# Social Spending and Economic Growth: The Case of Pakistan

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## Abstract

Using the annual data of Pakistan's economy from 1975 to 2018, this paper explores the channels linking social spending and economic growth. With separate modeling for education and health capital, the paper finds that health spending has a statistically significant and negative impact on the mortality rate which infers that health improvement in Pakistan is dependent on the volume of health expenditures. Also, educational spending has a statistically significant and positive impact on the educational level. Last model report that health and education capitals have a positive association with the economic growth of the country. Overall findings have made a great advance in the existing literature on how health and education capitals can play a vital role in boosting the economic growth of the country.

***Keywords***: Education Capital; Health Capital; Social Spending; Economic Growth; Pakistan

**JEL Classification**: E6; E62; H3; H52; O47

## Introduction

The recent revival of attention to fiscal policy problems has revitalized interest among researchers in validating and understanding the connections between fiscal policies and economic activity (Haile & Niño-Zarazúa, 2018; Thanh et al., 2020; Cammeraat, 2020; Udah & Ogudo, 2021). Funds that governments set aside for social programs are usually recognized as social

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spending (Connolly & Li, 2016). Social spending plays a key role in sustainable economic growth mechanisms (Ogudo & Udah, 2019). These programs are principally designed to offer assistance to the needy or poor and may include spending for education, medical care, and food. As well, they can offer either permanent or temporary assistance, depending on the needs of the individual. Governments regularly allocate budgets to citizens for their medical support and care who cannot afford it. Different welfare programs are regularly launched by the governments around the world such as addiction management, immunizations and offer universal health care for all citizens, regardless of gender, age, or income level. Health clearly performs a socially decisive topic. Health care service has a 'quality of life' effect because it has a representative role in a household's instantaneous utility function. The literature on growth clearly describes the role of human capital in enhancing economic development. Empirical studies of growth give a strong impact of health on both the quality and quantity of human capital and on growth (Bergh et al., 2020).

In Pakistan, unequal distribution and access to resources is a basic reason for societal conflicts and tension. Pakistan spends 1.8% and 0.8% of GDP on education and health respectively as compared to Bangladesh and India's 2.2% and 3.1% on education and 1.2% on health. Brazil, one of the highest HD performing countries, spends 5.7% of GDP on education and 4.25% on health. Congo a very poor African country that spends 6.2% on the education of GDP and 1.2% on health, has higher expenditure on social sectors than Pakistan. Social sector spending in Pakistan touched the lowest mark, which resulted in a widening of inequality, according to the Human Development Report 2019.

The impact of social spendings on the economic growth of an economy has been a widely discussed topic from a variety of perspectives for instance how educational spending or health expenditures influence the overall economic growth of an economy. To the best of our knowledge, there is no serious attempt has yet been from the perspective of Pakistan. The study in hand is an endeavor to fill this research gap. It provides a comprehensive empirical analysis on the linkages among health capital, education capital, and economic growth in a developing economy which is Pakistan in our case. In other words, this study explores to contribute by providing a unified

estimate of the role of social sector spending along with other policy interventions on human capital, social indicators and economic growth of Pakistan. In line with earlier studies, this study tries to explain in the context of health and education interaction, direct and indirect social spending effects on human capital and growth. The purpose of this study is to focus on the diversified effects of social spending on the creation of social capital. Furthermore, it also aims to analyze the effects of human capital on the growth of Pakistan. Precise objectives of the study include;

- To investigate the influence of social spending on health
- To analyze the effects of social spending on education
- To seek the role of education and health in economic growth

The primary contribution of the study is to analyze three different models with data from Pakistan. The first model investigates the impact of social spending on health capital. The second model investigates the relationship between social spending and education capital. The third model explores the combined effect of social capital (education and health) on the growth of Pakistan. The social sector has a direct impact on human development, public expenditure on the social sector (as compared to the size of Pakistan's economy, i.e. as % of the GDP) has been very low. So this study helps to highlight the importance of the social sector in the economic growth of the country and will assist in further research work in the future.

The rest of the paper is structured as follows; Chapter 2 deals with a literature review on the effects of social spending on health and education capital. Chapter 3 reviews the social sector of Pakistan. Chapter 4 is about research methodology. Chapter 5 provides the results and discussions while the last chapter presents a summary and proposes policy implications.

## Literature Review

Numerous studies have been conducted which postulates that health and education spending is positively associated with economic growth (Thanh et al., 2020; Udah & Ogudo, 2021). Correspondingly, health spending is a basic necessity for the development of the nations along with the expenditure on education. The following literature provides empirical evidence about it.

## Health Capital and Economic Growth

Sub Saharan OECD consists of less developed and under developing countries with small growth in per capita income and human capital (Myovella et al., 2020). Brempong et al (2004) checked the relationship between human capital and per capita growth of Sub-Saharan OECD countries. The study explored that human health affects the labor-capital to achieve a maximum output as it included the Solow growth model and panel data of different countries. The estimation results showed that health and per capita income are positively related to each other. General maintenance in human health leads to a 22 or 30% increase in per-capita income growth in sub-Saharan countries. Labor capital is also positively related to human health because a healthy person has the efficiency to increase the capital resources by his physical power (Bergh et al., 2020).

The establishment of a proper health care system requires the fair distribution of medical facilities all over the country (Brown et al., 2020). It plays an important role in diagnosing and curing diseases, and better technological innovations in the human health care system. Floersheim (2013) explored that fairly financing the health care system is a source of providing equal medical facilities to the population. High expenditures on health help in achieving the goal of economic growth and supporting the poor in maintaining their health. The study recommended different measures to National Health Institutes (NHI) for improvement and equal distribution of medical services to middle-class people. The findings showed that the provision of medical resources is independent of income testing procedures while it is related to the need and requirements of physically deprived persons. Health insurance plays an important role in the equal distribution of medical services and the cost-sharing by users of medical services leads to improved human capital production (Connolly & Li, 2016).

Health is a key factor influencing the labor working capabilities and their efficiencies (Ogudo & Udah, 2019; Brown et al., 2020). Furthermore, health also positively affects the education level and intellectual abilities of individuals. Adetunji (2013) explores the effect of human health on economic growth in Nigeria. The study included the time series data covering the period 1970-2008 by the OLS Method for the estimation. The

conclusion showed that economic growth is negatively related to the general death rate prevailing in the country while school enrollment ratio and life expectancy rate have a positive relationship with economic growth.

Investment in health factors and physical capital accumulation is a source of economic development (Ahmad & Younas, 2021; Ogbeifun & Shobande, 2021). Health improvement enhances the working capabilities of the labor force and they usually begin to raise the productivity level. Gong et al. (2012) investigated the effect of health investment on the Chinese growth process following the Ramsey model and Grossman utility function. The study used the province-level panel data on health investment covering the period from 1979 to 2003 to test the theoretical hypotheses of the research. The findings of the study showed that economic growth depends both on the health improvement ratio and existing health rate in the country. Excessive investment in health leads to decrease economic growth somehow because it increases the physical capital accumulation which leads to a rise in the cost of labor production.

The growth in global health care expenses not only reflects the purpose of economic development but also exhibits the enhancement in quality of life. Maximizing health care expenditure is a leading strategy to achieve the general growth level in an economy. Wang (2011) explored the fact that health maintenance is a key player in growing up a society well. This study used the international total health care expenditure of 31 countries covering the period from 1986 to 2007. The empirical analysis consisted of two types of analysis, the panel regression analysis and the second is the quintile regression analysis. The study found out that increasing expenditures leads to economic growth in different countries variously. The low-income countries responded differently according to growth expenditures in the country because the needs and circumstances of underdeveloped countries were different from developed countries. The rich countries of OECD nations prefer to keep their living standards high enough to meet the needs of society. Hartwig (2009) showed that the health capital formation increased the GDP growth rate by using the regression analysis with the cointegration technique of estimation.

Health is an important element of human capital (Bergh et al., 2020). This research study emphasis on increase health care expenditures to

maintain the general growth level. Some low-income societies have poor health due to the inadequate health care system and income inequalities. The localities with insufficient health resources are usually poor and invest less in population health activities. Lhila (2009) examined the relationship between income inequalities and low birth weight at the country and state levels. The study used birth weight as dependent and income inequality as an independent variable by simple Ordinary Least Squares Method applying Granger causality test to estimate co-integration. The research study concluded that income inequality decreases the public spending of health in society but there is a positive relationship between income inequality and the number of short-term general hospitals. This is the main reason for low investment in health in backward areas of the U.S. Low birth rate at the state level has a significant relationship with income inequality.

From the last two decades, China has achieved great economic progress and development due to rapid income growth and production. These raising income ratios lead to an increase in the expenditures on human life expectancy and the health care system. Liu et al (2008) measured the general rise in per capita income on the role of health and medical facilities. An OLS regression analysis depicted that people with poor health earn less than those who were physically and mentally sound. There was a significant difference between the earning of people who were in poor, good and excellent health. The conclusion showed that there was a big difference between the rural and urban output and health efficiency. Rural people who were usually poor with less health efficiency earn less as compared to urbanized.

Population health is the main factor of attracting foreign direct investment inflows in the country because a healthy workforce can perform better and generate employment opportunities (Connolly & Li, 2016). The role of population health in enhancing human capital was measured by (Alsan & Bloom, 2006). The study focused on human disability due to improper health which decreases their power of work. The study conducted panel data analysis of 74 industrialized developing countries covering the period of 20 years from 1980 to 2000. Regression analysis with Ramsey's Regression Specification Error Test (RESET) was applied to check the relationship between human health and FDI inflows. The findings showed

that population health positively affected the FDI in low and middle-income developing countries. Enhancing the life expectancy ratio along with education, infrastructure, governance and per capita income of people increases the foreign investment inflows in the country.

A general rise in health maintaining resources increases the medical system efficiency rapidly (Gavurova et al., 2021). Expenditures related to improving health and diagnosing diseases should be sufficient enough to maintain efficiency (Bergh et al., 2020). Suraratdecha and Okunade, (2006) measured the relationship between medical expenditures and maintaining efficiency in the health care system in a developing country Asia. The study used the data of five cross-sectional regions covering the period from 1982-1997. Translog production function and three demand factor equations were analyzed by the system regression method to estimate the results. The results showed that different medical resources e.g. nurses, doctors, medical stores, hospitals etc had different effects on the health care system according to the nature and needs of the specific region. In some regions of Asia, the marginal production cost of nurses and doctors is high compared to other regions.

Most of the people in Pakistan live under the absolute poverty line due to insufficient financial resources. During the last two centuries, poor masses and poor health has been a big hurdle in the economic development process. The relationship between economic growth and human capital is measured by Abbas and Foreman (2008) by using time series data of the country. The OLS regression analysis following the Johanson approach concluded that technical progress in the health care system enhances the per capita income of the country. Human infrastructure is the result of better health facilities increasing the labor ratio with maximum working abilities (Connolly & Li, 2016). The Gross Domestic Product of the country rises by a 20% increase in human capital. Human capital policies in the previous years had a negative effect on the economic growth process.

Economic growth is an up-burning issue nowadays and Pakistan's environment is not favorable for the process due to improper resource utilization. Malik (2006) checked the relationship between health and economic growth. The study measured the health care rate and growth development rate by infant mortality and other control variables. The simple

OLS Regression Analysis following causality and co-integration test concluded that health and education both have a significant relationship with growth but the death rate is negatively related. In 2002, the death ratio was high which further lead to economic recession and crisis.

Pakistan is an underdeveloping country with poor health and educational facilities (Farooq et al., 2020). Health development plays a key role in process of economic development. Human health improvement is related to better nutrition, rising life expectancy, better sanitation and technologies in all of the developing countries of the world. Increase in human capital due to rise in health expenditures measured by Akram, Padda and Khan. The study focused on the long-run relationship between the health and economic development of Pakistan. Pakistan is an under developing country with low health and educational facilities with a need for proper resource utilization. The study used time series data of Pakistan covering the period of 1972-2006 by applying the Cointegration, Error Correction and Granger Causality techniques in OLS Regression. The findings showed that the per capita income of the country has a positive relationship with health indicators. The increasing health expenditures e.g. doctors, hospitals, nurses, medicines etc lead to economic growth and development of Pakistan. Studies from Pakistan suggest that heath plays a vital role in the formation of healthy human capital, which further contributes to the economic growth of the country. More funds need to be allocated for the health sector to enhance its role in the betterment of growth.

**Education Capital and Economic Growth**

Danacica, Belascu, and Llie (2010) explored the "causal nexus between economic growth and higher education for Romania using time series data from 1980 to 2008. The study results verified the long-run relationship of higher education with economic growth and one-way causality that ran from economic growth to higher education". Permaani (2008) regarded education as an input of economic growth in East Asian countries. Panel data from 1965 to 2000is used for estimation. Human capital is proxied by schooling years and estimated 'Labor Augmented Solow Model' and resulted that the Asian countries proved a significant contribution of human capital to growth of the country (Bergh et al., 2020).

Afzal et al. (2010) investigated the linkages between school education and economic growth in Pakistan. They used the ARDL cointegration approach and revealed a long-run relation between two i.e. education and growth. School education and economic growth are retards by inflation only in the long run according to this study. This study emphasis on reduction in poverty and inflation, as a result, school education and economic growth can be fostered.

ARDL approach to cointegration is applied on ten different indicators of education and causality is tested by Toda Yamamoto (1995) technique, Afzal et al. (2011) explored the causality and cointegration in education and economic growth of Pakistan for the period of 1972 to 2009. Study results explained the long-run relationship among physical capital, labor force, education and economic growth in the case of Pakistan. The two-way linkage between education and economic growth is confirmed Toda Yamamoto causality results. The results of the study advise that the progress of university education led to more economic growth.

Stengos and Aurangzeb (2008) explored the education effect on economic growth in Pakistan for the period 1973 to 2001. The Levine Renelt methodology is applied to verify the causal impact of education on growth. Education has a robust effect on growth is confirmed by the study results. Moav and Neeman (2008) found the inverse relationship between human capital and poverty. The social groups who more saving and consume are less concerned more about their status. The study advised that less educated people are concerned less about their status. So, they remain in the poverty trap. Prior studies on the education and growth relationship in the case of Pakistan, provide evidence in favor that education is a key factor in a nation's economic growth. Education level contributes to the formulation of the skilled labor force in form of human capital and skilled labor productivity level fosters the economy's growth (Rodrigues et al., 2021).

## Social Sector and Economic Growth

The need of skillful people is rising often and in different countries, the production sector prefers labor with physical and intellectual skills rather than sick or illiterate labor (Kim et al., 2020). Colantonio (2010) measured

the interaction between education, health and economic development of different sub-Saharan countries of Africa. The study focused on health promotion in achieving the maximum ratio of economic development because it leads to raising labor productivity. The statistical method of multidimensional scaling results showed that the countries with a high level of education and good health maintenance proved to be as well growing economy as compared to third world countries. The serial correlation was found in the independent variables e.g. education and health because there is an important interaction between these two variables to achieve sufficient welfare and growth.

Public and private expenditures on health and education are important sources of achieving economic welfare and growth. These are the development expenditures of government that lead to maintaining social and public efficiency. Beraldo et al. (2009) conducted the study in comparison of different countries to check whether public expenditures on education and health differ from private expenditures. The study estimated an empirical analysis panel of 19 OECD countries for comparison and data covering the period between 1971 and 1998. Human factors and the labor force are the determinants of raising public and private expenditures on health and education. The findings showed that a high ratio of spending on education and health has a positive relationship with economic growth but health has a strong relationship than education. The comparative analyses between public and private expenditures depicted that public expenditures have a stronger effect on GDP growth than private and individual expenditures on education and health facilities.

Health and education are two important factors of human capital for smoothing the process of economic development. Education spending by Government is an important social indicator that leads to achieving Millennium Economic Development Goal. Baldacci et al. (2008) explored the link between social spending, growth, human capital and their effect on different economic policy alternatives. The study included different variables gender equalities, income level, health equation, poor governance to check their effect on human capital and social indicators by applying the OLS regression method. Health spending and education variables in the model have a positive and significant relationship with economic growth

while the inflation rate was negatively related. An increase in investment is a source of achieving maximum sufficiency in human capital and per capita income.

Education and health are prominent factors to influence the general capabilities of children in raising human efficiency. Boyle et al. (2006) analyzed the role of children's health and maternal skills in increasing the purchasing power parity rates. The study used the variables child health associated with strong maternal education, household wealth, Gross Domestic Product to estimate the multivariate regression model. The case study revolved around the economic growth achieved through children's capabilities and health maintenance. It was concluded that a high level of education is positively related to child health and fitness and household wealth based on diminishing return to scale with child health and care. Gross Domestic product has also a significant relationship with child health and efficiency.

Labor quality, human capital, and the health of workers are the determinants of the economic welfare and wellbeing of society. Human health is multidimensional and it includes the labor force production, good working capabilities etc. Bloom et al. (2003) used the production function approach to check the effect of health on economic development. The OLS regression results of different variables health, workforce, age, education and GDP showed the correlation between the controlling variables e.g. education and health. The findings showed that an increase in life expectancy increased the total output by 4%. The health effect was statistically significant and positive because it also enhances the labor force's working ability.

Sultan (2011) investigated the role of human physical capital in the economic growth process. Both healthy and unhealthy labor forces have different working capabilities. The study focused on the production ratio of both these categories in maximizing growth and development. The time series data covering the period 1978-2007 revealed the facts. A long-run relationship exists between health and growth to foster the production process. The OLS regression technique of estimation showed that health and education were positively related to economic growth but health is a

time taking process involving the physical capabilities and educational level.

Pakistan is a country with improper utilization of resources to maximize the production sector and enhance human capital. From the last few decades, the growth percentage is low as compared to other developing countries of Asia. Khan (2005) measures the relative growth performance of Pakistan in comparison of different other countries. The study focuses on the different capabilities of human physical capital, which affects the production process and technological utilization. The data of per capita GDP ranges from the period 1979 to 2004 for 72 middle and low-income countries and split into two sub-groups of Southeast Asian and South Asian countries and Pakistan was also included in the sample. The results showed that real per capita GDP in Southeast Asia increased by 2% during this period but Pakistan has done fairly in contrast to the developing countries of sample.

Proper health and education facilities are the key determinants of human capital in achieving maximum economic growth level. Asghar and Awan (2012) measured the role of human capital in terms of education and health on the economic growth of Pakistan. Growth and development is serious issue challenging the economic situations of the country. The annual data covering the period 1974-2009 is used for the estimation. The long-run causality and cointegration are checked by applying ADF, PP VECM test of misspecification. The conclusion showed that Pakistan's expenditures on health and education by the percentage of GDP were low. So there is a need of increasing public spending on education and health.

The social sector in Pakistan requires proper attention and regularity in the whole economic system to achieve maximum growth. Ismail (1996) measured the social sector ignoring in Pakistan by finding its determinants. Health and education are important key determinants of the social sector for the development of a country's economy. The case study explored the effective measure for the implementation of social action program. The population of Pakistan is increasing often which is a big reason for low per capita income. The period between 1978 and 1988 is under military-led management, once again a decrease in both per capita income and human resource development largely due to the oil crisis. Existing literature

witness that education and health capital plays a vital role in the economic development of the nation. This study is an attempt to address the above issue in the case of Pakistan.

## Data And Model

The health and education capital equation follows the prior literature and pointed to the relationship between health and education capital. The basic growth model includes separate health capital and education capital variables and it is according to the typical neoclassical growth model. Description of variables of each equation is discussed. Hausman specification test is used to check whether a variable or group of variables is endogenous or exogenous in models. Finally, the last section deals with the econometric strategy of generalized method of moments (GMM) which addresses the issue of simultaneity and endogeneity issues. Hence one can call this chapter a sketch of research methodology.

### Methodology

The purpose of this study is to check the potential impact of social spending on health and education capital and then the impact of human capital on economic growth, for this aim endogenous growth model is empirically estimated. Based on prior literature, drawing on a set of robust independent variables a general specification is used for the health capital model, education capital model and growth model. In the health and education models, we allow interactions between health capital and education capital indicators. Economic indicators and human capital mutually interact in the growth model. The econometric modeling follows equation by equation specification. Specification of health equation is similar to (Filmer et al., 1998; Baldacci et al., 2008).

$$MR_t = \alpha_1 + \beta_{11} \cdot HS_t + \beta_{12} ES_t + \beta_{13} FER_t + \beta_{14} \ln DOC_t + \beta_{15} \ln GE_t + \beta_{16} \ln PCI_t + u_{1t} \quad \ldots\ldots (1)$$

Where mortality rate per thousand (MR) stock of health capital is proxied by mortality rate, Education Spending (ES), Health spending (HS), and Patients per doctor (DOC) are proxied for health status and it is the natural log of the total number of population per doctor. Gender equality (GE) is included in the model to check the institutional factors that may

affect health status through the education of females. Income level (PCI) Prior studies suggest that income level basic indicator for health status (Pritchett & Summers, 1996, Carrin & Politi, 1996). Data sources, unit measures, symbols are mentioned in the table below:

**Table 3.1**

*Data and Source*

| Sr.No | Variable | Symbol | Unit measure | Source |
|---|---|---|---|---|
| 1. | Mortality rate | MR | Mortality rate, under-5 (per 1,000 live births) | WDI |
| 2. | Health spending | HS | Health expenditure, total (% of GDP) | SBP |
| 3. | Education spending | ES | Public spending on education, total (% of GDP) | WDI |
| 4. | Fertility rate | FER | Fertility rate, total (births per woman) | WDI |
| 5. | Patients per doctor | DOC | Natural log of the total number of population per doctor | SBP |
| 6. | Female enrollment ratio | FEM | School enrollment, primary, female (% gross) | SBP |
| 7. | Per capita income | PCI | Natural log of PCI | SBP |

For the education equation, according to Gupta et al. (2002) and Baldacci et al. (2003), the equation is:

$$EI_t = \alpha_2 + \beta_{21} \cdot ES_t + \beta_{22} \cdot \ln RGDP_t + \beta_{23} \cdot H_t + \beta_{24} \cdot URB_t + u_{2t} \quad (2)$$

This education equation analyses the direct impact of education spending on education capital. Real GDP (RGDP) is used because demand for education increases as per capita increases. Health capital (H); higher heath status increases sustained and effective use of the knowledge and skills that society gets through education. Barro (1996) suggests that better health can accumulate education capital. The stock of health capital is proxied by total expenditure on health is used. Urbanization (URB); According to Gupta et al. (2010), Urban areas have a higher enrolment rate than rural areas because the availability of education is typically easy in urban areas.

**Table 3.2**

*Data and Source*

| Sr.No | Variable | Symbol | Unit measure | Source |
|---|---|---|---|---|
| 1. | Real per capita GDP | RGDP | Natural log of Real per capita GDP | SBP |
| 2. | Education spending | ES | Public spending on education, total (% of GDP) | WDI |
| 3. | Health capital | H | Natural log of total expenditure on health status | SBP |
| 4. | Urbanization | URB | Urban population (% of total) | WDI |

The growth model is developed on (Mankiw et al., 1992; Bassanini & Scarpetta, 2001; Barro, 1996a, 1996b; Bloom et al., 2004; Gyimah Brempong & Wilson, 2004). The growth equation includes the health capital and education capital and it is based on a neoclassical growth framework.

$$g = f(H, E, I, Z)$$

Where "g" represents real per capita GDP growth; "I" is the investment proxied by gross capital formation; "H" denotes health capital; "E" represents education capital; and "Z" represents the set of institutional control and macro variables, like the trade openness, fiscal balance and inflation rate. The baseline growth equation is as follows:

$$\ln GDP_t = \alpha_3 + \beta_{31} MR_t + \beta_{32} \cdot EI_t + \beta_{33} \cdot GCF_t + \beta_{34} \cdot TO_t + \beta_{35} \cdot INF_t + u_{3t} \quad (3)$$

Where Gross capital formation (GCF) is proxies for "investment" based on constant local currency. Education Index (EI) is proxied as education capital. The mortality rate per thousand (MR) is proxied as stock of health capital. Trade openness (TO) is the sum of exports and imports of goods and services measured as a share of gross domestic product (GDP). Inflation (INF) is generally considered an important determinant of economic growth.

**Table 3.3**

*Data and Source*

| Sr.No | Variable | Symbol | Unit measure | Source |
|---|---|---|---|---|
| 1. | Gross domestic product | GDP | Natural log of GDP | SBP |
| 2. | Mortality rate | MR | Mortality rate, under-5 (per 1,000 live births) | WDI |
| 3. | Gross Fixed capital | GCF | Gross capital formation (% of GDP) | WDI |

| | | | | |
|---|---|---|---|---|
| 4. | Trade openness | TO | Trade (% of GDP) | WDI |
| 5. | Education index | EI | Index | UNDP |
| 6. | Inflation | INF | Inflation, GDP deflator (Annual %) | WDI |

To sum up, the present study is using the annual series data set over the period 1975 to 2018 (based on data availability). The data sample is large enough to use and conclude theoretical relation statistically. The main sources of the data are world data indicators (WDI), a handbook of statistics by the State Bank of Pakistan (SBP) and the United Nations Development Programme (UNDP).

All simple econometric models which comprise of single equation deal with one dependent variable, which is the function of one or more explanatory variables these models analyze unidirectional cause and effect relationships. In real-world interdependence of variables is very common. Then the appropriate econometric strategy suggests that we lump these variables in form of a simultaneous equation model. And values of these variables are determined simultaneously. Consider the following hypothetical model.

$$Z_{1t} = \varphi_{10} + \varphi_{12} Z_{2t} + \gamma_{11} W_{1t} + \mu_{1t}$$

$$Z_{2t} = \varphi_{20} + \varphi_{21} Z_{1t} + \gamma_{21} W_{1t} + \mu_{2t}$$

Where Z1 and Z2 are interdependent variables, and Wt is an exogenous variable, µ1 and µ2 are random error terms. Estimates through the OLS technique give inconsistent results because there is a mutual dependence of variables. Thus OLS method may not be applied. So we will move to further econometric techniques. For these techniques, we will check whether the equation is exactly, under or over-identified. Identification problem refers that whether we can obtain consistent estimates or not.

The Generalized Method of Moments (GMM) technique tackles the problem endogeneity. This technique is introduced by Hensen (1982), since

then it is used in time series cross-sectional and even panel data analysis. GMM is also called a semi-parametric estimator because it does not need to know the exact shape of the distribution. This is the main reason why this technique is widely used in all types of data.GMM also deals with the problem of time series data problems such as heteroskedasticity and auto-correlation, when we use the HAC option in estimation. GMM requires specific moments to estimate the model.

There are some solutions to solve the biasness problem of estimate one is to introduce exogenous variables in the model. This will reduce the biasness in the OLS estimator but it will remain positive. Another way is to use the instrumental variable method presented by Anderson and Hsiao 1982 and Arellano and Bond 1991. These estimators of instrumental variables are sometimes referred to as GMM estimators. In fact when the number of the available instrument is greater than the number of required instruments then we may apply the GMM technique. Based on prior literature, drawing on a set of robust independent variables a general specification is used for the health capital model, education capital model and growth model. In the health and education models, we allow interactions between health capital and education capital indicators. Economic indicators and human capital mutually interact in the growth model.

## Results and Discussion

This section provides the base to select the applicable modeling framework and suitable estimation technique as mentioned in an earlier chapter. Firstly check the endogeneity of variables in each model through the Hausman test. It also includes the implementation of the GMM technique for the models and interpretation of the results. In other words, it deals with the interpretation of the results of three equations health capital, education capital and growth equations respectively.

Our first model is the equation of health. We take mortality rate as a proxy of health which is a function of health spending, education spending, fertility rate, number of patients per doctor, female enrolment rate, and per capita income. Hausman specification test is used to analyze whether a variable or group of variables is endogenous or exogenous in the model. At

the 5 percent level of significance, the coefficient of residual in this study is statistically significant, and therefore, at this level, there is an endogeneity problem in the model. The GMM technique is used to address the endogeneity and simultaneity issues.

**Table 4.1**

*Health model (Equation 1) results*

Dependent Variable: MR

Method: Generalized Method of Moments

Sample : 1975-2018

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 90.36901 | 7.775044 | 11.62296 | 0.0000 |
| HS | -1.218097 | 0.598219 | -2.036205 | 0.0534 |
| ES | -0.261053 | 0.212933 | -1.225987 | 0.2326 |
| FER | 9.626056 | 0.560892 | 17.16206 | 0.0000 |
| DOC | 8.528692 | 0.336905 | 25.31483 | 0.0000 |
| FEM | -0.002425 | 0.024287 | -0.099834 | 0.9213 |
| PCI | -8.091390 | 0.546843 | -14.79655 | 0.0000 |

Health spending (HS) contributes a major role in the improvement of health in developing countries. The statistically significant coefficient in the model has a negative effect on the mortality rate. Due to a 1% change in health spending there will be a decrease of mortality rate by 1.218%, on the path of Deaton (2004), who found that benefits from investment in health are stronger in earlier stages of development of nations. Psacharopoulos and Patrinos (2002), Bidani and Ravallion (1997), Hojman (1996), Anand and Martin (1993) and Psacharopoulos (1994) also advise a positive relationship between social spending and social indicators.

Education spending (ES) also decreases the mortality rate by -0.261053 percent as it increases 1 percent because it creates overall awareness about

food, unhealthy environment and diseases. Statistically insignificant coefficient of education spending related to the mortality rate in this study may be because a very low percentage of GDP is allocated for the educational sector. “Better health raises the effective and sustained use of the knowledge and skills that individuals amass through education” (Schultz, 1999).

High Fertility rate (FER) induces mortality rate which is shown by its coefficient. With a 1% change in the fertility rate, there will be an increase of 9.626 per thousand in the sample country. The doctor per patient ratio (DOC) is one of the major contributors to the health model. The availability of more doctors to patients helps to improve the overall health conditions which in return will reduce the mortality rate. The value of its coefficient confirms this as a 1% change in variable brings 8.528 per thousand changes in mortality rate. A higher female enrolment in school is depreciating the child mortality rate. Our results are similar to other existing studies. Education capital has no direct effects on health capital it affects health capital through these indirect channels. Ranis and Ramirez (2000) and Boozer et al. (2003) argued that Female education strengthens the general “character” of society. Low fertility rates are associated with Higher education (Gupta et al., 2010). Due to higher Per capita income (PCI) mortality rate also decreases by 8.09 per thousand which may be due to the availability of better nutritional food, more access to recreational facilities and better medical facilities (Ogudo & Udah, 2019).

Our Second model explains the determinant of the education index whose explanatory variables are educational spending, real GDP, health spending, and share of the urban population in total population. Hausman specification test is used to check whether a variable or group of variables is endogenous or exogenous in the model. The coefficient of residual in this study is statistically significant at a 5% level of significance, and therefore, at this level, there is an endogeneity problem in the model. The GMM technique is used to address the endogeneity and simultaneity issues.

**Table 4.2**

*Education model (Equation 2) results*

Dependent Variable: EI

Method: Generalized Method of Moments Sample: 1975-2018

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.607486 | 0.036997 | -16.41971 | 0.0000 |
| ES | 0.011257 | 0.002401 | 4.688147 | 0.0001 |
| H | 0.002337 | 0.000416 | 5.615175 | 0.0000 |
| RGDP | 0.044453 | 0.014577 | 3.049577 | 0.0061 |
| URB | 0.013934 | 0.005763 | 2.417825 | 0.0248 |

Education spending (ES) enhances educational level which is shown by the education index. Statistically significant coefficient shows that due to a 1% increase in education spending there is a positive change of .001257% in Education capital. Batter Health (H) enables to afford to invest in education. This relation is explored by its statistically significant coefficient of Health expenditure .1% increase in Health expenditure can be translated into a .00237% increase in demand for education. Estimates are in the line of previous developing countries' cross-sectional literature, Gupta, Verhoeven, and Tiongson (2002b) and Baldacci, Guin-Sui, and de Mello (2003) explore that better health and education outcomes are the result of higher social spending. Better health encourages the effective and sustained use of the knowledge and skills that individuals gained through education Schultz, (1999), Barro (1996b).

Higher Real GDP (RGDP) increases the demand for education which is confirmed by its coefficient.1% change in real GDP affects .00444 % increase in Education capital. A higher share of urban population (URB) over total population ratio derives more demand of education in the case of the present study which has a possible cause that availability of educational institutions is comparatively high in the big cities. The value of its coefficient is positive and it is .01393 shows that due to high 1% urban population rate will cause a .01393 % increase in Educational capital.

Our third model explains determinants of growth whose explanatory variables are mortality rate, gross capital formulation, trade openness, education index and inflation rate. Again, the Hausman specification test is

used to check whether a variable or group of variables is endogenous or exogenous in the model. At the 5 percent level of significance, the coefficient of residual in the growth model is statistically significant, and therefore, at this level, there is an endogeneity problem in the model. Generalized Method of Moments estimation is used to solve endogeneity and simultaneously in equations without using exogenous instruments, Blundell and Bond (1998).

**Table 4.3**

*Growth model (Equation 3) results*

Dependent Variable: GDP

Method: Generalized Method of Moments

Sample : 1975-2018

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 15.38055 | 0.080064 | 192.1040 | 0.0000 |
| MR | -0.040665 | 0.000200 | -203.0558 | 0.0000 |
| GCF | 0.018293 | 0.008936 | 2.047141 | 0.0501 |
| TO | -0.017831 | 0.003695 | -4.826243 | 0.0000 |
| EI | 0.035435 | 0.003554 | 9.970682 | 0.0000 |
| INF | 0.004548 | 0.002893 | 1.571866 | 0.1272 |

The specification includes the infant mortality rate (MR) as part of the explanatory variables. The parameter of infant mortality rate turns out to be negative -0.040665 as expected and statistically significant. As mortality rate is a proxy of health capital and growth is positively affected by health capital. Higher child mortality could translate to a higher fertility rate which in turn increases population growth and thus lowers economic growth. Murtin (2009) provides evidence that child mortality is significantly and positively related to fertility.

The investment (GCF) variable has a statistically significant and positive parameter. A 1% increase in investment brings a 0.018% increase

in economic growth. Therefore, we safely can say that increase in investment leads to expand economic activities which in turn leads to an increase in output growth by an increase in productivity, increase in employment opportunities, getting the benefits of economies of scale and by raising the overall welfare of the country.

Trade openness (TO); negatively affect the economic growth in this study. It is statistically significant, the coefficient -0.017831 shows that due to 1% trade openness there will be a .00178 % decrease in GDP. Results are in the line of Kim et al. (2005), which explores the relationship between trade openness and growth rate for 62 countries (1947-2002). Ordinary Least Square results showed negative relations for developing countries and positive relations for advanced economies such as U.S. Ireland and Belgium. As imports increase the domestic investor is neglected because infant investors of developing countries cannot compete in price and quality with developed industrial countries and so, production level decreases. In the case of Pakistan due to a poor industrial base, energy crises, costly domestic production is replaced by cheaper imported goods which slowdowns economic growth.

Education (EI) always plays an important role in the development of nations. In estimated results, it is found that Education capital positively addressed the economic growth of Pakistan and the level of education capital also contributes positively. Education capital increases the growth rate by 0.35% and higher levels of education capital foster the growth rate. The Coefficient of Inflation (INF) rate enters positively and insignificant in the model shows that there will be 0.004548 % GDP growth due to 1% inflation. Due to Inflation, purchasing power decreases so demand for money increase, in result investment increase in monetary term and also growth. Similar results are concluded by different studies like Athanasios Koulakiotis et al 2011 investigates the causality between inflation and GDP and finds that inflation causes GDP and coefficients are significant at a 5% level of significance through panel models for 14 European countries. Like, Mallik and Chaudhury (2001) explored the relationship between inflation and GDP growth by using annual data, co-integration, and error correction models in their methodology for four South Asian countries (Bangladesh,

India, Pakistan, and Sri Lanka). The results of the study show a long-run relationship between GDP growth rate and inflation for all four countries.

## Conclusion and Policy Implications

Social spending plays a key role in sustainable economic growth. This study has intended to examine the relationship between social spending and economic growth. The impact of social spendings on the economic growth of an economy has been a widely discussed topic from a variety of perspectives for instance how educational spending or health expenditures influence the overall economic growth of an economy. To the best of our knowledge, there is no serious attempt that has yet been from the perspective of Pakistan. The study in hand is an endeavor to fill this research gap. It provides a comprehensive empirical analysis on the linkages among health capital, education capital and economic growth in a developing economy which is Pakistan in our case. The present study aims to focus on the diversified relationship between social spending and growth, the social capital of Pakistan from 1975-2018 (based on the data availability). The primary contribution of the study is to analyze three different models with data from Pakistan. The first model investigates the impact of social spending on health capital. The second model investigates the relationship between social spending and education capital. The third model explores the combined effect of social capital (education and health) on the growth of Pakistan. In the context of an endogenous growth model, the econometric approach used in this study to address the impact of social spending on social indicators and economic growth. This study uses the GMM technique presented by Anderson and Hsiao 1982 and Arellano and Bond 1991, to solve the problem of endogeneity. The results of this study indicate that there is a positive and significant effect of health and education capital on economic growth; it means higher levels of education and better health care result in a more productive workforce, increasing total factor productivity, and pushing a country's production function outward. Health spending improves the health capital in the health model and education spending has a positive effect on education capital in the education equation. In the growth equation, both health capital and education capital positively and significantly accumulate the economic growth. To sum up, we find that health spending has a statistically significant and negative impact on the

mortality rate which infers that health improvement in Pakistan is dependent on the volume of health expenditures. Also, educational spending has a statistically significant and positive impact on the educational level. The final model indicates that health and education capitals have a positive relationship with the economic growth of the economy.

## Policy Implications

Most of the developing countries did not consider and underrate the investment in human beings. But truly, the key feature of our economic system should be the growth of human capital, without it there would be only hard, manual work and poverty, except for those who have income from the property. Historically, spending on the health and education sectors remains on the lower side in Pakistan as compared to the other developing countries. This study shows that health and education capital is positively and significantly related to economic growth in Pakistan. So, the government needs to pay attention to the well-being of the social sector. Pakistan's annual budget for education is very low, thus needs to allocate a significant amount of funds to the education sector. Education must be regarded as a key factor for society well- being because it lifts the general "character" of society and the "quality" of economic and social decisions. Health is a neglected sector in Pakistan. Better health helps to improve the efficiency and the productivity of the economy; ultimately it contributes to economic growth and leads to human welfare. So, the government needs to focus on the health sector for the growth of the country. Public funds should be allocated to human capital formation and for the production of intellectual capital. To meet the current requirements of new technology and maximization of all human potential, there is a critical need for a highly-skilled educated and healthy workforce. There is a need to provide education facilities to the neglected areas. A major proportion of Pakistan's population is living in rural areas, where education facilities are inadequate. Government has to introduce different policies to increase the enrolment ratio at all education levels. In a conclusion, it can be emphasized that the allocation of more funds for the social sector can improve the health and education status of the nation. A Healthy and educated nation further can take part in promoting the growth of the country via innovative human capital.

## Declarations

### Authors Contribution

All authors contributed equally. This work is the part of the M.Phil disseration of Muhammad Raza.

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The authors did not receive support from any organization for the submitted work.

### Competing Interest/Conflicts of Interest

The authors declare that they have no competing interests.

### Availability of Data and Material

The data and material that support the findings of this study are available from the corresponding author upon reasonable request.

## References

Abbas, Q., & Foreman-Peck, J. S. (2008). Human capital and economic growth: Pakistan 1960-2003. *Lahore Journal of Economics*, *13*(1), 1-27.

Ahmad, N., & Younas, M. Z. (2021). A blessing in disguise? Assessing the impact of 2010–2011 floods on trust in Pakistan. *Environmental Science and Pollution Research*, *28*(20), 25419-25431.

Akram, N., Ihtsham ul Haq Padda, & Khan, M. (2008). The long term impact of health on economic growth in Pakistan. *The Pakistan Development Review*, *47*(4), 487-500.

Alsan, M., Bloom, D. E., & Canning, D. (2006). The effect of population health on foreign direct investment inflows to low-and middle-income countries. *World Development*, *34*(4), 613-630.

Asghar, N., Awan, A., & Rehman, H. (2012). Human capital and economic growth in Pakistan: A cointegration and causality analysis. *International Journal of Economics and Finance*, *4*(4), 135-147. http://dx.doi.org/10.5539/ijef.v4n4p135

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

Beraldo, S., Montolio, D., & Turati, G. (2009). Healthy, educated and wealthy: A primer on the impact of public and private welfare expenditures on economic growth. *The Journal of Socio-Economics*, *38*(6), 946-956. https://doi.org/10.1016/j.socec.2009.06.013

Bergh, A., Mirkina, I., & Nilsson, T. (2020). Can social spending cushion the inequality effect of globalization? *Economics & Politics*, *32*(1), 104-142. https://doi.org/10.1111/ecpo.12143

Boaz, R. F. (1975). Equity in paying for health care services under a national insurance system. *The Milbank Memorial Fund Quarterly. Health and Society*, *53*(3), 337-352.

Boyle, M. H., Racine, Y., Georgiades, K., Snelling, D., Hong, S., Omariba, W., Hurley, P., & Rao-Melacini, P. (2006). The influence of economic development level, household wealth and maternal education on child health in the developing world. *Social Science & Medicine*, *63*(8), 2242-2254. https://doi.org/10.1016/j.socscimed.2006.04.034

Brown, O., Kangovi, S., Wiggins, N., & Alvarado, C. S. (2020). Supervision Strategies and Community Health Worker Effectiveness in Health Care Settings. *NAM perspectives*, *2020*, 10.31478/202003c. https://doi.org/10.31478/202003c

Cammeraat, E. (2020). The relationship between different social expenditure schemes and poverty, inequality and economic growth. *International Social Security Review*, *73*(2), 101-123. https://doi.org/10.1111/issr.12236

Colantonio, E., Marianacci, R., & Mattoscio, N. (2010). On human capital and economic development: some results for Africa. *Procedia-Social and Behavioral Sciences*, *9*, 266-272. https://doi.org/10.1016/j.sbspro.2010.12.148

Connolly, M., & Li, C. (2016). Government spending and economic growth in the OECD countries. *Journal of Economic Policy Reform*, *19*(4), 386-395. https://doi.org/10.1080/17487870.2016.1213168

Farooq, S., Ramzan, M., Ali, F. H., & Rashid, H. A. (2020). Analyzing the efficiency of health care in Pakistan: An application of data envelopment analysis to rural health centers in Punjab. *Pakistan Vision*, *21*(2), 273.

Gavurova, B., Kocisova, K., & Sopko, J. (2021). Health system efficiency in OECD countries: dynamic network DEA approach. *Health Economics Review*, *11*(1), 1-25. https://doi.org/10.1186/s13561-021-00337-9

Gong, L., Li, H., & Wang, D. (2012). Health investment, physical capital accumulation, and economic growth. *China Economic Review*, *23*(4), 1104-1119.

Gupta, M. R., & Barman, T. R. (2010). Health, infrastructure, environment and endogenous growth. *Journal of Macroeconomics*, *32*(2), 657-673.

Gyimah-Brempong, K., & Wilson, M. (2004). Health human capital and economic growth in Sub-Saharan African and OECD countries. *The Quarterly Review of Economics and Finance*, *44*(2), 296-320.

Haile, F., & Niño-Zarazúa, M. (2018). does social spending improve welfare in low-income and middle-income countries? *Journal of International Development*, *30*(3), 367-398.

Hartwig, J. (2010). Is health capital formation good for long-term economic growth?–Panel Granger-causality evidence for OECD countries. *Journal of Macroeconomics*, *32*(1), 314-325. https://doi.org/10.1016/j.jmacro.2009.06.003

Ismail, Z. H. (1996). *Impediments to Improvements in Social Sectors in Pakistan*. Karachi: Social Policy and Development Centre.

Khan, M. S., Amjad, R., & Din, M. U. (2005). Human capital and economic growth in Pakistan [with comments]. *The Pakistan Development Review*, *44*(4), 455-478.

Kim, S., Chang, S., & Castro-Lacouture, D. (2020). Dynamic modeling for analyzing impacts of skilled labor shortage on construction project management. *Journal of Management in Engineering*, *36*(1), 04019035.

Lhila, A. (2009). Does government provision of healthcare explain the relationship between income inequality and low birthweight? *Social Science & Medicine*, *69*(8), 1236-1245. https://doi.org/10.1016/j.socscimed.2009.07.011

Liu, G. G., Dow, W. H., Fu, A. Z., Akin, J., & Lance, P. (2010). Income productivity in China: On the role of health. In *Investing in human capital for economic development in China* (pp. 293-311).

Malik, G. (2006). *An examination of the relationship between health and economic growth* (Working Paper No. 185). Indian Council for Research on International Economic Relation. https://www.econstor.eu/handle/10419/176204

Myovella, G., Karacuka, M., & Haucap, J. (2020). Digitalization and economic growth: A comparative analysis of Sub-Saharan Africa and OECD economies. *Telecommunications Policy*, *44*(2), 101856. https://doi.org/10.1016/j.telpol.2019.101856

Narayan, S., Narayan, P. K., & Mishra, S. (2010). Investigating the relationship between health and economic growth: Empirical evidence from a panel of 5 Asian countries. *Journal of Asian Economics*, *21*(4), 404-411. https://doi.org/10.1016/j.asieco.2010.03.006

Ogbeifun, L., & Shobande, O. A. (2021). A reevaluation of human capital accumulation and economic growth in OECD. *Journal of Public Affairs*, e02602. https://doi.org/10.1002/pa.2602

Ogudo, P. A., & Udah, E. B. (2019). Stabilization effects of social spending on economic growth in selected two West African countries. *Journal of Emerging Trends in Economics and Management Sciences*, *10*(5), 233-247.

Rodrigues, A. L., Cerdeira, L., Machado-Taylor, M. D. L., & Alves, H. (2021). Technological skills in higher education—Different needs

and different uses. *Education Sciences*, *11*(7), 326. https://doi.org/10.3390/educsci11070326

Thanh, S. D., Hart, N., & Canh, N. P. (2020). Public spending, public governance and economic growth at the Vietnamese provincial level: A disaggregate analysis. *Economic Systems*, *44*(4), 100780. https://doi.org/10.1016/j.ecosys.2020.100780

Udah, E. B., & Ogudo, P. A. (2021). Stabilization Effects of Social Spending on Economic Growth in Selected West African Countries. *Nile Journal of Business and Economics*, *7*(17), 33-52.

Vickers, N. J. (2017). Animal communication: when i'm calling you, will you answer too?. *Current Biology*, *27*(14), R713-R715. https://doi.org/10.1016/j.cub.2017.05.064

Wang, K. M. (2011). Health care expenditure and economic growth: Quantile panel-type analysis. *Economic Modelling*, *28*(4), 1536-1549. https://doi.org/10.1016/j.econmod.2011.02.008

Zheng, H. (2009). Rising US income inequality, gender and individual self-rated health, 1972–2004. *Social Science & Medicine*, *69*(9), 1333-1342. https://doi.org/10.1016/j.socscimed.2009.08.016