Oxford University Press.

Romer, D. (2001): Advanced Macroeconomics: McGraw-Hill: New York

UNESCO database. Secondary Education Enrolments. Accessed on 17 November, 2009, from: http://www.unesco.org

United Nations Website. Accessed on 17 November, 2009, from: http://www.un.org

World Bank. (2008). World Development Indicators Data Base. Accessed on 17 November, 2009, from: http://www.worldbank.org

World Health Organisation Website. Infant Mortality Rates. Accessed on 17 November, 2009, from: http://www.who.int