Pakistan Economic and Social Review
Volume 59, No. 2 (Winter 2021), pp. 179-202

DETERMINANTS OF HUMAN CAPITAL DEVELOPMENT IN SAARC COUNTRIES: ROLE OF PUBLIC INFRASTRUCTURE AND INSTITUTIONAL QUALITY

HUSSEIN AL-ZYOUD, SHAHID ALI AND NAVED AHMAD*

Abstract. This paper examines the determinants of human capital development in the SAARC region. This study adopts a modified version of Sen's (1999) capability approach to resolving the inherent problems of endogeneity and persistence in economic data. This study uses second-generation cross-sectional dependence, slope heterogeneity, and unit root tests. Westerlund's cointegration test is used to check the cointegration among variables. This study uses the CS-ARDL approach to calculate the long-run estimates. It deals with endogeneity problems and a small-sample bias effectively. The results indicate a positive effect of GDP, labor force participation rate, infrastructure, public health expenditures, public education expenditures, and institutional quality on human capital development in the SAARC region.

Keywords: Human Capital Development, Health, Education, Public Infrastructure Expenditures, Institutional Quality, Labor Force and Economic Growth

JEL Classification: I25, J24, O43

---

*The authors are respectively Associate Professor at Faculty of Business, Athabasca University, Canada, Assistant Professor at Department of Economics and Development Studies, University of Swat, Course Coordinator (Economics) at Faculty of Business, Athabasca University, Canada.
Corresponding author's e-mail: nahmad@athabascau.ca

I. INTRODUCTION

Human capital is vital to a country's economic growth and development and plays a unique role in many exogenous and endogenous economic growth theories. The role of human capital in the growth process is well established in the literature. According to Barro (1991), initial higher human capital stock produces higher real per capita growth, thus allowing low-income countries to catch up with rich countries if low-income countries have a high human capital per person and vice versa. Lucas (1988) concluded that human capital is an engine of growth. The Solow growth model also assumed labor and capital as main factors. Mankiw et al. (1992) augmented the Solow model and introduced human capital as a production factor.

Wigley and Akkoyunlu-Wigley (2006) analyzed the determinants of human capital using Amartya Sen's capability approach. They focused on education while Law and Widdows (2008) examined the health dimension and De Muro and Tridico (2008) considered the role of institutions. However, the determinants of human capital remain debatable. Human Capital Development (HCD) depends on many determinants such as domestic investment in education, infrastructure, healthcare, institutional quality, economic growth, political stability, the prevalence of corruption, foreign direct investment, and trade openness. The literature theoretically justifies the importance of public investment; empirical research, especially in developing countries, fails to support this assumption (Maitra, 2018).

The South Asian Association for Regional Cooperation (SAARC) region has become one of the fastest-growing regions globally. Its economies have achieved higher economic growth than that of the rest of the world. For example, in 2018 and 2019, the average GDP growth rates were 4.6 and 4.6 percent, respectively, whereas global GDP growth rates were 3.6 and 2.9 percent, respectively (Maper. 2020). Although there was a steady growth rate among the SAARC countries at different economic rates, there is still a need for significant improvements in both quality and quantity of qualified labor forces, which, in return, will enhance the efficiency and productivity of all economic sectors. The socio-economic conditions of the SAARC region immensely from that of the rest of the world's economies (Mani, 2018). Compared to other SAARC countries, Pakistan and Sri Lanka experienced negative growth (United Nations, 2019). Since its independence from British domination, the region has gone a long way and has hoped for steady human development and economic prosperity (Osmani, 2018; Yadav and Iqbal, 2021). In terms of poverty, SAARC countries have the largest share of total world's multidimensional poor.

The role of human capital and its determinants in SAARC countries' economic development has received little attention. This study focuses on the drivers of economic growth and examines the impact of human capital on economic development. Unlike previous studies, it extends the determinants of human capital. First, it explores the role of macroeconomic factors in nurturing economic growth in the SAARC countries. Specifically, it addresses the following research hypotheses: The availability of public infrastructure improves progress in human capital, which in turn accelerates economic growth in SAARC countries. Second, institutional quality and economic development reinforce one another, and since political upheavals are common among developing countries, the role of institutional quality must be investigated to determine whether it has crucial implications for human capital and economic development.

The rest of this paper is structured as follows. The relevant theoretical and empirical literature is presented in Section II. Section III discusses the research methodology and data sources. The empirical results are presented in Section IV. The last section presents the conclusion.

II. REVIEW OF LITERATURE

The role of human development has been debated for a long time, a considerable body of theoretical and empirical studies have considered human development a vital factor affecting long-term sustainable growth, health outcomes, and income distribution. (Anas et al., 2017; Ciobanu, 2015; Shome & Tondon, 2010; Sorina, 2013; Munyemana, 2013; Khodabakhshi, 2013; Bloom & Canning, 2003; Behrman et al., 2008; Aghion et al., 2009; Tang, 2011; López and Motelón, 2012; Husain et al., 2015; Becker, 2009). For example, Alam (1992) argued that initial enrollments in higher education and human development are causes of income convergence across developed countries.

Moreover, many studies have identified the determinants of human development in the literature; economic growth, spending on education, and health explain renewable energy consumption. High economic growth increases human development and creates new welfare opportunities for the economy (Ciobanu Oana, 2015). The studies in this field have examined the determinants of human development by using cross-sectional and panel data frameworks. Dae Bong (2009) suggested various factors that determined the human capital, such as the time spent by students in education and government investment in education. Solow stressed that human capital and investment are factors of the output (Mankiw et al., 1992). In addition, the new growth theory provided a solid basis for future work on human capital and economic growth (Lucas, 1988). With the introduction of new growth theory, human capital received importance, and studies included human capital in their growth models. The new-growth theorists consider government expenditures on infrastructures, healthcare, education, administration, and new technology to be core variables of human development (Hanushek and Woessman (2008), Barro and Sala-i-Martin (1992). Didenko (2007) extended the empirical literature by incorporating factors such as healthcare reforms, education, vocational training, job training, formal education, and part-time education.

Education, Health Status and Human Development

Education is the most widely discussed determinant of human development in the literature. Advancements in education have enhanced human development and productivity. However, the magnitude of the effect of education on growth differs between the leading and lagging countries. Hanushek and Woessman (2008) and Barro and Sala-i-Martin (1992) found that high educational attainment, as represented by test scores, is highly related to output performance. Aghion et al. (2009) found that the growth effect of education is more significant in advanced countries than in lagging countries. Lee and Lee (1995) found a strong link between student achievement scores and growth performance in sample countries and achievement scores rather than the enrolment ratio, which affects output growth. Fernandez and Paolo (2000) inferred similar findings and argued that achievement scores represent more human capital and high growth performance in countries.

It is argued that educational investments are made for higher anticipated returns; knowledge and skills are required to improve the returns. Previous research has asserted that the longer you study or more training you receive, the more future rewards you will receive. (McMahon, 2009; Bowen, 2018). According to Reza and Widodo (2013), education per worker has positively affected the economic growth in Indonesia. Siddiqui et al. (2016) have examined the human capital (HC) growth nexus in the Asian region using a disaggregated geographic lens and found that government education spending is positively related to development in the East and South Asia regions.

In the empirical literature, citizens' health status is used as another proxy for human capital. Health status was measured based on life expectancy. In addition to educational attainment, life expectancy is also considered a crucial factor in human development. For instance, Barro (1992) argued that human capital measured as educational attainment and life expectancy is strongly related to growth performance. Behrman et al. (2008) inferred similar findings and argued that life expectancy and educational attainment are necessary for economic development. According to Rahman et al. (2018), increased public health spending can reduce the burden of private expenditure and the personal spending ability to use goods and services. Therefore, public health spending is related to health and human capital improvements. Thus, an improved health system leads to higher Gross Domestic Product (GDP) and vice versa. (Bloom DE, Canning D, Sevilla J. 2004; Bloom DE, Canning D. 2003; and Öztürk S, Topcu E. 2014). For example, Piabuo and Tieguhong 2017, Erçelik 2018, and Naidu and Chand, 2013 showed a positive relationship between economic growth and health care expenditure; they argued that an increase in health expenditure has contributed to economic improvement.

Despite the fact that all of these studies believe that education and health are critical for economic growth and development, the majority of these studies are criticized because of unconditional model specifications. The traditional Solow model was used in the majority of these studies to investigate the impact of education and health on economic growth.

Furthermore, the proxies used for health and education in the existing literature are questionable.

Institutional Quality and Human Development

The dynamic role of institutional development in human development is well debated in the literature. (Acemoglu et al., 2014; Georgiadis & Binder, 2011, United Nations Development Programme, 2009; De Muro and Tridico, 2008; Sapkota, 2014; Waema, 2002). De Muro and Tridico (2008) suggested that human development and institutional links are more complicated because of the multidimensional nature of human development. Many countries with weak institutions have failed to execute policies and programs compared with those with strong institutions.

Previous studies have concluded that low institutional quality significantly influences economic growth in achieving human development. Many countries with weak institutions have failed to execute policies and programs compared with those with strong institutions. The World Bank (2002) highlighted the causal link between economic growth and the institutional framework. It recognized that institutions are essential for escalating market development; it is necessary to reform legal frameworks and institutional quality to achieve high economic growth in developing countries. There is a substantial long-run impact of policy factors such as institutional quality, stability, government consumption, and openness on substantial long-run per capita output. Accordingly, these macro-economic variables may affect the accumulation of physical and human capital and productivity growth (De Gregorio and Lee, 2004).

Infrastructure and Human Development

There is a link between infrastructure quality and economic growth and development. This link may describe how public policies can enhance the quality of infrastructure services in underdeveloped economies. Investment in public infrastructure stimulates private investment, market competition, and new markets. It also decreases production and transaction costs. (Randolph et al. 1996; World Development Report, 1994). It complements private investment (Blejer and Khan, 1984). Thus, investment in public infrastructure leads to crowding in private investments; consequently, there is a direct and positive relationship between public investment in infrastructure and private investment, making other economic institutions more efficient (Leff,1984, Musalem, 1989).

For instance, investment in telecommunication networks has increased economic growth. (Norton, 1992). The significant factor is creating public infrastructure for economic growth, which depends on capital accumulation through investment projects from expenditures on public infrastructure prospects. It comprises the generation of electricity, new schools, universities, new information networks for speedy communication, new roads and highways, new centers of research and technologies, etc. These are essential for different sectors, particularly private industries. For instance, per capita income and advanced access to India's banking facilities significantly improved the savings rates (Agrawal et al., 2010). Hence, in other SAARC economies, the saving ratios are lower than those in India except for Nepal because of the excellent public infrastructure. From the supply-side perspective, retained earnings from firms and household savings generate funds that can be used for further investment projects.

Labor Force Productivity and Human Development

As far as the labor force participation rate is concerned, capital accumulation plays a significant role in increasing the wage rate, income level, and labor productivity. Furthermore, it increases the demand for investable goods and consumption rate. In SAARC countries, the labor force is larger than the entire European Union population. Hanushek et al. (2000) found a stable, consistent, and robust connection between the labor force and economic growth. The increasing workforce size allows for economic expansion and stimulates gross domestic product. Working-age people determine the size of the labor force. Employment and income of workers will increase if the educated workforce increases, reforms in labor market institutions occur, and cultural factors and habits of general mass change.

Studies have found an inverse relationship between birth rates and income (Krishnamurty, 1966). Knowles (2002) estimated the neoclassical growth model and found that increasing female schooling is attached to higher levels of labor productivity across countries in the long run. Similarly, Sehrawat and Giri, 2017, found a positive and significant relationship between female human capital and economic development and augmented labor productivity in the short and long run for India's economic growth.

In summary, the role of human development in economic development is well-documented in the literature. Several studies have been conducted to identify the determinants of human development; for example, economic growth, education, and health are well-documented in the literature. However, most earlier studies have relied on life expectancy and secondary school attendance as indicators of health and education. Hence, the existing literature on the proxies used for health and education is questionable. Therefore, this study examines health and education expenditures instead of life expectancy and the enrolment ratio.

Furthermore, previous literature has ignored the role of education and health expenditures in influencing human development. As a result, the current study adds to the existing literature by analyzing the impact of education and health expenditures on human growth. Moreover, this study employed advanced econometric techniques that can handle potential problems in panel data, such as the dependency of cross-sections and slope heterogeneity.

III. METHODOLOGY

Model Specification:

This study analyzes the determinants of HDI in the case of SAARC countries from 1990 to 2020. The empirical equation is modeled as:

$$HDI_{it} = \beta_0 + \beta_1 LGDP_{it} + \beta_2 LPEE_{it} + \beta_3 LPHE_{it} + \beta_4 LINFRA_{it} + \beta_3 INST_{it} + \beta_3 LFPR_{it} + v_{it} \quad (1)$$

where HDI represents human development index, LGDP represents log of Gross Domestic Product, LPEE represents the log of Public Education Expenditures, LPHE represents the log of Public Health Expenditures, LINFRA represents the log of public infrastructure Expenditures, INST stands for Institutional Quality, and LFPR stands for Labor Force Participation Rate.

Data

This study used the Human Development Index (HDI) as the dependent variable to capture the human capital development. Whereas, the key exogenous variables are Gross Domestic Product (GDP), Public Education Expenditures (PEE), Public Health Expenditures (PHE), public infrastructure Expenditures (INFRA), Institutional Quality (INST), and Labor Force Participation Rate (LFPR).

All variables were taken at a constant price (U.S. 2011). Moreover, the contentious variables, such as GDP, PEE, PHE, and INFRA were transformed into a natural log form. The data for all variables, except institutional quality, were obtained from World Development Indicators. This study used a comprehensive index of institutional quality, that captures all six indicators of institutional quality. These indicators were collected from worldwide governance indicators (WGI).

Methodology

Analytical Techniques

Cross-Sectional Dependency Test

Cross-sectional dependency (CSD) is a significant problem associated with panel data. To test for cross-sectional dependency, this study uses Pesaran (2004) and Pesaran (2015) to test for weak cross-sectional dependency. It is imperative to check for CSD because first-generation techniques provide biased and inconsistent results in the presence of CSD. In the case of the existence of CSD, second-generation unit root tests (such as the cross-sectionally augmented IPS test) and cointegration methods (such as the Westerlund cointegration method) are preferred, which can deal with cross-sectional dependence. Therefore, this study used the advanced CSD tests proposed by Pesaran (2004) and Pesaran (2015). Pesaran's (2015) CSD statistic equation is written as:

$$CSD^{NT} = \sqrt{\frac{TN(N-1)}{2}} * \hat{\bar{\rho}}_N \tag{2}$$

where, $\hat{\bar{\rho}}_N$ represents pair-wise correlation coefficient, T and N stand for the time period and cross-sections. The study also uses Pesaran's (2004) cross-sectional (CD) test, with the following general equation:

$$\mathrm{CD}_{Test} = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{k=1+i}^{N} T_{ik} \tag{3}$$

The null hypothesis of the Pesaran (2004) CD test is that there is cross-section independence CD ~ N (0,1)).

Unit Root Tests:

To obtain unbiased results in the presence of a CSD, we use a cross-sectionally augmented IPS (CIPS) test to check the unit root in the series. The second-generation CIPS test is preferred over other first-generation panel unit root tests because of its power to deal with CSD and slope heterogeneity. The CIPS's test is given by the following model:

$$\Delta W_{i,t} = \varphi_i + \varphi_i Z_{i,t-1} + \varphi_i \bar{Z}_{t-1} + \sum_{l=0}^{p} \varphi_{il} \Delta \overline{Z_{t-l}} + \sum_{l=1}^{p} \varphi_{il} \Delta Z_{i,t-l} + \mu_{it} \tag{4}$$

where $\bar{Z}_{t-1}$ and $\Delta\overline{Z_{t-l}}$ present the cross-section averages, and µt is the serially uncorrelated error term. The individual Cross Sectionally Augmented Dicky Fuller (CDF) values are obtained from the t-ratio of the coefficient of $\bar{Z}_{t-1}$ and $\Delta\overline{Z_{t-l}}$ (in equation 2) to get the CIPS statistic, which is given as:

$$\widehat{\mathrm{CIPS}} = \mathrm{N}^{-1} \sum_{i=1}^{n} \mathrm{CDF}_i \tag{5}$$

CIPS has the null hypothesis that all time-series are non-stationary. In addition to CIPS test, we also use Pesaran's Cross Sectionally Augmented Dicky Fuller (PESCADF).

Westerlund (2007) Cointegration Test

To gauge the error correction in the heterogeneous panel model, this method is particularly important because of its ability to address CSD and slope heterogeneity. Moreover, Westerlund's (2007) cointegration test can compute the speed at which long-run equilibrium is restored. Westerlund's (2007) approach computes two group-mean test statistics and two-panel test statistics. The test statistics are as follows:

$$G_\tau = \frac{1}{N}\sum_{i=1}^{N}\frac{\hat{\alpha}_i}{SE(\hat{\alpha}_i)} \qquad (6)$$

$$G_\alpha = \frac{1}{N}\sum_{i=1}^{N}\frac{T\hat{\alpha}_i}{\hat{\alpha}_i(1)} \qquad (7)$$

$$P_\tau = \frac{\hat{\alpha}}{SE(\hat{\alpha})}, \qquad (8)$$

$$P_\alpha = T\hat{\alpha} \qquad (9)$$

where, G_α and G_τ represent the group mean test statistics, and P_α and P_τ represent the panel test statistics. $SE(\hat{\alpha}_i)$ represents the standard error of $\hat{\alpha}_i$. The error correction can be obtained by solving equation 9 for $\hat{\alpha}$, i.e., $\hat{\alpha} = P_\alpha/T$.

Cross-Sectionally Augment ARDL (CS-ARDL) Approach

After confirming cointegration, we estimate the long -and short-run estimates of Model 1. For this purpose, we use the CS-ARDL approach. The CS-ARDL method is preferred over other first-generation approaches because of its ability to address the CSD and slope heterogeneity. Compared with the CS-ARDL method, other approaches such as ARDL, FMOLS, and DOLS provide biased and inconsistent results in the presence of CSD. This study estimates the following CS ARDL regression:

$$\mathrm{HDI}_{it} = \alpha_0 + \sum_{j=1}^{p}\lambda_{it}\mathrm{HDI}_{i,t-j} + \sum_{j=0}^{p}\acute{\alpha}_{it}\mathrm{X}_{t-j} + \sum_{j=0}^{3}\ddot{\upsilon}_{it}\bar{Z}_{t-j} + \mu_{it} \qquad (10)$$

where $\bar{Z}_t = (\Delta\overline{HDI}_{it}, \bar{X}_t{}', \overline{PEE}_{it}{}', \overline{PEH}_{it}, \overline{INFRA}_{it})'$ and $X_{it} = (\overline{INST}_{it}, \overline{GDP}_{it}, \overline{LFPR}_{it})'$.

In order to test for cointegration, equation 3.10 can be rewritten as a cross sectionally augmented conditional error correction model (ECM) as follows:

$$\Delta HDI_{it} = \alpha_0 + \lambda_{1i} HDI_{i,t-1} + \lambda_{2t} X_{i,t-1} + \lambda_{2t}\Delta X_{i,t-1} + \varphi_{1t}\overline{HDI}_{t-1}) + \varphi_{2t}\bar{X}_{t-1}) + \sum_{i=0}^{p-1} \acute{\alpha}_{3ij}\overline{\Delta HDI}_{t-j} + \sum_{i=0}^{p-1} \acute{\alpha}_{4ij}\overline{\Delta X}_{t-j} + Ci + \eta_{it} \qquad (11)$$

where λ_{1i} represents the error correction coefficient.

Panel Causality Test

To inspect the causal relationship between HDI and its determinants, such as PEE, PHE, GDP, INFR, INST, and LPPR, this study uses the Dumitrescu-Hurlin test. This test is preferred over other panel causality tests because of its ability to address the CSD and slope heterogeneity. Because this endeavor utilizes panel data consisting of small cross-sections (six countries) over a long period (20 years), we apply the Dumitrescu-Hurlin panel causality test. Since this endeavor utilizes panel data consisting of small cross-sections with six countries and 20 years, we apply the Dumitrescu-Hurlin panel causality test.

IV. RESULTS AND DISCUSSIONS

According to Pesaran’s (2015) CD test results, all the variables are cross-sectionally dependent. Pesaran’s (2004) CD test results show that the HDI, PEH, INFRA, GDP, LFPR, and INST are cross-sectionally dependent. Due to the presence of cross-sectional dependency, we use second-generation unit roots and corresponding panel cointegration techniques.

TABLE 1

Cross-Sectional Dependency

Variables	CD (2004)	CD (2015)	Correlation Coefficient
HDI	23.570*	25.455*	0.924
PEE	-0.520	25.090*	-0.020
PEH	-1.960***	24.458*	-0.077
INFRA	21.340*	22.678*	0.837
INST	3.670*	-2.314**	0.144
GDP	25.06*	20.981*	0.044
LFPR	-1.42	23.653*	0.056

, ** and * represent significant at 1 %, 5 % and 10 % level of significance respectively*

The results of the CIPS show that all variables except HDI and LFPR are integrated of order zero. However, as per the results of the first-generation unit root test (PESCADF), all variables except GRWT are integrated of order one. The mix order of integration enables us to employ the CS-ARDL method, which considers cross-sectional dependence and nonstationarity.

TABLE 2

Unit Root Testing

Level I(0)		
Variables	CIPS	PESCADF
HDI	-2.043	-1.028
PEE	-2.470**	-2.067
PEH	-2.442**	-1.842
INFRA	-2.378**	-1.758
INST	-2.271***	-1.687
GDP	-2.801*	-2.540**
LFPR	-1.262	-1.393
First Difference I(1)		
HDI	-4.418*	-3.776*
PEE	--	-4.242*
PEH	--	-4.390*

INFRA	--	-2.282***
INST	--	-4.612*
GDP	--	---
L.E.	-2.714*	---
LFPR	-2.220***	-2.517**

, ** and * represent significant at 1 %, 5 % and 10 % level of significance respectively.*

The results of the Westerlund (2007) test confirm the existence of a long-run nexus between HDI and its determinants such as public health expenditures, public education expenditures, GDP, labor force participation rate, and institutional quality. The first two columns represent the group-mean statistics Gτ and Gα, whereas the panel statistics (Pτ and Pα) are reported in the second two columns. The error correction can be obtained by solving equation 3.9 for α ̂, i.e., α ̂= P_α/T. We obtained α ̂as 0.77. This implies that approximately 77% of the error is corrected each year between HDI and its factors.

TABLE 3

Cointegration results using Westerlund (2007)

Test statistics	Model: $HDI^{it} = f(LPEE^{it}, LPEH^{it}, LINFRA^{it}, INST^{it}, LGDP^{it}, LFPR^{it})$
Gt	- .960**
Ga	-15.65***
Pt	-7.365**
Pa	-23.757*

*Note: ** and *** represent significant at 5 and 10 percent respectively.*

Next, the CS-ARDL results for HDI determinants are presented in Table 4. The results suggest that in the long run, GDP, public health expenditures, public education expenditures, institutional quality, and labor force participation rate are important factors affecting HDI in SAARC countries. However, the infrastructure variable does not significantly affect the HDI in the long run. In the short run, GDP, labor force participation rate, infrastructure, and institutional quality are important factors affecting HDI in SAARC countries.

In the long run, GDP has a positive impact on the HDI. For example, a one-unit increase in GDP leads to a 0.172 unit increase in the HDI. These results are consistent with those of Hakim and Setiawan (2013), who concluded that GDP positively affects HDI. Economic activities represented by GDP does not affect HDI in short run; however, in the long run, GDP has a positive impact on HDI. A one-unit increase in GDP leads to a 0.172 unit increase in HDI. These results are consistent with those of Hakim and Setiawan (2013). This indicates that increasing economic activities results in an increase in the quality of human capital. Increased level of GDP enables countries to improve its human capital.

LFPR (Labor Force Participation Rate) has a positive impact on HDI in both short run and long run. A one-unit increase in GDP leads to a 0.018 unit increase in HDI. The positive effect of LFPR on HDI gains trace of significance in long run. These results are consistent with those of Knowles (2002) and Sehrawat and Giri, 2017. This indicates that increasing LFPR will result in an increase in the HDI. Increased LFPR. Increased LFPR in SAARC countries implies that more people aged 18–60 are available for work, which can improve the quality of human capital and labor force productivity. Moreover, an increase in LFPR will hike the demand for investable goods and the rate of consumption, which has serious implications for wage rate, income level, labor productivity and ultimately human development.

The variable PHE (Public Health Expenditures) does not affect HDI in short run; however, in the long run, PHE has a positive impact on HDI. In long run, a one-unit increase in GDP leads to a 1.992 unit increase in HDI. This result conforms with previous studies where a positive impact of public health expenditure was identified by Bloom and Canning (2003), Naidu & Chand (2013), Kim & Lane (2013), and Novignon et al. (2012). This implies that when government increases its expenditure on health care, this will translate to an increase in the quality of human capital and thus higher economic growth. Therefore, the quality of human capital is higher, thus productivity of labor forces increases, income per head increases leading to an increase in household consumption per head.

The variable PEE (Public Education Expenditures) does not affect HDI in short run; however, in the long run, PEE has a positive impact on HDI. In long run, a one-unit increase in GDP leads to a 0.029 unit increase in HDI. These results are consistent with those of Baldacci et al. (2008), and Siddiqui et al. (2016). This indicates that increasing government spending on education will result in an increase in the quality of human capital. As a result, the quality of human capital improves, increasing labour force productivity.

In the long run, institutional quality has a positive impact on HDI in both short run and long run. In the long run, a one-unit increase in institutional quality leads to a 0.999 unit increase in HDI. The positive effect of INST on HDI gains trace of significance in long run. These results are consistent with those of Farooq et al (2020), Knack & Keefer (1995), Law et al. (2018a), Law et al. (2013a), Arcand et al. (2015). Furthermore, our results also align with the De Gregorio and Lee's findings. The results of these studies show a strong positive effect of the rule of law index on growth, demonstrating that nations with more efficient law enforcement to safeguard property and contractual rights had greater development rates and can attract more investment and promotes businesses and boosts economic growth.

TABLE 4

Results of CS-ARDL

Short Run Estimates						
	Coef.	Std.Err.	Z	P>z	[95%Conf.	Interval]
ΔGDP	0.088	0.055	1.610	0.107	-0.019	0.196
Δ LFPR	10.346	5.484	1.890	0.059	-21.094	0.402
Δ INFRA	-4.628	2.520	-1.840	0.066	-9.566	0.311
ΔPHE	0.025	0.022	1.130	0.261	-0.068	0.018
ΔPEE	0.007	0.010	0.700	0.485	-0.027	0.013
Δ INST	0.195	0.100	1.950	0.051	-0.001	0.391
Long Run Estimates						
GDP	0.172	0.083	2.070	0.038	-0.335	-0.009
LFPR	0.018	0.007	2.410	0.016	-0.032	-0.003
INFRA	0.002	0.002	0.910	0.362	-0.003	0.007
PHE	1.992	0.937	2.130	0.034	-3.828	-0.155

PEE	0.029	0.014	2.080	0.038	-0.056	-0.002
INST	0.999	0.053	18.970	0.000	-1.102	-0.896
$\pi(-1)$	-0.756	0.391	-1.9335	0.053	-7.541	0.347

The results of causality test show that there is unidirectional causality from PEE and INFR to HDI. Moreover, there is evidence of bi-directional causality between PEH and HDI. Further, the variables INFR and HDI are also bi-directionally related. There is also evidence of a bi-directional causal relationship between GDP and HDI, LFPR, and HDI. These results suggest that a policy shock in PEE, INFR, PEH, INST, GDP, and LFPR has repercussions for HDI in SAARC countries. Moreover, a shock in HDI has also repercussions for PEH, INST, GDP, and LFPR in SAARC countries.

TABLE 5

Dumitrescu-Hurlin Panel Causality Test

Null Hypothesis	**W – Stat.**	**Zbar – Stat.**	**Z – bar tilde**
PEE – HDI	2.9843*	3.7123*	3.1026*
HDI– PEE	1.6868	1.2849	0.9886
PEH – HDI	5.2967*	8.0383*	6.8700*
HDI – PEH	2.9995*	3.7408*	3.1274*
INFRA – HDI	4.1805*	5.9502*	5.0515*
HDI – INFRA	1.7595	1.4209	1.1071
INST– HDI	2.5596**	2.9177*	2.4106**
HDI – INST	3.2064*	4.1277*	3.4644*
GDP – HDI	2.0008***	1.8724***	1.5003
HDI – GDP	6.9644*	11.1584*	9.5872
LFPR – HDI	4.1281*	5.8521*	4.9661*
HDI – LFPR	2.3244**	2.4778**	2.0275**

*Note: ** and *** represent significant at 5 and 10 percent respectively.*

V. CONCLUSION

This study investigates the main determinants of HCD for seven SAARC countries using panel data estimation for the period 1990 to 2020. We adopted a modified version of Sen's HCD framework as it provides more information and a link between HCD and its determinants. The results of this study show that there is a long-run association between HCD and its determinants. Moreover, economic growth, infrastructure, institutional quality, public expenditures on education, and public expenditure on health are positively related to HDC in SAARC countries.

Policymakers should seek to enhance HCD in SAARC countries by adopting a long-run perspective. There are two reasons for adopting a long-run perspective and outcomes. First, policymakers should focus more on improving infrastructure and increasing expenditure on health facilities, which would lead to high HCD in SAARC countries. Second reason is that it is the institutional quality that affects HCD in the short run, which is important for good governance in the countries.

In terms of policy implications, this study suggests that governments in the SAARC region should enhance public education investment to minimize the burden on the private sector because public education investment is strongly tied directly to the rise of human capital, or a better education system leads to a higher GDP, and vice versa. Furthermore, the sample countries must boost expenditure on health, which is regarded as a critical determinant of human growth. Our findings motivate sustainable economic growth to augment human capital development in SAARC countries.

REFERENCES

Acemoglu, D., Naidu, S., Restrepo, P., & Robinson, J. A. (2014). Democracy Does Cause Growth. SSRN Electronic Journal, 1–32. https://doi.org/10.2139/ssrn.2411791

Aghion, P., Howitt, P., Murtin, F. (2011). The Relationship Between Health and Growth: When Lucas Meets Nelson-Phelps. Review of Economics and Institutions, 2(1), Article 1. doi: 10.5202/rei.v2i1.1. Retrieved from http://www.rei.unipg.it/rei/article/view/22

Agrawal, P., Pravakar, S., & Dash, R. K. (2010). Savings Behavior in India: Co-Integration and Causality Evidence. The Singapore Economic Review, 55(02), 273–295. https://doi.org/10.1142/s0217590810003717

Agrawal, P., Sahoo, P., & Dash, R. K. (2009). Savings behavior in South Asia. Journal of Policy Modeling, 31(2), 208–224. https://doi.org/10.1016/j.jpolmod.2008.11.002

Arcand, J. L., Berkes, E., & Panizza, U. (2015). Too much finance? Journal of Economic Growth, 20(2), 105–148. https://doi.org/10.1007/s10887-015-9115-2

Baldacci, E., Clements, B., Gupta, S., & Cui, Q. (2008). Social Spending, Human Capital, and Growth in Developing Countries. World Development, 36(8), 1317–1341. https://doi.org/10.1016/j.worlddev.2007.08.003

Barro, R. & Sala-i-Martin, X. (1992). "Convergence," Journal of Political Economy, University of Chicago Press, vol. 100(2), pages 223-251

Barro, R. (1991), “Economic growth in a cross section of countries”, The Quarterly Journal of Economics, Vol. 106 No. 2, pp. 407-443.

Barro, R. J., & Lee, J. W. (1993). International comparisons of educational attainment. Journal of Monetary Economics, 32(3), 363–394. https://doi.org/10.1016/0304-3932(93)90023-9

Blejer, M. I., & Khan, M. S. (1984). Government Policy and Private Investment in Developing Countries (Politique des pouvoirs publics et investissement prive dans les pays en developpement) (Politica estatal e inversion privada en los paises en desarrollo). Staff Papers - International Monetary Fund, 31(2), 379. https://doi.org/10.2307/3866797

Bloom, D. E., Canning, D., & Sevilla, J. (2004). The Effect of Health on Economic Growth: A Production Function Approach. World Development, 32(1), 1–13. https://doi.org/10.1016/j.worlddev.2003.07.002

Bloom, D., & Canning, D. (2003). Health as Human Capital and its Impact on Economic Performance. Geneva Papers on Risk and Insurance - Issues and Practice, 28(2), 304–315. https://doi.org/10.1111/1468-0440.00225

Bowen, H. (2018). Investment in Learning: the Individual and Social Value of American Higher Education. Routledge.

Dae-Bong, K. (2009). Human Capital and Its Measurement. Organization for Economic Cooperation and Development OECD World Forum on Statistics, Knowledge, and Policy 27-30 October, Busan South Korea. Retrieved from http://www.oecd.org/site/progresskorea/44109779.pdf.

De Gregorio, J., & Lee, J. W. (2004). Growth and Adjustment in East Asia and Latin America. Economía, 5(1), 69–134. https://doi.org/10.1353/eco.2005.0004

De Muro, P., & Tridico, P. (2008). The role of institutions for human development. In HDCA Conference, New Delhi, Retrieved from https://www.researchgate.net/profile/Pasquale_De_Muro/publication/228430665_The_role_of_institutions_for_human_development/links/0deec51b04edd12174000000/The-role-of-institutions-for-human-development.pdf

Didenko, A. Y. (2007). Educational reforms in Spain and Estonia and their impact on human capital growth (Master's thesis). University of Oslo, Norway. Retrieved from https://www.duo.uio.no/handle/10852/30940

Erçelik, G. (2018). The relationship between health expenditure and GDP per capita in Turkey from 1980 to 2015. Journal of Politics, Economy and Management, 1(1), 1–8.

Erich Gundlach, 1997. "Human capital and economic development: A macroeconomic assessment," Intereconomics: Review of European Economic Policy, Springer; ZBW - Leibniz Information Centre for Economics; Centre for European Policy Studies (CEPS), vol. 32(1), pages 23-35.

Farooq, A., Arshi, S., Sattar, N., & Khalil, A. (2020). An Empirical Relationship Between Human Capital, Institutional Quality, and Economic Growth in Pakistan. Forman Journal of Economic Studies, 16, 133–152. https://doi.org/10.32368/fjes.20201606

Georgiadis, G., & Binder, M. (2011). Determinants of Human Development: Capturing the Role of Institutions. SSRN Electronic Journal, 1–49. https://doi.org/10.2139/ssrn.2031500

Hanushek, E. A., & Kimko, D. D. (2000). Schooling, Labor-Force Quality, and the Growth of Nations. American Economic Review, 90(5), 1184–1208. https://doi.org/10.1257/aer.90.5.1184

ICT human resource development in Africa: Challenges and strategies (ATPS Special Paper No. 10). https://atpsnet.org/wp-content/uploads/2017/05/special_paper_series_10.pdf

Khodabakhshi, A. (2011). Relationship between GDP and Human Development Indices in India. International Journal of Trade, Economics, and Finance, 251–253. https://doi.org/10.7763/ijtef.2011.v2.111

Knack, S., & Keefer, P. (1995). INSTITUTIONS AND ECONOMIC PERFORMANCE: CROSS-COUNTRY TESTS USING ALTERNATIVE INSTITUTIONAL MEASURES. Economics & Politics, 7(3), 207–227. https://doi.org/10.1111/j.1468-0343.1995.tb00111.x

Knowles, S. (2002). Are educational gender gaps a brake on economic development? Some cross-country empirical evidence. Oxford Economic Papers, 54(1), 118–149. https://doi.org/10.1093/oep/54.1.118

Krishnamurty, K. (1966). Economic Development and Population Growth in Low-Income Countries: An Empirical Study for India. Economic Development and Cultural Change, 15(1), 70–75. https://doi.org/10.1086/450198

Law, I., Widdows, H. (2008). Conceptualizing Health: Insights from the Capability Approach. Health Care Anal 16, 303–314. https://doi.org/10.1007/s10728-007-0070-8

Law, S. H., Azman-Saini, W., & Ibrahim, M. H. (2013). Institutional quality thresholds and the finance – Growth nexus. Journal of Banking & Finance, 37(12), 5373–5381. https://doi.org/10.1016/j.jbankfin.2013.03.011

Law, S.H. & Habibullah, M.S. (2006). "Financial Development, Institutional Quality and Economic Performance in East Asian Economies," Review of Applied Economics, Lincoln University, Department of Financial and Business Systems, vol. 2(2), pages 1-16.

Leff, N. H. (1984). Social benefit-cost analysis and telecommunications investment in developing countries. Information Economics and Policy, 1(3), 217–227. https://doi.org/10.1016/0167-6245(84)90003-9

Lucas, R. E. (1988). On the mechanics of economic development. Journal of Monetary Economics, 22(1), 3–42. https://doi.org/10.1016/0304-3932(88)90168-7

Maitra, B. (2018). 'Investment in Physical, Human Capital, Economic Growth and Life Expectancy in Bangladesh: An Empirical Investigation', South Asia Economic Journal, 19(2): 251–269.

Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A Contribution to the Empirics of Economic Growth. The Quarterly Journal of Economics, 107(2), 407–437. https://doi.org/10.2307/2118477

McMahon, W.W., 2009. Higher Learning, Greater Good: The Private and Social Benefits of Higher Education. JHU Press

Musalem, Alberto R., 1989. "Private investment in Mexico: an empirical analysis," Policy Research Working Paper Series 183, The World Bank.

Naidu, S., & Chand, A. (2013). Do central government health expenditure and medical technology advancement determine economic growth rates in the Pacific island countries? Asia-Pacific Journal of Business Administration, 5(3), 234–245. https://doi.org/10.1108/apjba-01-2013-0005

Osmani, S. R. (2018). Socio-economic development in South Asia (WIDER Working Paper 2018/105). United Nations University World Institute for Development Economics Research (UNU WIDER).

Piabuo, S. M., & Tieguhong, J. C. (2017). Health expenditure and economic growth - a review of the literature and an analysis between the economic community for central African States (CEMAC) and selected African countries. Health Economics Review, 7(1), 1–13.https://doi.org/10.1186/s13561-017-0159-1

Rahman, M.M., Khanam, R. & Rahman, M. (2018). Health care expenditure and health outcome nexus: new evidence from the SAARC-ASEAN region. Global Health 14, 113. https://doi.org/10.1186/s12992-018-0430-1

Randolph, Susan, and Bogetic, Zeljko and Heffley, Dennis R. (1996). Determinants of Public Expenditure on Infrastructure: Transportation and Communication. Available at SSRN: https://ssrn.com/abstract=620528

Reza, F., and T. Widodo. 2013. "Impact of Education on Economic Growth in Indonesia." Journal of Indonesian Economy and Business 28 (1): 23 – 44.

Romer, P. M. (1986). Increasing Returns and Long-Run Growth. Journal of Political Economy, 94(5), 1002–1037. https://doi.org/10.1086/261420

Sala-i-Martin, X. (1996), "The Classical Approach to Convergence Analysis", The Economic Journal, Vol. 106, No.437, pp. 1019-1036

Sapkota, J. B. (2014). Access to infrastructure and human development: Cross country evidence. In H. Kato (Ed.), Perspectives on the post-2015 development agenda (pp.59-83). Tokyo, Japan: JICA Research Institute. Retrieved from https://www.jica.go.jp/jica-ri/publication/booksandreports/jrft3q00000029wt-att/Perspectives_on_Post-2015_JICA-RI.pdf

Sehrawat, M. and Giri, A.K. (2017), "An empirical relationship between financial development indicators and human capital in some selected Asian countries", International Journal of Social Economics, Vol. 44 No. 3, pp. 337-349. https://doi.org/10.1108/IJSE-05-2015-0131

Sen, A. (1999). Development as freedom. New York, NY: Anchor Books Press.http://www.c3l.uni-oldenburg.de/cde/OMDE625/Sen/Sen-intro.pdf

Sharpe, A. (2001). The development of indicators for human capital sustainability. Centre for the Study of Living Standards, CSLS session "The development of indicators for human capital sustainability", Canadian Economics Association, McGill University, Montreal, Canada. http://www.csls.ca/events/cea01/sharpe.pdf

Siddiqui, A., & Rehman, A. U. (2016). The human capital and economic growth nexus: in East and South Asia. Applied Economics, 49(28), 2697–2710. https://doi.org/10.1080/00036846.2016.1245841

Solow, R. M. (1956), "A Contribution to the Theory of Economic Growth," Quarterly Journal of Economics, Vol. 70, No.1, pp. 65-94.

Tripathi, M., & Inani, S. K. (2020). Do information and communications technology affect economic growth? Empirical evidence from SAARC countries. Information Technology for Development, 26(4), 773–787. https://doi.org/10.1080/02681102.2020.1785827

UN DESA. (2019). World economic situation and prospects: Monthly briefing. United Nations Department of Economic and Social Affairs (UN DESA)

UNDP. 2009. Human Development Report 2009: Overcoming barriers: Human mobility and development. New York. http://hdr.undp.org/en/content/human-development-report-2009

United Nations. (2018). The sustainable development goals reports. https://unstats.un.org/

sdgs/files/report/2018/TheSustainableDevelopmentGoalsReport2018-EN.pdf

United Nations. (2019). World economic situation and prospects. https://www.un.org/ development/desa/dpad/wp-content/uploads/sites/45/WESP2019_BOOK-CH3-5- south-asia-en.pdf

United Nations. (2020). World economic situation and prospects. https://unctad.org/system/files/official-document/wesp2020_en.pdfWaema, T. M. (2002).

Wigley, S., & Akkyoyunlu-Wigley, A. (2006). Human Capabilities Versus Human Capital: Gauging the Value of Education in Developing Countries. Social Indicator Research, 78(2).

Yadav, A. and Iqbal, B.A. (2021). Socio-economic Scenario of South Asia: An Overview of Impacts of COVID-19. South Asian Survey. 28(1) 20–37.