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Dynamics of Education Expenditure, Health Expenditure and Economic Growth: The Case of Selected SAARC Countries

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Abstract

This study examines the dynamics of expenditures on education; expenditures on health and economic growth for case of selected SAARC countries by employing panel data for the time span of 1990 to 2022. The result of unit root test exhibits that except education expenditure, which is stationary at level, all other variables are stationary at the 1st difference. Hausman test proposes that fixed effect model (FEM) is suitable for estimations. FEM with a specific cross-section coefficient is also used in the study. The results of FEM reveal that education expenditure, health expenditure, investment and government positively and significantly influence economic growth of selected SAARC countries. Results of Pedroni, Johansen as well as Kao co-integration tests explored long run connections among expenditures on education, expenditures on health and economic growth in selected SAARC countries. Results of Fully Modified Ordinary Least Square and Dynamic Modified Ordinary Least Square and ARDL methods suggest positive as well as significant effect of expenditures on education, health expenditure and investment on economic growth of selected SAARC countries in long run. The results exhibit positive and significant association of education expenditure and health expenditure while positive but insignificant association of investment with economic growth of selected SAARC nations in short run. Findings of the study indicate that increased investment can have crucial effect in enhancing economic growth in selected SAARC nations. The study suggested that advancing human capital through more spending on health and education is essential for economic growth. Enhancing investment in these two areas of human capital should be the highest priority for policy makers in selected SAARC countries.

Keywords: Education Expenditure, Health Expenditure, Economic Growth, FEM, FMOLS, DOLS, SAARC Countries

JEL Classification: H51, H52, F43

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1. Introduction

Government expenditures are the funds used by government for acquisition and provision of services which include defense, law and order, social security, health as well as education. Researchers' interest in confirming and comprehending relationships between fiscal policies and growth has recently re-emerged in response to the recent resurgence of interest in growth theory. Significant empirical research work has been conducted over the past 15 years with goal of finding the components of public spending (both at the aggregate and dis-aggregate levels) that are significantly linked to economic growth. The data sets and econometric methods utilized in this empirical literature vary, and the results are frequently ambiguous. Various contradictory explanations presented can be roughly grouped into two categories. According to the first, the lack of agreement in the results is due to variations in the collection of conditioning variables used by different studies. The second category, in contrast, comprises of a small number of studies that contend that the widespread propensity among researchers to overlook the effects of government budget limitation for their regressions is the likely cause of the heterogeneity in the results (Bose et al., 2007).

Education expenditure is the total government budget of the country allocated for various educational activities (Kweka and Morrissey, 2000). Information about how public spending by different economic sectors affects growth is particularly helpful for developing nations, where there are resource shortages and sectoral allocation of scarce public resources is a critical problem. The conclusion that education is the primary area where public spending should be prioritized to facilitate economic expansion is significant in this regard (Bose et al., 2007). The growth of human capital depends on education. By boosting a person's productivity as well as efficiency, it produces skilled labor able to steer the economy in the direction of long-term economic development (Riasat et al., 2011). Education is broadly recognized as an essential factor for promoting economic development. Enhancing skills, competency, as well as productivity are essential for expansion of human resources and improving economic growth. Education has a favorable influence on both society and people. Education is critical in reducing poverty and eliminating social and economic inequities in developing countries like Pakistan (Kakar et al., 2011).

Human capital has long been acknowledged as essential to economic growth by economists. Investments in human capital, like education spending, account for the majority of the increase in real earnings per worker. Human capital investments enhance an individual's productivity and profitability. The main thing

is that a well-educated workforce will be more productive in long run (Schultz, 1961; Becker, 1964 as cited in Churchill et al., 2017). In line with the human capital theory, education enhances both competency and income, establishing itself as a valuable asset. This asset is indispensable for individuals, contributing to heightened productivity within the state. "Investing in human lives is a necessary asset" (Marshall, 1920 as cited in Chani et al., 2021). Education is widely acknowledged as a key factor in a country's long-term growth. Education not only enhances people's quality of life, but also supplies the workforce required to increase production (Gunu and Yakubu, 2022).

All costs for family planning, nutrition, and medical emergency assistance are included in the category of health expenditures. Health-care spending leads to lower mortality as well as morbidity, which result in higher proportion of persons of at age of working in population and higher per capita incomes. Healthy people are more active, energetic and productive, which is beneficial to the country. Health has an impact on labor output since it enables persons for intellectual and physical development. Health-care investment is crucial for improving the 'human factor' which fosters economic growth through technological advancement and worker productivity (Faruk et al., 2022).

Education is basically a long run investment that can lead to increased production for a country, and both developed and developing countries have prioritized educational reforms in their overall national development strategies. Countries all over the world are investing heavily in education in order to increase their human capital base (Owusu-Nantwi, 2015). Investments are made in development’s fields of education and health to advance the ability and skills of country's citizens, which in turn improves the economy's development. Development expenditures are directly linked to economic growth, the government should encourage them (Shehzad and Munir, 2020). Empirical findings on the association among human capital and growth show that improvements in health and education have an influence on productivity, production, and thus economic growth. When education and health are considered to be the two most fundamental components of human capital, it is undeniable that expenditures in these areas will aid growth in both the long as well as short term. When considering countries with higher levels of economic growth, this is very common to reveal that their levels of education and health are similarly high (AK, 2012). The international community pledged to end extreme poverty by the year 2015 at the beginning of the new century. The MDGs were subsequently established by the United Nations, with lowering maternal as well as child mortality rates in developing countries and achieving universal primary education serving as the two main objectives to combat

poverty. The governments of both wealthy and developing nations broadly embraced the objectives (Donou-Adonsou, 2021).

Many studies have been done to investigate the association among government expenditures and economic growth and connection among expenditures on education, expenditures on health and economic growth in different countries. Earlier literature in this specific area focused only investigation of connection between health expenditures and economic growth or between expenditures on education and economic growth but no research study has explored the combined relationship among expenditures on education, expenditures on health, as well as economic growth, particularly in SAARC nations. The present study aims to bridge the gap in existing literature. The study's main goal is to explore the dynamics of expenditures on education, expenditures on health as well as economic growth for selected SAARC nations. Specific objectives are to explore the influence of expenditures on education and expenditures on health over economic growth in each of four selected SAARC countries.

The remaining sections of this paper are structured as follows: Section 2 consists of literature review, offering empirical context for the present study. Data as well as methodology explained in section 3. Section four present findings and discussions. The conclusions along with policy implications are given in section 5.

2. Literature Review

This section provides a succinct overview of the empirical effects of expenditures on education and expenditures on health on growth. Abdulqadir et al. (2021) revealed the link among healthcare spending and economic growth in Sub-Saharan African nations from 2000 to 2018. The mean and pooled group estimators were used to determine the association between variables. The results demonstrated that linear health care spending has a positive as well as significant influence over Sub-Saharan African nations' economic growth.

Donou-Adonsou et al. (2021) examined how investments in health and education affect economic growth of developing nations. Study employed data from 1980-2015. FEM was used to investigate the significant contributions of health along with education spending to economic growth in developing nations. It was suggested that strengthening investment in these facets of human capital should be given top priority by policymakers in developing nations.

Kousar et al. (2020) used data from 1998 to 2018 to reveal the effect of education as well health spending towards growth in Pakistan. The study used OLS technique for estimation and found positive and also significant connection of

education along with health spending with growth in Pakistan. The findings showed that improvement in education as well as health expenditure boost up the economic growth of Pakistan. Study suggested that the Pakistani government should follow the recommendations of the WHO and devote 13% of its annual budget to health area. To overcome challenges of current day through strong economic growth, authorities should make use of contemporary technology and the services of qualified professionals in the education and health sectors.

Minhaj and Nishat (2018) utilized data from 1972 to 2017 to reveal influence and importance of government expenditures over welfare of people in Pakistan. The findings of the ARDL technique demonstrated that all elements of government spending have a major effect on welfare, as proxied by GDP per capita. The study's findings explored that government expenditures over education, health, subsidies, and economic services have favorable and significant impact over GDPPC in Pakistan, whereas government spending on law and order has a negative and insignificant influence. Study also explored that government expenditures over education has favorable and significant association with employment, whereas government spending over health has a negative and significant association with employment in Pakistan. Also, the government spending over law and order, the current account deficit, and private investment have no important influence on improving employment levels.

Al-Fawwaz (2016) analyzed the influence of government spending overgrowth for case of Jordan using data from 1980 to 2013 using OLS as estimation technique. The results of OLS exhibited positive as well as significant association of total government expenditures and current government expenditures with growth in Jordan. Also, there is positive but insignificant influence of capital government expenditures over economic progress in Jordan. The research proposed that the capital government expenditures should contract while the current government expenditures should enhance in order to boost up economic growth.

Mose (2014) revealed the influence of government spending over economic growth in East Africa using aggregate as well as disaggregate expenditures data from 1980-2010. The findings of this study illuminate positive as well as significant influence of government expenditures over health and defense on economic growth but expenditures over education as well as agriculture were positively but insignificantly influencing economic growth in East Africa. The research suggested that East Africa should spend more in health and defense to boost up economic growth.

Kiran (2014) analyzed the influence of educational expenditures over economic growth in 18 different LA countries using data from 1970 to 2009 in presence of two structural breaks which were basically unknown. Findings revealed the existence of co-integration among educational expenditures and GNI, but no co-integration was found in Chile, Jamaica, Paraguay, Guyana, Peru and Nicarag.

Mercan and Sezer (2013) used data from 1970 to 2012 to examine how Turkey's educational spending has affected economic growth using ARDL and ECM techniques. It was also found that there is a positive and significant connection between educational expenditures and growth both in the short and long term.

Razmi (2012) used data from 1990 to 2009 to unleash the influence of government health spending over HDI in Iran. Variables included government health spending, HDI, mortality rate, GDP per capita, and primary school enrollment. ADF discovered that variables were stationary at the level. OLS based findings showed a positive significant association among government health spending, GDP, primary school enrollments, and HDI, but a negative significant relationship between mortality rate and GDP. Based on Granger causality test, a Uni-directional association among health expenditure and HDI is established.

Tamang (2011) revealed the connection among education expenditures and growth using data from 1980 to 2008 for the case of India. The findings of Johanson co-integration and ECM techniques revealed long term and short-term connection among variables. The findings illustrated that one percent improvement in education expenditure per labor will boost up the economic growth up to 0.11 percent while one percent improvement in physical capital per labor will improve the economic growth by 0.28 percent.

Gunalp and Gur (2002) explored the influence of government spending over economic growth in thirty-four different developing nations during period of 1979-1997 employing the IFS data. Results of Fixed Effect Model revealed positive as well as significant influence of government expenditures over economic growth in these selected developing nations. According to the study these results were consistent with the World Bank definition that state play important role in economic growth as well as development.

Most of the studies mentioned above concluded that in various countries, there is a positive connection among government expenditure and economic growth or education spending, health expenditure and economic growth.

3. Methodology

Following Donou-Adonsou et al. (2021) this study proposed following model to find out the dynamics of expenditures on education, expenditures on health and economic growth:

$$LnGDPPC_{it} = \beta_0 + \beta_1 lnEDUE_{it} + \beta_2 lnHEE_{it} + \beta_3 lnGOVE_{it} + \beta_4 lnINV_{it} + \mu_{it} \quad (1)$$

Where,

GDPPC = Gross Domestic Product Per Capita

EDUE = Education Expenditure

HEE = Health Expenditure

GOVE = Government

INV = Investment

μ = Error term,

the subscript (i = 1……. n) indicates the country

while the subscript (t = 1…….t) shows the time period.

Equation 1 estimates the dynamics of education expenditure, health expenditure and GDPPC used for economic growth. The dependent variable is GDPPC while Education expenditure per capita, Health expenditure per capita, government proxied by government final consumption expenditure per capita, Investment is measured by GCF per capita all are explanatory variables. β0 is intercept while β1, β2 and β3 are slope coefficients of Education expenditure, Health expenditure, Government and Investment respectively.

4. Data and Estimation

4.1. Data

This study utilized panel data of six SAARC countries (Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka) for time span: 1990-2022.

Variable Name	Proxy	Data Source
Economic Growth	GDP per capita (constant 2015 US$)	WDI
Education Expenditure	Educational Expenditure Per capita (constant 2015 US$)	UNESCO
Health Expenditure	Health Expenditure per capita (constant 2015US$)	WDI
Government	Government final consumption expenditure per capita (constant 2015 US$)	WDI
Investment	Gross capital formation per capita (constant 2015 US$)	WDI

4.2. Estimation Technique

This must be taken into account that certain country-specific elements may have an impact on growth but are difficult to measure when estimating equation. The model may produce false findings when the non - observable country-specific variables are linked to the included explanatory variables. We have the option to utilize either Fixed Effects (FE) or Random Effects (RE) models to handle this issue. FE technique is preferred in this study because the RE estimation calls for omitted variables to be uncorrelated with included explanatory variables in same nation, which seems not possible in given model this study take into consideration. The Hausman test is used in this study to reveal whether RE version of model performs better than the FE version. The country-specific variables vary among nations but remain stable over time within a single nation. The FE method corrects all the model's variables by deducting their respective means over time in order to prevent correlation between the non-observed country-specific factors and the explanatory variables used in the current analysis. The estimated coefficients more precisely reflect the influence of the added explanatory variables when the intercept and fixed country-specific variables are removed from the estimated equation.

The RE model assumes that country-specific coefficients are chosen at random from a distribution with such a constant mean as well as variance rather than necessarily assuming a fixed value. Furthermore, there is no connection among right-side variables in model and nation effects on growth. When estimated using the maximum likelihood technique, the RE model provided that it holds true, provides a helpful set of estimations, whereas the estimation of FE produces bit accurate estimates.

4.3. Model Specification Test

The Hausman specification test is frequently utilized to select best model among FE model and RE model. The Fixed Effect Model is supported by high Hausman Chi-Square statistics as well as low p-value, whereas Random Effects Model is supported by low Hausman Chi-Square statistics as well as high p-value. It investigates the following claims:

Ho: = Random Effect Model is suitable

H1: =Fixed Effects Model is suitable

The null hypothesis means RE model is the proper model is rejected if Hausman statistics is greater than probability value, favoring fixed effect model

instead (Awan et al., 2018). The current study likewise makes use of a fixed effects model with a specified cross-section coefficient.

The majority of earlier studies has a basic problem is that the effects of cross-sectional dependence are not considered. The presence of unobserved elements that are common to all cross-sectional entities causes cross-sectional dependency in the disturbances. It's feasible that unobserved elements like cultural or technological spillovers have an impact on developing nations in a similar way (Donou-Adonsou et al., 2021). It is now well known that the premise of cross-sectional independence that underlies much of the panel data literature is false, particularly when analysis of macroeconomic or financial data that show significant inter-economy connections. Ignoring such dependencies which may be caused by omitted random effects, possibly associated with regressors can lead to biased as well as spurious estimates. In order to utilize an estimating methodology that yields reliable estimates when cross-sectional dependency is present in data, it is essential to determine whether it is. The LM test devised by Breusch and Pagan (1980) has been used to evaluate cross-section independence (Shastri et al., 2017).

Before calculating the long-term association among variables, the study first checks each variable's stationarity since if the variables have issues with unit root, the projected results are thought to be false and spurious to the development of policy. Hence, we must investigate stationarity qualities of the data (Khan et al., 2016). "First generation" panel unit root tests have a tendency to reject unit root null hypothesis overly in existence of cross section dependence that should be substituted by second generation tests. Several effective second-generation tests are provided in the literature. The CIPS test is rely over an ADF (p) regression that is cross-sectionally augmented using lagged cross-sectional mean as well as lagged 1^{st} differences of cross-sectional mean to remove cross-sectional dependence through filtering.

Pedroni (1999, 2004) lists a variety of statistics that can be used to test the null hypothesis that there isn't any co-integration in panel data. These comprise three "between dimension" group mean panel tests and four "within dimension" panel tests that take into account parameter variation between nations. For the purpose of testing the null hypothesis of there isn’t any co-integration, Kao (1999) presented DF and ADF-type unit root tests for e_{it}. The Johansen (1988) suggests two alternative methods to identify the existence of co-integration vectors in nonstationary time series, likelihood ratio trace statistics as well as maximum eigenvalue statistics are two examples. By integrating the individual cross-sectional tests for co-integration, Maddala and Wu (1999) present a substitute for the first

two tests for assessing co-integration in the entire panel. They do this by using Johansen's (1988) test for co-integration.

The next phase includes estimating long run coefficients when the long run association has been confirmed. To explore long-run relationships, Pedroni (2000) proposes using FMOLS estimation. A non-parametric estimating method called FMOLS can be used to address homogeneity and serial correlation issues. A panel dynamic OLS estimator (DOLS), which is a generalization of the approach first put forth by Saikkonen (1991) and Stock and Watson (1993) for time series regressions, was advised by Kao and Chiang in 2000. The use of DOLS estimators can also be used to rectify the serial correlation as well as endogeneity. DOLS is a parametric estimation that uses the lagged of the first difference for endogeneity control to produce a fair estimator of the long-term parameters.

5. Results and Discussions

Findings of this study on association among expenditures on education, expenditures on health as well as economic growth in selected SAARC nations are presented in this section. The FEM, FMOLS and DOLS are used to achieve the study's goal.

Table 1. Breusch-Pagan LM Test Results

Statistics	d.f	p-value
69.001	15	0.0000

Source: Author's calculation

The LM test result is given in Table 1. Results show that $p < 0.05$, so the alternative hypothesis of cross-sectional dependency is accepted. So, unit root tests of 2nd generation "which considers cross-sectional dependencies" are used.

Table 2. Result of Homogeneity Test

T-statistic	P value
9.512	0.0000
10.418	0.0000

Source: Author's calculation

Result of homogeneity test is given in Table 2. Null hypothesis of heterogeneous constant term as well as slope coefficients is accepted and therefore, the fixed effect model "which takes into account the unobserved effects" is applied.

Results of unit root test given in Table 3 show that education expenditure is stationary at level while GDP per capita, health expenditure, government and investment are stationary at first difference.

Descriptive statistics for each variable utilized in the present study are exhibited in Table 4. The average mean score for the selected nations per capita GDP is 7.06. Health expenditure in selected nations has an average mean score of

2.48, whereas education expenditure has an average mean score of 3.59. The average expenditure on education was higher than that of health and stood at 3.59 over the sample period. The standard deviations revealed great disparities among health expenditure across SAARC countries, unlike education expenditure.

Table 1. Unit Root Test Findings

Series	Cross Sectional LM, Pesaran and Shin Test		Results
	Level	1st Difference	
LnGDPPC	-1.02569	-4.22148***	I(1)
LnEDUE	-3.23547***	-5.06860***	I(0)
LnHEE	-2.54479	-5.58404***	I(1)
LnGOVE	-2.20574	-4.03320***	I(1)
LnINV	-2.43984	-3.63363***	I(1)

Note: ***, **, *, shows the 1%, 5% and 10% level of significance respectively.
Source: Author's calculation

Table 4. Descriptive Statistics

Variables	Observation	Mean	Std.Dev	Min	Max
lnGDPPC	192	7.06	0.56	6.08	8.35
lnEDUE	192	3.59	0.71	1.99	5.43
lnHEE	192	2.48	1.02	0.93	5.45
lnGOVE	192	4.74	0.78	3.21	6.42
lnINV	192	5.75	0.80	4.33	7.44

Source: Author's calculation

Table 5. Correlation Matrix

Series	lnGDPPC	lnEDUE	lnHEE	lnGOVE	lnINV
lnGDPPC	1	0.82	0.88	0.86	0.80
lnEDUE	0.82	1	0.90	0.94	0.89
lnHEE	0.88	0.90	1	0.92	0.87
lnGOVE	0.86	0.94	0.92	1	0.86
lnINV	0.80	0.89	0.87	0.86	1

Source: Author's calculation

The correlation among variables is given in Table 5. Each key variable (Education expenditure and Health expenditure) and GDPPC are positively correlated. The correlation between GDPPC and health expenditure is high 0.88, while the correlation among GDPPC as well as education expenditure is 0.82. The correlation between health expenditure and Education expenditure is 0.90.

Table 6. Hausman Test Finding

Summary	Chi-Sq. Statistics	d.f	p-value
Hausman Test	19.966	4	0.0005

Source: Author's calculation

The results of the Hausman test are shown in Table 6 above. The results show that FEM is more suitable for estimation than the REM, based on a highly significant p value (0.0005) of the Hausman test. So, the study estimates results using the Fixed Effect Model.

Table 7 indicates FE results of association among education expenditure, expenditures on health and growth in selected SAARC nations. Results indicate

that expenditures on education have favorable as well significant effect over economic growth, and coefficient of education expenditure shows that a 1% rise in education expenditure will boost economic growth by 0.21% in selected SAARC nations. The findings suggest a positive as well as significant connection among health expenditure and growth, with the coefficient of health expenditure indicating that, in selected SAARC countries, a 1% improvement in health expenditure will cause 0.23% rise in economic growth.

Table 7. Findings of Fixed Effect Model: LnGDPPC is Dependent Variable

Variable	Coefficient	Std-Error	t-value	p-value
C	3.16	0.090	34.85	0.0000
LnEDUE	0.21	0.036	5.82	0.0000
LnHEE	0.23	0.034	6.67	0.0000
LnGOVE	0.33	0.031	10.58	0.0000
LnINV	0.20	0.022	8.18	0.0000
R^2	0.98			
F-statistic	1081.69 (0.0000)			

Source: Author's own calculation

The findings indicate a positive as well as significant association among government and economic growth. According to the government coefficient, selected SAARC countries will experience an increase of 0.33% in economic growth for every one percent increase in government. The results show positive and significant effect of investment over economic growth and coefficient of investment indicates that one percent rise in investment will boost the economic growth by 0.20% in selected SAARC countries. R^2 demonstrates that education expenditure, health expenditure, government, and investment account for 98% of the variation in economic growth, and F-statistic value demonstrates that the model is a good fit.

Fixed Effect Results for Education Expenditure: LnGDPPC is Dependent Variable

A Fixed Effect with a specific cross-section coefficient has been utilized to evaluate the connection between expenditures on education, expenditures on health, government, investment and economic growth. Below are the results.

Table 8. Fixed Effect Results for Education Expenditure

Variable	Coefficient	Std-Error	t-value	p-value
C	3.10	0.103	29.961	0.0000
BAN-lnEDUE-BAN	0.10	0.046	1.743	0.0831
BHU-lnEDUE-BHU	0.33	0.039	8.457	0.0000
IND-lnEDUE-IND	0.11	0.043	2.600	0.0101
NEP-lnEDUE-NEP	0.21	0.045	4.719	0.0000
PAK-lnEDUE-PAK	0.01	0.072	0.072	0.9425
SRI-lnEDUE-SRI	0.26	0.061	4.270	0.0000
R^2	0.98			
F-statistic	894.72 (0.0000)			

Source: Author's own calculation

Table 8 shows Fixed Effect results for education expenditure in selected SAARC nations. In BAN, BHU, IND, NEP, and SRI, the findings indicate a positive as well as significant association between education expenditure and economic growth while Pakistan's results indicate a positive but insignificant correlation among education expenditure and growth.

According to the findings, Bangladesh's economic growth will increase by 0.1% for every 1% increase in education expenditure. The results indicate that a 1% improvement in education expenditure will boost Bhutan's economic growth by 0.33%. According to the results, India's economic growth will boost by 0.11% for every 1% increase in education expenditure. In Nepal, a 1% rise in education expenditure will result in a 0.21% improvement in economic growth. The economic growth of Pakistan will improve by 0.01% for every 1% rise in education expenditure. The findings indicate that a 1% increase in education expenditure will boost Sri Lanka's economic growth by 0.26%.

Table 9. Fixed Effect Results for Health Expenditure

Variable	Coefficient	Std-Error	t-value	p-value
C	3.22	0.116	27.684	0.0000
BAN-lnHEE-BAN	0.12	0.080	2.663	0.0005
BHU-lnHEE-BHU	0.46	0.052	8.745	0.0000
IND-lnHEE-IND	0.23	0.049	4.669	0.0101
NEP-lnHEE-NEP	0.26	0.042	6.146	0.0000
PAK-lnHEE-PAK	0.17	0.038	4.323	0.0000
SRI-lnHEE-SRI	0.43	0.063	6.721	0.0000
R^2	0.98			
F-statistic	912.03 (0.0000)			

Source: Author's own calculation

Table 9 shows Fixed Effect results for health expenditure in selected SAARC nations. The findings indicate positive as well as significant connection among health expenditure and growth in each of the selected SAARC nations. Bangladesh's economic growth will increase by 0.12% with every 1% rise in health spending. In Bhutan, a 1% rise in health expenditure will result in 0.46% boost in economic growth. A 1% improvement in health spending will enhance growth by 0.23% in India. In Nepal, a 1% rise in health spending will cause 0.26% improvement in economic growth. The economic growth of Pakistan will expand by 0.17% for every 1% increase in health expenditure. Sri Lanka's economic growth will be increased by 0.43% for every 1% increase in health expenditure.

Panel co-integration tests devised by Pedroni (1999, 2004), Johansen (1988), and Kao (1999) are used in this study to test for co-integration relationships among variables.

Table 10. Pedroni Residual Co-Integration Test

Test Statistics	t-statistic	p-value
Panel v-statistic	-1.204	0.8857
Panel rho-statistic	-1.949	0.0257
Panel PP-statistic	-6.617	0.0000
Panel ADF-statistic	-5.734	0.0000
Group rho-statistic	-0.529	0.2986
Group PP-statistic	-8.419	0.0000
Group ADF-statistic	-5.582	0.0000

Source: Author's own calculation

Panel co-integration test result is shown in Table 10. The results show that out of seven tests, five had p values less than 0.05 and are significant, indicating a long run association among education spending, health expenditure, and growth in selected SAARC countries.

Table 11. Fisher Johansen Panel Co-integration Test

Hypothesized No of CE(s)	Fisher Stat (from trace stat)	p-value	Fisher stat (from max-eigen test)	p-value
None	139.8	0.0000	97.93	0.0000
At most 1	60.21	0.0000	35.94	0.0003
At most 2	32.20	0.0012	21.39	0.0449
At most 3	20.59	0.0567	18.52	0.1007
At most 4	18.24	0.1085	18.24	0.1085

Source: Author's own calculation

Johansen panel co-integration test results given in Table 11 demonstrates that the max-eigen test values are less than Fisher statistics values up to at most 3, which supports the existence of four co-integrating factors and the co-integration among education expenditure, health expenditure, and economic growth in selected SAARC nations.

Table 12. Kao Residual Co-integration Test

Test	t-statistic	p-value
ADF	-3.482	0.0002

Source: Author's calculation

Kao residual co-integration test results in Table 12 show that Kao test's p value is highly significant, rejecting null hypothesis, and coming to the conclusion that there is co-integration among education expenditure, health expenditure as well as economic growth in selected SAARC nations.

Long Run Results

Given the presence of co-integration connection among variables, this study now estimates long run parameters with the help of FMOLS and DOLS methods.

Table 13 shows FMOLS and DOLS findings of long run connection among education expenditure, health spending and economic growth in selected SAARC countries. Results of FMOLS and DOLS methods in both pooled as well as grouped

versions suggest positive as well as significant influence of education expenditure and investment over economic growth while the result of FMOLS shows positive as well as significant effect of health expenditure in both pooled and grouped versions while the results of DOLS method show positive and significant influence of health expenditure under grouped version but positive and insignificant affect under pooled version over economic growth.

Table 13. FMOLS and DOLS Results

	FMOLS		DOLS	
Variable	Pooled	Grouped	Pooled	Grouped
LnEDUE	0.01	0.01	0.01	0.01
	(8.81)***	(9.24)***	(8.18)***	(2.95)***
LnHEE	0.06	0.08	0.02	0.10
	(3.23)***	(5.88)***	(0.65)	(2.41)***
LnGOVE	0.07	-0.001	0.09	0.01
	(2.63)***	(-0.03)	(2.37)**	(0.13)
LnINV	0.12	0.16	0.15	0.21
	(5.26)***	(5.79)***	(4.73)***	(3.16)***

Note: *** and ** shows 1% and 5% level of significance respectively
Source: Author's calculation

The findings of FMOLS as well as DOLS methods in pooled versions suggest positive and also significant influence of government over economic growth while the results of grouped version of FMOLS show negative and insignificant affect but DOLS grouped version shows positive and insignificant effect of government over economic growth of selected SAARC nations in the long run. In selected SAARC nations, a 1% rise in education expenditure will boost economic growth by 0.01%. Under both FMOLS and DOLS, a 1% rise in health expenditure will raise the economic growth up to 0.06%, 0.08%, 0.02%, and 0.1%, respectively in the long run. Under both FMOLS and DOLS, a 1% rise in investment will increase economic growth by 0.12%, 0.16, 0.15, and 0.21%, respectively in the long run.

Table 14. Short Run Results: Dependent Variable is ΔLnGDPPC

Variable	Coefficient
ΔlnEDUE	0.03**
	(0.01)
ΔlnHEE	0.04***
	(0.01)
ΔlnGOVE	-0.01
	(0.02)
ΔlnINV	0.01
	(0.03)
ECT	-0.71***
	(013)

Source: Author's calculation
Note: ***, ** shows 1% and 5% level of significance respectively

Results reported in Table 14 show positive as well as significant association of education expenditure and health expenditure while positive but insignificant

correlation of investment with economic growth of selected SAARC countries in short run. The results of the study show negative but insignificant correlation of government with economic growth of selected SAARC countries in short run. The economic growth will boost up by 0.03 percent for every 1 percent rise in education expenditure, 0.04 percent for every 1% improvement in health expenditure, 0.01 percent for every 1% increase in investment and reduce by 0.01 percent for every 1% rise in government in short run for case of selected SAARC countries. The lagged EC term is negative as well statistically significant, and its high value indicates that rate of adjustment towards long-term equilibrium is quite high.

6. Conclusions and Policy Implications

Productivity increase is a sign of economic growth, and it can be attained by increasing labor and capital expenditures. However, if there is a healthy and educated labor available in the economy, capital investments can only be properly utilized. As a result, both health and education are crucial for enhancing productivity and economic growth. They play a crucial role in economic development since they serve as both input and output.

The major goal of this study was to explore the connection between expenditures on education, health expenditure and economic growth utilizing panel data covering the years 1990 to 2022 in selected SAARC countries. The results of Breusch-Pagan LM test explored the presence of cross-sectional dependency in data and the results of homogeneity test revealed heterogeneity in both constant and slope coefficients. The result of unit root test exhibits that except education expenditure, which is stationary at level, all other variables are stationary at 1st difference. The Hausman test recommends that FEM is more suitable for estimations. The findings of FEM illustrate that education expenditure, health expenditure, investment and government positively and significantly affect economic growth of selected SAARC countries. These findings are identical with; (Khan et al., 2016, Sihaloho, 2021 and Donou-Adonsou et al., 2021).

Fixed Effect results for education expenditure in BAN, BHU, IND, NEP, and SRI, indicates positive and also significant association among education expenditure and economic growth and these results are consistent with (Tamang 2011, Riasat et al 2011, Mallick et al., 2016, Kesavarajab 2021), while Pakistan's results indicate a positive but insignificant connection among education expenditure and growth and results are in line with (Ejaz et al., 2017). Fixed Effect results for health expenditure indicates positive and also significant connection among health expenditure and economic growth in each of the selected SAARC

nations and these findings are in line with (Mitra and Gupta 2004, Haldar 2008, Rahman 2011, Vijesandran and Vinayagathasan 2015, Ejaz et al., 2017).

Results of co-integration tests explored long run connection between expenditures on education, health expenditure and growth in selected SAARC nations. Results of FMOLS and DOLS methods suggest positive and significant effect of education expenditure, health expenditure and investment on economic growth of selected SAARC countries in long run.

The findings of the study show that increased investment can play an important role in enhancing economic growth in selected SAARC countries. The study suggested that advancing human capital through more spending over health and education is essential for economic growth in selected SAARC countries. Enhancing investment in these two areas of human capital should be a top priority for policy makers in selected SAARC countries.

References

Abdulqadir, I. A., Sa'idu, B. M., Adam, I. M., Haruna, F. B., Zubairu, M. A., & Aboki, M. (2022). Dynamic inference of healthcare expenditure on economic growth in Sub-Saharan Africa: A dynamic heterogenous panel data analysis. *Journal of Economic and Administrative Sciences*.

Al-Fawwaz, T. M. (2016). The impact of government expenditures on economic growth in Jordan (1980-2013). *International Business Research*, 9(1), 99-106.

Awan, R. U., Akhtar, T., Rahim, S., Sher, F., & Cheema, A. R. (2018). Governance, corruption and economic growth. *Pakistan Economic and Social Review*, 56(1), 1-20.

Bose, N., Haque, M. E., & Osborn, D. R. (2007). Public expenditure and economic growth: A disaggregated analysis for developing countries. *The Manchester School*, 75(5), 533-556.

Chani, M. I., Sheikh, M. R., Mansha, M., Abbas, A., & Iqbal, J. (2021). Impact of human capital investment on economic growth in muslim and non-muslim asian countries. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 18(4), 5227-5247.

Churchill, S. A., Ugur, M., & Yew, S. L. (2017). Government education expenditures and economic growth: A meta-analysis. The BE Journal of Macroeconomics, 17(2).

Donou-Adonsou, F., Pradhan, G., & Basnet, H. C. (2021). Human capital expenditure and income in developing countries. *The Journal of Developing Areas*, 55(3), 113-128.

Ejaz, S., Amır, H., & Shabbır, M. S. (2017). Public expenditure and its impact on economic growth: A case of Pakistan. *Kashmir Economic Review*, 26(1), 1-17.

Faruk, B. U., Haque, M. I., Tausif, M. R., & Khan, M. R. (2022). The association between health expenditure, institutions, and economic growth in MENA countries. *Health Promotion Perspectives*, 12(1), 92-100.

Günalp, B., & Gür, T. H. (2002). Government expenditures and economic growth in developing countries: Evidence from a panel data analysis. *METU Studies in Development*, 29(3-4) ,311-332.

Gupta, I., & Mitra, A. (2004). Economic growth, health and poverty: An exploratory study for India. *Development Policy Review*, 22(2), 193-206.

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), 79-97.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, 12(2-3), 231-254.

Kakar, Z. K., Khilji, B. A., & Khan, M. J. (2011). Relationship between education and economic growth in Pakistan: A time series analysis. *Journal of International Academic Research*, 11(1), 27-32.

Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. *Journal of Econometrics*, 90(1), 1-44.

Kesavarajah, M. (2019). Does composition of public expenditure matter for economic growth? Lessons from Sri Lanka. *Staff Studies*, 49(2), 1-80.

Khan, H. N., Khan, M. A., Razli, R. B., Sahfie, A. A. B., Shehzada, G., Krebs, K. L., & Sarvghad, N. (2016). Health care expenditure and economic growth in SAARC countries (1995–2012): A panel causality analysis. *Applied Research in Quality of Life*, 11, 639-661.

Kiran, B. (2014). Testing the impact of educational expenditures on economic growth: New evidence from Latin American countries. *Quality & Quantity*, 48, 1181-1190.

Kousar, S., Batool, S. A., Batool, S. S., & Zafar, M. (2020). Do government expenditures on education and health lead toward economic growth? Evidence from Pakistan. *Journal of Research & Reflections in Education*, 14(1), 53-63.

Kweka, J. P., & Morrissey, O. (2000). Government spending and economic growth in Tanzania, 1965-1996. *Credit Research Paper*, 00/6, 1-40.

Maddala, G. S., & Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics*, 61(S1), 631-652.

Mallick, L., Das, P. K., & Pradhan, K. C. (2016). Impact of educational expenditure on economic growth in major Asian countries: Evidence from econometric analysis. *Theoretical and Applied Economics*, 2(607), 173-186.

Mercan, M., & Sezer, S. (2014). The effect of education expenditure on economic growth: The case of Turkey. *Procedia-Social and Behavioral Sciences*, 109, 925-930.

Minhaj, S., & Nishat, M. (2018). Impact of government's spending on the welfare in Pakistan economy. *The Pakistan Development Review*, 57, 1-19.

Mose, N. G. (2014). *Effect of government expenditure on economic growth in East Africa: A disaggregated mode.* Doctoral dissertation, Egerton University, KEYNA.

Owusu-Nantwi, V. (2015). Education expenditures and economic growth: Evidence from Ghana. *Education*, 6(16), 1-6.

Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics*, 61(S1), 653-670.

Pedroni, P. (2004). Panel cointegration: Asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric Theory*, 20(3), 597-625.

Rahman, M. M. (2011). Causal relationship among education expenditure, health expenditure and GDP: A case study for Bangladesh. *International Journal of Economics and Finance*, 3(3), 149-159.

Razmi, M. J., Abbasian, E., & Mohammadi, S. (2012). Investigating the effect of government health expenditure on HDI in Iran. *Journal of Knowledge Management, Economics and Information Technology*, 2(5), 1-8.

Rengin, A. K. (2012). The relationship between health expenditures and economic growth: Turkish case. *International Journal of Business Management & Economic Research*, 3(1), 404-409.

Riasat, S., Atif, R. M., & Zaman, K. (2011). Measuring the impact of educational expenditures on economic growth: Evidence from Pakistan. *Educational Research*, 2(13), 1839-1846.

Saikkonen, P. (1991). Asymptotically efficient estimation of cointegration regressions. *Econometric Theory*, 7(1), 1-21.

Shastri, S., Giri, A. K., & Mohapatra, G. (2017). An empirical investigation of the twin deficit hypothesis: Panel evidence from selected Asian economies. *Journal of Economic Research*, 22, 1-22.

Shehzad, K., & Munir, H. A. Long-and short-run relationship between government spending and economic growth of Pakistan. *Asian Finance Research Journal*, 3(1), 1-14.

Stock, J. H., & Watson, M. W. (1993). A simple estimator of cointegrating vectors in higher order integrated systems. *Journal of the Econometric Society*, 61(4), 783-820.

Tamang, P. (2011). The impact of education expenditure on India's economic growth. *Journal of International Academic Research*, 11(3), 14-20.

Vijesandiran, S., & Vinayagathasan, T. (2015). Dynamic relationship between human capital and economic growth in Sri Lanka: A co-integration analysis. *Asian Online Journal*, 2(2), 20-29.

Wiksadana, W., & Sihaloho, E. D. (2021). Does government spending in health, education, and military improve welfare in Asian developing countries? *Journal Ekonomi & Studi Pembangunan*, 22(1), 59-74.

World Development Indicator: https://databank.worldbank.org/source/world-development-indicators.

Yakubu, I. N., & Gunu, I. M. (2022). The impact of government educational expenditure policy and school enrolment on economic growth in Ghana (1970-2017). *Asian Journal of Research in Education and Social Sciences*, 3(4), 107-117.

Zellner, A. (1962). An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. *Journal of the American Statistical Association*, 57(298), 348-368.