PUBLIC HEALTH EXPENDITURE AND ECONOMIC GROWTH NEXUS IN SOUTH ASIAN COUNTRIES

Submitted by

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CERTIFICATE

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I Jawad Khan hereby state that my MPhil thesis titled public health expenditure and economic growth nexus in south Asian countries is my own work and has not been submitted previously by me for taking any degree from this University Pakistan Institute of Development Economics or anywhere else in the country/world.

At any time if my statement is found to be incorrect even after my Graduation the university has the right to withdraw my MPhil degree.

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Dedication

I dedicate this Research to my beloved parents, have been a great source of inspiration and support; their love encouraged me at every step-in life and particularly during my studies at PIDE. I dedicate my little effort to my brothers and sister whose love, trust, and prayers are unforgettable for me. This thesis is also dedicated to my respectable Prof. Dr. Fazli Hakim Khattak for encouragement and guidance to build and improve my motivations toward conducting and completion of this Research Study.

(Jawad Khan)

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ABSTRACT

This study aims to analyze the nexus between public health expenditure and economic growth. For this purpose, the panel data has been utilized over the period from 1995 to 2018 for 07 South Asian countries. Public health expenditures have been used as independent variables, economic growth (GDP per capita) as its dependent HDI variable, labor force, life expectancy and infant mortality as control variables. Correlation and granger causality were applied in this study, then panel unit-root test, then panel cointegration test and finally the panel cointegration regression FMOLS techniques. Panel cointegration regression FMOLS estimator investigated the study of long run (LR) between variables. The results of the panel cointegration regression FMOLS analysis revealed that long-term (LR) economic growth (GDP per capita) is positively and significantly affected by public health expenditure, HDI, labor force, life expectancy, and infant mortality. The key information resulting from the study is that expenditure on public health is related positively and significantly to economic growth (GDP per capita). The result of the relationship study is that expenditure on public health not only directly impacts economic development, but also indirectly. The study provides specific evidence to policymakers that increased health expenditure contributes to increased countries economic growth.

Keywords: Public Health Expenditure; Economic Growth; Panel Cointegration Regression FMOLS; South Asian Countries

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LIST OF ABBREVIATIONS

2SLS	Two-Stage Least Squares
ADF	Augmented Dickey Fuller
AIDS	Acquired Immune Deficiency Syndrome
AR	Autoregressive
AR	African Region
ARDL	Autoregressive-Distributed Lag
DOLS	Dynamic Ordinary Least Squares
DV	Dependent Variable
ECM	Error Correction Model
EG	Economic Growth
ERS	Economic Research Service
FMOLS	Fully Modified Ordinary Least Squares
GDP	Gross Domestic Product
GDP PC	GDP Per Capita
GMM	Generalized Method of Moments
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
ILO	International Labour Organization
IPS	Im-Pesaran-Shin
LDCs	Least Developed Countries
LLC	Levin-Lin-Chu
LR	Long Run
NGO	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
OIC	Organisation of Islamic Cooperation
OLS	Ordinary Least Squares
PCC	Pearson Correlation Coefficient

PHCE	Public Healthcare Expenditure
PHE	Public Health Expenditure
PMG	Pooled Mean Group
SEG	Sustainable Economic Growth
SR	Short Run
TB	Tuberculosis
U. S	United States
UNDP	United Nations Development Program
VAR	Vector Auto-Regression
VECM	Vector Error Correction Model
WB	World Bank
WDB	World Data Bank
WDI	World Development Indicators
WDR	World Development Report
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1. Background of the study

Nowadays, health economics is usually used in health sectors as it wants to offer methods and strategies that enable decision-makers to start preparing, distribute and influence health resources to effectively and fairly meet the healthcare needs through expenditure increases. Additionally, the information which can be developed using the methodology of health economics can be useful in deciding how much gross domestic product a country can allocate to just the health sector. Research examining the relationship between gross domestic product (GDP) and public healthcare expenditure (PHCE) occur in developed countries (Newhouse, J. P. 1977). The South Asian region is facing some of the world largest worst socio-economic inequities, but these compound broad gaps throughout access to healthcare. While there is a wide range of research on the inequalities that lead to health inequality and their effect on health outcomes, less is understood about the response among policymakers in South Asia (Zaidi, et al. 2017).

Sustainable economic growth (SEG) is a vital part of the human capital. The growth potential theories demonstrate the significance of human capital (HC) as an important agent for economic growth. The definition of human capital has been broadly defined in economic literature, such as education, health, training, migration, and other investment opportunities that improve the productivity of the employee (Akram et al, 2008). Enriched human capital has been an important factor in any country having achieved required long-term economic growth. In the long-term, human capital growth

has a positive effect on per capita income in aspects of education and health, going to follow the neoclassical growth model (Bloom, et al. 2004). According to Newhouse, J. P. (1977) analysis of the relationship between GDP and PHCE in developing countries revealed that around 92% of PHCE changes can be influenced by differences in economic growth and that GDP per capita growth is the best indicator of how much money a country could even afford to spend on the healthcare sector.

Financial access is indirectly measured by out-of-pocket expenditure and accounts for 56% of total health expenditure in Pakistan, 62% in India, 64% in Afghanistan and 67% in Bangladesh 15% etc. This is also because insufficient health facilities force people to rely on the private sector, and they often must buy drugs when government hospitals are out of stock. South Asia's social and private health insurance ranges from 0% of overall health expenditure in Afghanistan to 7.7% in India (Zaidi, et al. 2017).

There is a bidirectional relationship between the situation of public health expenditure and economic development. Health and other forms of human and physical capital increase GDP per capita by increasing the productivity of existing resources coupled with resource accumulation and technological change. Additionally, some of this increased revenue is spent on investment in human resources, leading to more per capita growth. According to Fogel (1994), around one-third of Britain GDP between 1790 and 1980 was the result of changes in health, especially in nutrition, public health and healthcare facilities, and these improved healthcare facilities should be viewed as technological change that improves labor.

But at the other hand, economic growth contributes to improved nutrition, better sanitation, innovations in medical technology all this increasing life expectancy as well as decreases child mortality rates. The World Development Report (2007) portrays the

situation by suggesting that the average birth-life expectancy in less than 40 years has increased from 51 years to 65 years. Similarly, the average life expectancy in developing countries was just 40 years in 1950 but had risen to 63 years by 1990 (World Bank, 1993). Preston (1976) examined various determinants of life expectancy and stressed that economic growth is the most significant factor.

1.2. Public Health in South Asia

South Asia is strategically important region, faces unrestricted demographic and geographic challenges to public health from around world. India, Pakistan, Bangladesh, Nepal, and Sri Lanka contribute approximately 1/5 of the world population (Neupane, et al. 2014). More significant though, these countries are home to two-thirds of the world population having survived on less than $1 a day. The low life expectancy and high rates of malnutrition, infant mortality and TB and HIV / AIDS incidence in South Asia are second only to sub-Saharan Africa. The region faces poor sanitation, poor maternal health, insufficient access to health care, and widespread malaria, as well as a growing epidemic of chronic disease, and related health issues. Despite the severity of these interrelated threats, these five countries are expenditure on health on average less than 3.2% of their gross domestic products, compared to an 8.25% global average (World Health Organization, 2010).

Health developments in the region have spread unevenly in recent decades, both within and across countries. Rural areas are doing worse than urban areas with respect to life expectancy, vaccination rates, maternal health, malaria incidence and access to almost all health services. Data show similar disparities between the literate and the analphabet in health outcomes, particularly in India. The same variations are perceived

across the whole country. Life expectancy in Sri Lanka exceeds that of the rest of the region for around eight years (Moroi, T. & Takahashi, T. 2002).

Service level agreements to the persistent health issues in South Asia has been increasing real significance for US foreign policy, amplified after 11 September. India, which is on rapid growth and as a notable exception to the planet, considering the 26-year civil war on the island country, Sri Lanka provides a valuable example of health development. Its economy and population have viewed the US as the most important foreign partner since the Cold War. The relationship between U.S. and Indian interests in Asia enhancing trade, stabilizing energy markets, promoting democracy, and preserving stability and prosperity through a balance of power improved U.S.-India ties during President George W. Bush administration, resulting in a 2008 deal to share U.S. civilian nuclear technology with India. President Barack Obama reconfirmed the significance of the role shortly after his arrival at the White House, welcoming India's Prime Minister Manmohan Singh as the special guest at the first dinner party of his presidency. In the last decade, India strategic rival, Pakistan held a similarly important position in US foreign policy, but for very different reasons (World Health Organization, 2010).

Its unmanaged border with Afghanistan and its potential susceptibility to nuclear arsenal have placed Pakistan at the forefront of the US campaign and war against Al-Qaeda and Taliban. While the challenges that characterize India are challenges in terms of development, population, and scale, Pakistan faces crisis of state authority, priorities, and resources. The other countries in the region face systemic and long-term policy issues and problems of US foreign policy, in which health outcomes are key in Bangladesh and Nepal. Bangladesh is one of the world's most densely populated countries, making the provision of health services particularly difficult,

especially for mothers and children. Nepal is not only India-China two most populous countries in the world but also two of the most geopolitically important. As of this report's publication, Nepal is the most recent country in the world to become a republic, and its young government faces tremendous health challenges across its challenging geography. Sri Lanka is a high performer in the health sector; the challenge is to ensure that a recurrence of its ethnic conflict does not undermine the remarkable human development record in Sri Lanka (World Health Organization, 2010).

1.3. Health in South Asia: Familiar and emerging challenges

About 1.6 billion people populating 1.7 million square kilometers, the one of scale is a noticeable health problem in South Asia. Sustainable delivery of affordable, high quality healthcare to such a population in such an area requires both substantial resources and effective management of uses. The region has seen a significant rise in health expenditure per capita, even as health expenditure as a share of gross domestic product (GDP) has declined and from 2004 to 2008, annual health expenditure per capita rose from $11 to $17 in Bangladesh; from $27 to $43 in India; from $17 to $20 in Nepal; from $17 to $24 in Pakistan; and from $44 to $81 in Sri Lanka (World Health Organization. 2010).

Health conditions in the region have improved but, in many places remain unacceptably depraved. From 2000 and 2007 all five countries saw improvement in life expectancy, infant mortality, and childhood immunization. Worldwide, however, 27 million unimmunized children live in India alone about 10 million. Diarrhea, acute respiratory infections, and vaccine-preventable diseases make child mortality a continuing public health problem, particularly in Pakistan, where 90 out of every 1,000 childbirth under five (World Health Organization, 2013).

The countrywide shortage of suitable health services has also had disquieting consequences for maternal health. Deficiencies in South Asia health care systems, compounded by extreme poverty and malnutrition, result in one of the highest maternal mortality rates in the world. Improving the coverage of immunization needs extension of the basic health services in rural areas and a reliable and cheap vaccine supply (Moroi, T. & Takahashi, T. 2002).

The problems be located equally distributed and Sri Lanka gets 58 maternal deaths for every 100,000 births. Each year about 185,000 women die during childbirth in the South Asian region. India accounts for 136,000 of those deaths with a population approaching 1.1 billion people, while qualified professionals are attending nearly 50% of births. Nepal and Pakistan have only 19% and 29% of births, respectively, qualified professionals; this gap can only be covered by a major expansion of health care workers to provide services before, during, and after birth. Unsupervised delivery service is both a cultural practice and a political requirement in many rural parts of Bangladesh, India, Nepal, and Pakistan. In addition, maternal health problems start well ahead of birth. While 78% of expectant mothers in the developed world receive at least antenatal check-up the number drops to 68% in South Asia (Young, M. W. 2011).

1.4. Problem statement

The health sector faces several problems, but the most serious problems faced by the health sector leading to decline are as follows: health facilities are undermined by equality and quality in healthcare delivery. South Asian countries health care sector as there is political influence, the workers lack transparency, are not loyal or committed to their work. The newly appointed are often not qualified because they have inadequate influence over their area, which causes them a problem when treating patients. The

funds are not properly distributed and may also help to provide better hospitals, better medicines. The rate at which the services are received by people belonging to the low-income community is so high that they are not accessible. Government hospitals services and facilities are not up to the mark and may also increase patient infection and can suffer as a result. And many doctors do not come to their jobs because of the low returns. Most physicians choose to practice independently instead of operating in government hospitals (Adeel, et al. 2016).

1.5. Purpose of the study

This analysis aims to examine at the long-term relationship between public health expenditure and economic growth. The contribution of public health expenditure to economic growth is from the health lead growth hypothesis, by using cointegration. long-term analysis of public health expenditure and economic growth would be helpful in determining the possible magnitudes of fully accumulated effects of economic growth on health. Hypothesis that 'economic growth affects health' is a long run phenomenon would be test.

1.6. Objectives of the study

The major objectives of the study are below:

- To investigate the effect of public health expenditure on the economic growth
- To analyzing the relation of public health expenditure and economic growth

1.7. Significance of the study

The study is significant in the context, that it investigates the relationship between expenditure on public health and economic growth. In addition, it will be the contribution of public health expenditure to economic growth reducing from health driven growth theory. And empirical evidence is that the previous studies discussed the

relationship between health expenditure and economic growth in many countries such as the Mediterranean countries of the North and South Bank, the OIC nations, Algeria, Nigeria, the United States and Turkey, but the study dealing with the case of South Asia and also the period between 1995 and 2018 were scarce. However, most studies and economists focused on the development of public health expenditure as a fundamental component of human capital in supporting economic growth but did not consider the health effects on economic growth and human capital production and accumulation.

1.8. Definition of key constructs

The different theories about growth indicate its role as an effective agent for economic growth. In economic literature, the definition of human capital has been broadly defined by including education, health, training, migration, and other investments that increase individual productivity (Akram, et al. 2008).

1.8.1. GDP Per Capita (Dependent variable proxy for economic growth)

"GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars" (World Bank, 2017).

1.8.2. Public Health Expenditure (Independent variable)

"Public health expenditure includes recurrent and capital expenditure (central and local levels), external borrowing and grants (including donations from international agencies and NGOs) and social or compulsory insurance funds" (WHO).

1.8.3. Control Variables

A variable that held constant in order to simplify the relationship between two other variables, here our focus on public health expenditure and GDP per capita (proxy for economic growth), while the other factor that also effect public health expenditure (i.e. labour force, life expectancy, and infant mortality) and GDP per capita (i.e. human development index) are held constant.

1.9. Research Questions

The emphasis of the study will be on public health expenditure and economic growth nexus.

1. How public health expenditure influence on the economic growth?
2. How does human capital accumulation impact on the country economic growth?
3. What is the relation between public health expenditure and economic growth?

1.10. Development of Hypotheses

Hypotheses for our study based on literature and model are as follows:

- Null Hypotheses (H_{01}) examines that there is no significant impact of public health expenditure on economic growth (GDP per capita) whereas alternative hypotheses (H_{11}) explain that there is significant relation of public health expenditure on economic growth (GDP per capita).

- Null Hypotheses (H_{02}) examines that there is no significant impact of life expectancy on economic growth (GDP per capita) whereas alternative hypotheses (H_{12}) explain that there is significant relation of life expectancy on economic growth (GDP per capita).

- Null Hypotheses (H_{03}) examines that there is no significant impact of public health expenditure on life expectancy whereas alternative hypotheses (H_{13}) explain that there is significant relation of public health expenditure on life expectancy.

CHAPTER 2

LITERATURE REVIEW

As noted in the introduction, numerous studies have been conducted regarding the relationship between human capital production and economic growth. Such studies primarily suggest that the relationship between human capital and economic development has been positive. There has been a flurry of research in the last decade studying the relationship of health-to-economic growth. There is a substantial and rich literature on what defines the amount of money a nation dedicates to the medical needs of its population, and the discussion keeps on growing. This section of the study looks at some literature.

While using the average height of the adult survival rate and life expectancy as a measure of health status, Mankiw, N. G., Romer, D., & Weil, D. N. (1992) found that health is a significant determinant of the income variation of different countries. Around 17% to 20% of fluctuations in cross-country income can be explained by differences in cross-country health status. Arora, S. (2001) examined the life expectancy at birth at age; structure of 5, 10, 15, and 20 and adult age as healthcare outcomes in 10 industrialized countries. The study concludes that the improvement in health status has increased the long-term economic growth rate by 30% to 40%. It also concludes that high disease and death prevalence are among the main causes of poor long-term growth in developing countries.

Bhargava, et al (2001) found a positive association between adult survival and economic development using the adult survival rate as a health status measure. Results remain similar when adult survival rates are substituted for the life expectancy. However, the fertility rate has an unfavorable relation to economic growth. Because

infant mortality affects the life expectancy considerably. Growth in the labor force is for the most part smaller than growth in the population. Consequently, the high fertility rate restricts economic growth by putting more pressure on scary capital. Gallup, J. L., and J. D. Sachs (2001) considering initial poverty, economic policy, tropical region and life expectancy, per capita GDP in countries with extreme malaria prevalence grew 1.3% lower than in others, study also indicates that a 10% decrease in malaria incidence will contribute to a 0.3% rise in GDP growth per capita.

Van Zon, A., & Muysken, J. (2001) argues that good health is a requirement that people should be able to provide work. The study found that rising demand for health services from an aging population will have an adverse impact on economic growth. Scheffler, R. M. (2004) suggests that health should not be treated as output (life expectancy, adult survival rate, etc.) but should be input (health costs). Study shows the elasticity of health care expenditure in relation to GDP is greater than one. This means that if GDP rises by 10% then healthcare expenditure increases by more than 10%. The developed countries are also expenditure more in health than the developing countries.

Gyimah et al, (2004) stated that investment in health capital (health expenditure) and stock (child mortality rates) has a positive and important connection to per capita income growth. However, the relation is quadratic. The study concludes that health investment in LDCs will boost short-term economic growth and increase long-term income because health investment becomes part of human capital stock. Using different measures of adult nutrition and wellbeing in household surveys, Schultz, T. P. (2005) explore the effect wellbeing has on overall factor productivity. Study shows that improved human health capital has an important, beneficial impact on the worker income and productivity. Study states that developing countries still lack the resources to invest in health; on the other hand, poor health status is slowing economic growth.

Developing countries seem to be in a vicious cycle that results in continued underdevelopment.

Lorentzen et al, (2005) analysed the impact of adult mortality rates on economic development. The study finds that high mortality rates limit economic growth by curtailing the time horizon. As a result, people act which delivers short-term gains at long-term costs. Fertility, investment in physical and human resources are also the channels that influence economic growth. While evaluating the contribution of health by calculating it by the rate of male survival in economic growth between the ages of 15 years and 60 years, Jamison et al, (2005) founds that improved health represented about 11% of growth. The study concludes that investment in physical capital, education and health plays an important role in stimulating economic growth. Sachs and Warner (1997) suggested an equations relationship between the human health resources and economic growth rates, using life expectancy as a health measure. The study concludes that balanced human capital is pushing down economic growth.

Fogel, R. W. (1994) concludes that approximately one-third of UK income growth between 1790-1980 could be attributed to improving health facilities and increasing nutritional benefits. The report also states that research can be viewed as improving technical progress.

Hitiris, T., & Posnett, J. (1992) investigation of international health expenditure differences have been restricted to the use of relatively small cross-sectional data samples. Our aim here is to re-examine the results of previous research using a collection of 560 pooled time series and cross-sectional observations. Results affirm the importance of GDP as a determinant of health expenditure with an estimated elasticity of income at or near unity but also suggest that OECD countries should not

be viewed as a single, homogeneous group. The importance of certain non-income variables is also confirmed, although the direct effect of these factors seems small.

Anderson, G. F., & Frogner, B. K. (2008) Investigate the United States has spent $6,401 per capita on health care more than twice the OECD mean nation per capita income. Between 1970 and 2005, in the percentage of gross domestic product (GDP) devoted to health care, the United States had the largest increase (8.3%) among all OECD countries. While it had the third largest amount of public expenditure, health insurance reached just 26.2% of the U.S. population in 2005. The United States was similarly likely to be in the upper and lower half of the 17 normative indicators implemented by the OECD.

Health system resources are calculated using multiple metrics including health expenditure (total health expenditure per household, health expenditure as a percentage of GDP, proportion of public expenditure in total healthcare expenditure), number of doctors, number of hospital beds, number of computed tomography scanners (Mohan, R., & Mirmirani, S. 2007, Baltagi, B. H., & Moscone, F. 2010). In this study the indicator for calculating health inputs is overall health expenditure per capita.

Jaba et al., (2014) analyzing the relation between input dynamics and healthcare Systems outputs. Input from the health care system is expressed through health care expenditure per capita (current US$), and output from the health care system is expressed through life expectancy at birth (years). The data were gathered for 175 world countries over 16 years (1995-2010), grouped by geographic location and level of income. We use a data analysis panel to estimate the life expectancy by a feature of health expenditure. The findings obtained suggest a significant correlation between public expenditure and life expectancy. State effects are important and suggest that there are major variations between the countries. Health systems success is measured

either by longevity measures such as life expectancy (life expectancy at birth, life expectancy at 65 years, stable life expectancy) for the total population and/or gender, or by mortality measures (mortality rate, infant mortality rate, life expectancy lost). Such metrics are considered effective proxies for assessing the health status of a population (Shaw et al, 2005; Cutler et al., 2006; Poças, A., & Soukiazis, E. 2010).

The life expectancy of a country, the healthy is the population (Jen et al., 2010). The study mentions life expectancy for determining the state of health. Previous research investigating the relationship between health services and health outcomes is a mix of metrics, model methodology and countries studied. Nixon, J., & Ulmann, P. (2006) did a literature review in that area. Most of these studies examined panel data for developed countries such as the USA (Lichtenberg, F. R. 2002); Canada (Crémieux et al., 2005) or the OECD countries (Hitiris, T., & Posnett, J. 1992; Shaw et al., 2005), while some recent papers concentrate on emerging and less developed countries (Bayati et al., 2013). It has been shown that health expenditure has a substantial positive influence on life expectancy and a major negative impact on mortality rates.

The preceding literature discusses the participation of health and three different ways of labor force, i.e. productivity, life expectancy and effect on income. Much of the literature discusses the productivity-health relationship based largely on the principle of human capital (Becker, G. S. 2009), which indicates a positive connection between human health and its impact on productivity. Approach to life expectancy claims that besides productivity there are also several other considerations that also determine this relationship. Since according to this approach, it is health that affects the preferences between leisure and work, those with poor health prefer leisure to work, so that they can take care of their ill health. The determination would cause them to shake their labor market life expectancy (Chirikos, T. N. 1993). The revenue influence

indicates a strong correlation between the two. Sick patients require medical attention and people require medical expenses (Dwyer, D. S., & Mitchell, O. S. 1999; Cai, L., & Kalb, G. (2007).

The current study focused on health expenses and labor force participation linkages which use Pakistan as an example scenario. The sample data are for the period from 1972 to 2013. The economic survey of Pakistan and WDI was analyzed for data collection, and the approximate results were collected using the Autoregressive Distributive Lag Model, which revealed a positive correlation between the rate of health and labor force participation in Pakistan. In addition, secondary school enrolment and recruitment also have beneficial effects on labor participation in both long and short periods of time. Life expectancy has detrimental effects, and in one case, access to trade is insignificant. It is suggested that government could increase its expenditure on basic health issues alongside investment-friendly policies to encourage higher participation in the labor force. This is also proposed that education can be promoted for successful labour in a country (Rauf et al., 2018).

Growth in gross domestic product does not automatically mean human development growth; experience at global level has shown that income growth and human development are not often partners, and in some countries there has been a rise in one of them with a decline in the other. On the other hand, a study found that the efficiency of these expenses is dropping as government health expenses increase. In view of the above, this study hypothesizes and tests a positive relationship between expenditure allocation states to the index of health and human development. The model, the index of human development is regarded as an endogenous variable and total health expenditure is taken as descriptive variable. Estimation of the hypothesized relationship is done using combined data from countries from 2000-2008, extracted from the

document "2025 Horizon" from the Iranian government. Results indicate that the growth in health expenditure in these countries has contributed to a higher human development index (Mirahsani, Z. 2016).

This study aims to examine the differentials of 19 major Indian states across rich and poor states as well as across rich and poorer strata and urban rural segments. The study shows that, in addition to individual health financing policies of the respective state governments, there are significant disparities also between rural and urban strata and wealthier and poorer segments of society. Which are illustrated by high inequality coefficients and an increasing in health concerns related to second generation lifestyle, as well as levels of use of both preventive and curative services in both the public and private sector. Our findings highlighted the need to increase public health expenditure, boost productivity in using existing public facilities and popularize government-run health insurance schemes mainly intended for the poor. Such measures will in part help to minimize unequal outcomes (Purohit, B. C. 2012).

The determinants of public health expenditure in Ghana, using data from the annual time series 1970-2008. The study explored the stationery and cointegration properties between expenditure on public healthcare, but environmental and socio-economic indicators use ERS maximum point unit root test and Engle-Granger cointegration test. In doing so, we looked at the long-term effect of real GDP, CO2 emissions, crude birth rates, life expectancy, poverty, and urbanization on public health expenditure in Ghana. The FMOLS methodology was used to estimate the public health expenditure model's long-term multipliers. Findings from the study indicate that expenditure on public health in Ghana is positively influenced by real GDP, policies that aim to improve the health of the population as calculated by life expectancy and actual birth rates. We see strong proof that Ghana wants healthcare. To achieve

improved healthcare these variables, need more and critical attention (Boachie, et al. 2014). According to Mayer, D. (2001) the probability of gender group survival for adults is also used as a measure of the health status. A causality test study using the Granger-type indicates that health status is generally responsible for economic growth in Latin America, and particularly in Brazil and Mexico. Adult health gains were associated with an average 0.8% to 1.5% increase in wages. Additionally, the growth effect for improving female health is higher than for men's health.

Bloom et al., (2004) uses the 2SLS methodology to find that life expectancy and education have a positive and important effect on GDP. Health advancements not only increase production through worker productivity, but also through capital accumulation. The study also found that a one-year improvement in a population's life expectancy resulted in an increase in output of 4%.

As a measure of economic growth, Malik, G. (2006) found using OLS that there is no significant correlation between health status and economic growth, calculating health status by infant mortality, life expectancy rate and basic health rate and per capita GDP. By using 2SLS however, the analysis found that health metrics had a very significant impact on economic development.

Suhrcke, M., Võrk, A., & Mazzuco, S. (2006) uses the adult death rate, birth rate and life expectancy to evaluate ill health economic costs together with the economic advantages of improving it for Estonia. The study showed that the fertility rate and adult mortality rate had a significant and negative impact on both OLS and Fixed effect model specifications. Furthermore, the study concludes by using survey data that have statistically reliable and negative effects on the supply of labor and productivity at the level of the individual.

2.1. Literature Gap

Various studies have analyzed the impact of health on economic growth. There is extensive body of literature on the disparities that contribute to health inequity and their effect on health outcomes, less known about the response from policy makers in South Asian countries. (See, for example, Zaidi et al, 2017). The result confirms that health variable plays a very significant role in determining the long run economic growth. As all the health indicators have a significant impact on the long run economic growth. (See, for example, Akram, et al. 2008; Bhargava, et al. 2001). The main difference between these studies and the present study is that they ignored the cointegration between public health expenditure and economic growth whereas the present study empirically analyzes this cointegration and granger causality. Many researchers have worked on impact of health on economic growth, but they did not discuss the public health expenditure and economic growth in South Asian countries.

CHAPTER 3

THEORETICAL BACKGROUND

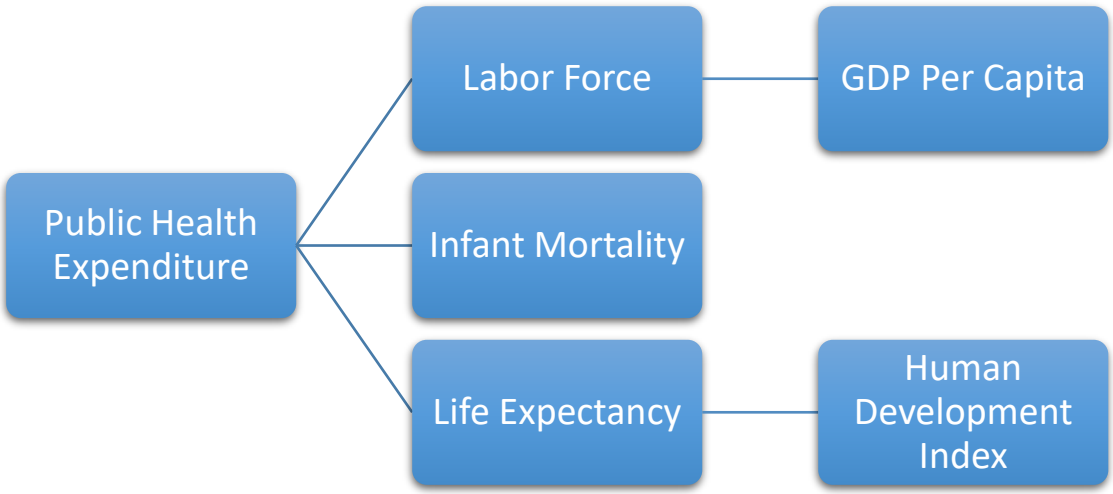
3.1. Introduction

In this chapter, theoretical framework is proposed for this research study, to examine the relevant theories. And to relate all variable to each other's, there are total six variables and how these variables are connecting this all process are explain in the theoretical framework.

3.2. Theoretical Framework

A theoretical framework is designed with the help of literature review, it is noted here that the literature did not completely investigate the connection between public health expenditure and economic growth (GDP per capita proxy for economic growth). There is no study that has examined the long-term relationship between them. In view of this, we attempt to analyze the link between public health expenditure and economic growth (EG) with using panel data from 1995 to 2018 for seven South Asian countries. The relationship between various variables is displayed in figure 1. Here our focus is on public health expenditure and economic growth while the other factors that also affect public health expenditure (i.e. total labour force, life expectancy, infant mortality) and economic growth (i.e. human development index, etc.) are held constant.

Figure 1: Theoretical Framework



Endogenous growth models provide the process whereby investments in public health influence population growth and economic development. These models stress the importance of human capital for economic growth. The neoclassical growth models describe savings-based economic development and population growth. Solow, R. M. (1956) Highlighted that countries with higher savings will have higher per capita incomes whichever other aspect is equal. The savings and population rates in Solow's model are key determinants of per capita income across countries (Heshmati, A. 2001).

In 1965, Buchanan created a theoretical model to persuade public authorities independently of demand, to invest more in health. This hypothesis emphasizes that inefficiency in the provision of health care would be illustrated not by a scarcity of health care facilities but by a reduced quality such as pollution, infrastructure, and unequal distribution of workers.

There have been numerous models for incorporating the human capital effects on sustainable growth. Romer, P. M. (1986) and Barro, R. J. (1991) Highlighted that human capital is a very significant element for stimulating economic growth. Nonetheless, Barro theoretical underpinnings in contemporary human capital literature are still very important in Africa (Ssozi, J. O. H. N., & Asongu, S. A. (2015). Mankiw, N. G., Romer, D., & Weil, D. N., Modified Solow model (1992) stressed equally the contribution of human resources to economic development. These endogenous models do not assume a constant of human capital. Instead, they focus on the ability of human resources to influence growth both in the short term and in the long run. The theoretical model constructed in this study shows a practical relationship between economic development and health expenditure, one of the components of human capital.

Economic growth = f (public health expenditure; health indicators) + (human development index).

Therefore, in this study the following econometric relation will be estimated.

GDP per capita$_{it}$ = ¼ α þ β_iPublic health expenditure$_{it}$ þγ iInfant mortality$_{it}$ þδ_iLife expectancy$_{it}$ þ ω_iLabour force$_{it}$

Where i = different country module t = time module from 1995 to 2018 β_i, γ_i, δ_i, ω_i, φ_i are coefficients for our different variables and ε_{it} error term. Health as human capital is determined by expenditure on medicine, the life expectancy of a person at birth and the proportion of the population that makes up the total labor force of the economy. This study also highlights the importance of trade for the economy: researchers hypothesized that production would increase with healthy human resources through higher labor productivity, thus generating higher added value for the products and services produced when the business climate is favorable. Household consumption is similarly considered since a large proportion of in-coming households are spent on

consumption in developed countries and, moreover, represent the level of domestic demand, which has a multiplier impact on industry's added value and hence economic growth.

The purpose of this research is to find evidence of causality between expenditure on health and economic growth and to check the existence of cointegration, hence long-run relationships between variables of study. This also aims to check whether health expenditure has a greater effect on South Asian countries economic development. The granger causality test, panel cointegration test and Panel OLS, Fully Modified Ordinary Minimum Squares (FMOLS) panel, and Panel Dynamic Ordinary Least Squares (DOLS) models are used to corroborate outcomes and avoid the inherent problems of one method. Unit root checks are used to assess whether a sequence is stationary or not. A sequence is stable if its probability distribution does not change over time. Im, K. S., Pesaran, M. H., & Shin, Y developed the Augmented Dickey fuller (ADF) test. (2003) this analysis will be included. This will use the combined measures Im, Pesaran and Shin (IPS) and Fisher.

Test for a long-term relationship between health expenditure and economic growth also includes using the Johansen technique. The power of the Johansen test can therefore be significantly skewed in multivariate systems with limited sample size. Thus, the use of time series knowledge as well as cross-section details is crucial. Tests for Panel Cointegration are used. Kao, C. (1999) and Pedroni, P. (2004) several measures developed to investigate the nature of cointegration in a multivariate system. Their proposed statistics test the hypothesis of null no-cointegration against an alternative to cointegration. Unfortunately, the time series for pooling has resulted in significant losses in terms of the acceptable heterogeneity of the individual time series. It is crucial that the process of pooling time series will retain as much variation as

possible between individual time series. The testing process for cointegration between variables should allow as much heterogeneity as possible among the different countries of the panel. If pooled results are based on homogeneous panel cointegration theory, common coefficients of the slope are placed. Pesaran, M. H., & Smith, R. (1995) Highlighted that if a different estimator is used because of discrepancies between countries, then the expenditure on health and economic development is not cointegrated. In this analysis, residual tests are used for Pedroni, P. (2004), seven tests will be used and four for in-dimensional panels and three for in-dimensional panels, the weighted statistics for in-dimensional panels are also highlighted.

The granger causality would be used to prove the direction of causality between the research variables, with special interest being given to the direction of causality between health expenditure and economic growth. The granger's causality is very susceptible to the use of sum of lags. The test will have four possible outcomes: a) neither variable in Granger causes the other, b) unidirectional causality from x to y, c) unidirectional causality from y to x; d) both variables in Granger cause each other.

In the cointegrated panel data, many methods can be used to estimate including: OLS, fully modify OLS (FMOLS), Dynamic OLS (DOLS), and PMG (Pooled Mean Group). Research of properties of the OLS estimator (the finite sample properties of the OLS estimator, t-statistics, bias-corrected OLS estimator and bias-corrected t-statistics) by Chen, W., Clarke, J. A., & Roy, N. (2014) measured reveals that the bias-rectified OLS estimator does not generally benefit from an OLS estimator. Other alternatives such as the FMOLS estimator or the DOLS estimator in cointegrated panel regressions may be more appropriate. In traditional time series econometrics, FMOLS is well known since serial correlation in errors and endogeneity in regressors is supposed to be eliminated. Kao, C., & Chiang, H. (1999) demonstrated that both Fully Modified OLS

(FMOLS) and OLS both show signs of small sample bias and that the Dynamic OLS (DOLS) estimator is capable of outperforming both. This study will consider three error correction estimators: OLS panel, fully modified OLS (FMOLS) panel and dynamic OLS (DOLS) to empirically analyze the relationship between health expenditure and economic growth.

CHAPTER 4

METHODOLOGY AND DATA

4.1. Theoretical Framework

According to the requirement of the aims as well as objectives of this study, research methodology is fundamentally a complete proposal for performing research. By considering these broad objectives, specific research tasks have been developed by research. Which shows research purpose as well as results, this chapter explains also methodological procedure to test the hypotheses that have been proposed in this study. This chapter will also discuss the planned methods and analysis as well. It includes research design, sources of data collection, econometric modeling, Description of the variables, econometric analysis, and the estimation procedure.

4.2. Research Design

Research design is a structure of methods and techniques selected by a researcher to integrate various components of the research in a logical way to manage the problem statement effectively. This provides insights into how a growing approach can be used to conduct the research. May researcher has a list of research questions which can be answered by designing research. It not only shows the data collecting method but also explains the logic behind. In this research, seven (07) South Asians countries and annual penal data from 1995 to 2018 are used, to check the long-term relation between public health expenditure and economic growth. There are 168 observations are utilized in the panel dataset, which is enough for the analysis of regression. It is also called longitudinal data model and panel dataset consists of several observations on various individuals (which ranges from i=1. n), which are observed over a time at equal intervals. T refers to the time, N= number of cross-sections when

data is observed. The panel data model was considered appropriate and more suitable for the study because data for various factors has been collected from different samples and for multiple times. During this section: firstly, the researcher examine data collection sources and ethical procedures; secondly, the researcher present the econometric modeling and description of the variables used in this research; and thirdly, the researcher present the econometric analysis.

4.2.1. Steps to estimation of panel cointegration model

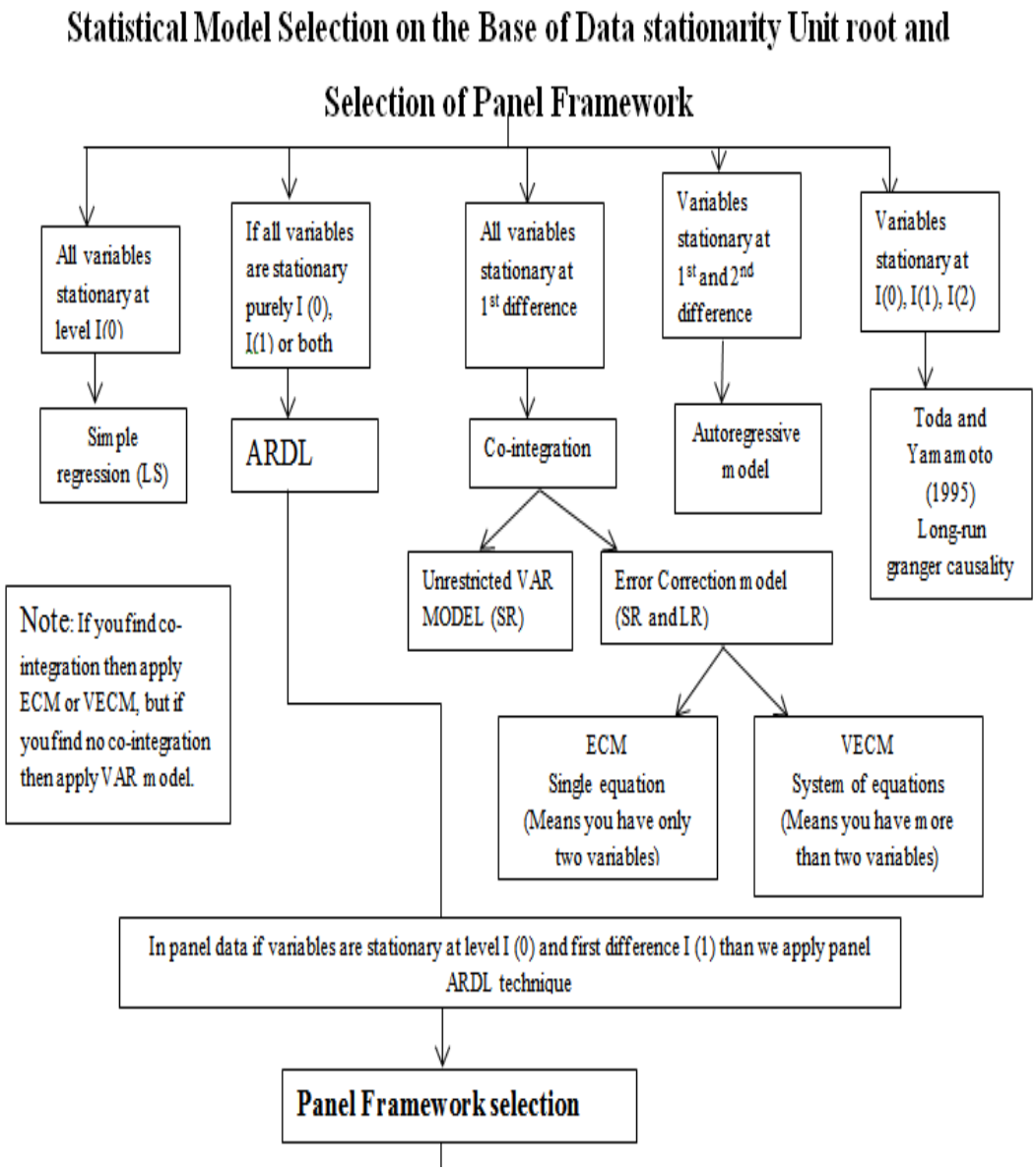
By following steps, the researcher applies certain econometric techniques for the estimation of panel cointegration model.

1. Descriptive Statistics
2. Correlation
3. Granger Causality
4. Penal Unit Root Test
5. Penal Cointegration Test
6. Cointegration Regression (FMOLS)
7. Cointegration Regression (FMOLS, OLS, and DOLS)

Firstly the researcher present the descriptive statistics for showing data summary or overview; secondly the researcher perform correlation test to verify how strongly pairs of variables are related, and then perform granger causality for the concept of causality that is based on prediction. According to granger causality, if a signal X_1 variable "Granger-causes" (or "G-causes") a signal X_2 variable, then past X_1 variable values will contain information that helps predict X_2 variable above and beyond the information contained in past X_2 variable values alone. Then the researcher presents the panel unit root test for model or technique selection on the Prob 0.05 bases.

The study applies panel cointegration model. The panel data model will be used either with random or fixed effect. The estimation technique of the panel cointegration model for data analysis is applied, if the variables are stationary at the first difference I(1). The empirical study is based primarily on the collection of standard panels cointegration methods, such as Pedroni's cointegration tests and the fully modified ordinary least squares (FMOLS)/Dynamic OLS (DOLS) estimators, with two distinctive aspects.

Figure 2: Panel Framework to select econometric techniques for estimation



4.3. Variables and Data Source

Panel data was used over the period 1995 to 2018 to statistically explore the connection between the specified variables. Annual data for seven (07) South Asian countries is used with 168 observations suitable for panel data regression analysis. The analytical information comes from secondary sources, with three main sources: "world development indicators" (WDI), UNDP and Our World In Data. WDI collect data on GDP per capita (proxy for economic growth), labor force, life expectancy, and infant mortality while data public health expenditure are acquired from Our World In Data, while Human Development Index are collect from UNDP. GDP per capita (proxy for economic growth) has been used as the dependent variable (DV) for the present analysis, while public health expenditure, human development index (HDI), life expectancy, labor force, and infant mortality. All suggested independent variables are expected to have a significant connection to GDP per capita (proxy for economic growth). The model is overall functional shape is given below:

Table 1: Variables and data source

Variables	Description	Measures	Data Source
$YGDP\ PC_{it}$	GDP Per Capita	GDP per capita (current US$)	WDI
PHE_{it}	Public Health Expenditure	WHO estimates of public expenditure on health care, expressed as percentage of GDP	Our World In Data
HDI_{it}	Human Development Index	Measuring levels of education, standard of living, and life expectancy	UNDP
LF_{it}	Labor Force	Labor force participation rate, total (% of total population ages 15+) (modeled ILO estimate)	WDI
LE_{it}	Life Expectancy	Life expectancy at birth, total (years)	WDI
IM_{it}	Infant Mortality	Mortality rate, infant (per 1,000 live births)	WDI

4.4. Econometric Model

Our main interest is to define and estimate a basic type of functional model of health expenditure. By estimating the equation 1 below, we are exploring the effect of economic growth (GDP per capita proxy for economic growth) on health expenditure.

Equation 1 is a non-linear equation used to measure the change in expenditure on public health by finding its derivative in respect of economic growth. This means that a change in percentage of economic growth will change expenditure on public health by a_1.

Equation 1

$$\mathrm{GDP_{it}} = a_0 + a_1\mathrm{PHE_{it}} + a_2\mathrm{HDI_{it}} + a_3\mathrm{LF_{it}} + a_4\mathrm{LE_{it}} + a_5\mathrm{IM_{it}} + \varepsilon_{it} \qquad (1)$$

Where:

$\mathrm{GDP_{it}}$ = GDP Per Capita (proxy for economic growth)

$\mathrm{PHE_{it}}$ = Public Health Expenditure

$\mathrm{HDI_{it}}$ = Human Development Index

$\mathrm{LF_{it}}$ = Labor Force

$\mathrm{LE_{it}}$ = Life Expectancy

$\mathrm{IM_{it}}$ = Infant Mortality

ε_{it} = Error term

Panel dataset consist of several observations on various individuals (which ranges from I = one…n) which are observed over a time at equal intervals. T refers to time, N= number of cross-sections when data is observed, t = Years (1995, 1996, 1997… 2018), $a_0, a_1, a_2, a_3, a_4,\ a_5, a_6,\ and\ a_7\ =$ Partial slope coefficients.

The model above uses the OLS regression model to calculate the linear correlation of the independent and dependent variables. The research would concentrate

on the impact of GDP per capita on PHE regulation for effects from other factors (Mathew 2007).

4.5. Description of the Variables

In this section, we introduce the variables used in the study. Generally, different studies utilized these variables in literature. In this section we will also discuss the factors that affect economic growth, i.e. control variables, according to preceding studies, the following variables are explained as follows:

4.5.1. GDP Per Capita (proxy for economic growth)

"GDP per capita is a mid-year Gross Domestic Product divided by population. GDP is the sum of the gross value added by all resident producers in the economy plus any product taxes and minus any subsidies that are not included in the product value. It is measured for the depreciation of produced properties or the depletion and deterioration of natural resources, without making deductions. Data is in constant U.S. dollars for 2010 (World Bank, 2017)".

4.5.2. Public Health Expenditure

"Public health expenditure consists of ongoing and capital expenditure from government (central and local) budgets, external loans and grants (including contributions from foreign organizations and NGOs), and voluntary (or compulsory) health insurance funds (World Bank, 2017).' The World Health Organization (WHO) definition stipulates: "Public health expenditure consists of reoccurring and capital expenditure from government (central and local) budgets, external loans and grants (such as donations from international agencies and NGOs) and social (or compulsory) health insurance funds".

4.5.3. Human Development Index (HDI)

The first Human Development Report introduced a new approach for the advancement of human wellbeing in 1990. Human development or the approach to human growth-is about increasing human life's diversity, rather than merely the resources of the community in which human beings work. It is an approach which focuses on people and their choices and opportunities (UNDP)[1].

People: Human development is focused on improving people's lives instead of automatically leading economic growth to greater well-being for everyone. Development is viewed as income growth, rather than an end.

Opportunities: human development is about providing more freedom for people to live lives that they value. In effect, this means developing the abilities of the people and giving them the opportunity to use them. Educating a girl, for example, would build up her skills, but it is of little use if she is denied access to jobs or lacks the skills for the local labor market. Three basics for human development are living a long, healthy, and creative life, being knowledgeable and having access to the resources necessary for a decent standard of living. Many other things are also important, especially in helping to create the right human development conditions, and some of these are in the table below. Having attained the basics of human development, they open opportunities for progress in other aspects of life.

Choice: Basically, human development is about more choice. It is about providing opportunities for people, not insisting they take advantage of them. No one can guarantee human happiness and people make their own choices. The development

[1] http://hdr.undp.org/en/humandev

process-human development-should at least create an environment for people, individually and collectively, to develop to their full potential and have a reasonable opportunity to lead dynamic and effective lives which they value.

As the international community moves towards adopting and tracking the 2030 agenda, the understanding of human development remains useful in articulating development goals and improving people's well-being by ensuring an equitable, safe, and healthy world (UNDP).

4.5.4. Life Expectancy

Life expectancy at birth indicates the number of years a newborn child would live if prevailing mortality patterns were to remain the same throughout its lifetime at the time of birth (World Bank 2017). The birth life expectancy reflects a population's overall mortality rates. It summarizes the mortality pattern prevailing every year in all age groups among children and adolescents, adults, and the elderly. Global birth life expectancy in 2016 was 72.0 years (74.2 years for females and 69.8 years for males), ranging from 61.2 years in the African region of the WHO to 77.5 years in the European region of the WHO, giving a ratio of 1.3 between both regions. Women around the world live longer than men. The difference in life expectancy between the sexes in 2000 was 4.3 years and remained nearly the same by 2016 (4.4). The global average life expectancy grew by 5.5 years between 2000 and 2016; the fastest increase since the 1960s. In the 1990s, when life expectancy in Africa dropped due to the AIDS epidemic, and in Eastern Europe following the fall of the Soviet Union, those gains reverse decline. The increase of 2000-2016 was the greatest in the African region of the WHO, where life expectancy increased by 10.3 years to 61.2 years , driven mainly by

improvements in child survival, and increased access to antiretroviral for HIV treatment (World Health Organization)[2].

4.5.5. Labor Force

"The rate of participation in the labor force is the proportion of the population aged 15 and older that is economically active: all people who provide labor to produce goods and services over a given period. Labor force comprises people aged 15 and older who provide labor for the manufacture of goods and services over a given period. It includes people who are currently employed and people who are unemployed but seek work as well as job seekers for the first time. However, not all of those who work are included. Unpaid soldiers, family soldiers, and students are frequently ignored and there are countries that do not recognize army members. The size of the labor force tends to vary over the year as seasonal workers move in and out (World Bank, 2017)".

4.5.6. Infant Mortality

"The infant mortality rate is the number of babies dying per 1,000 live births in a given year (WDI) before they reach age one. The child mortality rate is the number of deaths under the age of one year that occur during a given year between live births in a given geographical area, per 1,000 live births that occur in the population of that geographical area during the same year (OECD)"[3].

[2] World Health Organization

https://www.who.int/gho/mortality_burden_disease/life_tables/situation_trends_text/en/

[3] https://stats.oecd.org/glossary/detail.asp?ID=1347

4.6. Static versus Dynamic (Panel Data Models)

Different frameworks available in terms of consistency and effectiveness for panel data analysis, i.e. "Pooled-OLS, fixed-effect (re), and random-effect (re)" have limitations. In the case of Pooled-OLS, heterogeneity is not considered in cross-sections; it imposes combined interception and coefficients slope, making it a very restrictive model.

According to Baltagi (2008)" to capture the time and cross-section effects, Although maintaining the presumption that the estimator had a standard slope and variance, the fixed effect model sought to solve the restriction of the pooled OLS model by adding cross-sectional unique intercepts and dummy variables. In addition, Campos and Kinoshita (2008) examined that "this estimator remains less efficient because of the degree of freedom loss. Moreover, the fixed-effect model produces biased estimates of parameters when some independent ones are dependent. While the random-effect model overcomes the problem of degree of freedom in the fixed-effect model by assuming common intercepts, its assumption that all models are time-invariant which implies strict exogeneity is often invalid."

In the literature available for evaluating the panel data models, researchers used the generalized method of moments (GMM) estimation technique. According to (Roodman, 2006; Samargandi, 2015) in the case of large cross-sections and small-time series (N>T) the results of GMM estimators become misleading, in addition, “Assuming the homogeneity of the lagging dependent variables results in skewed estimates.” For panel data model, these estimators captured the short-term dynamics only and ignore the trends and stationarity variables because these models generally constrained to small time-series. Therefore, it is not clear, whether the panel model estimates represent a

long–term structural equilibrium or in-depth relationship (Christopoulos & Tsionas, 2004) in the context of a large period. Pesaran (1999) in a time-consuming situation, the validity of the over-identification test becomes doubtful, and the number of instruments required increases. Pesaran et al. (1999) proposed that the panel regression and the ECM (Error Correction Model) should be combined by applying auto-regressive distributive lag (Cointegration) procedure to estimate large cross-section and time spread through multiple heterogeneous panel datasets.

4.7. Model Selection

In this research, the researcher utilized penal cointegration in three different regression, to examine the nexus between public health expenditure and economic growth. This present study emphasis is only on South Asians countries, the granger causality test is applied to select the appropriate model for the interpretation of results. In the study, we utilized the panel cointegration model for the data analysis. Panel cointegration model is applied when the number of cross-sections (N) is greater than the time (T).

4.8. Econometric Analysis

To check its suitability and validity for analysis, few initial tests were applied on data before proceeding with the methodology and final analysis of the data. Unit root tests are applied to the data to check the stationary nature of the variables.

4.8.1. Panel Unit Root Testing

Before applying Panel Autoregressive analysis, we first test the stationarity of variables to avoid a spurious regression problem. According to Canning and Pedroni (2004), "Panel Data shows the essence of time series if each cross-section contains data of more than 10 years, whereas time series data usually initiate non-stationary. hence

to avoid spurious regression. (Maddala & Wu, 1999; Hadri, 2000; Levin et al., 2002; Pesaran et al., 2004; Pesaran, 2007). We used the Levin-Lin-Chu (LLC) Root Test Unit only. According to Slamon et al. (1987), "The LLC unit root test takes into consideration the heterogeneity of cross sections, serial correlation, but LLC will have low power in the small sample. “To fix the weakness of the LLC unit root test, IPS tests have been used that consider this same heterogeneity of multiple cross-sections, serial correlation and perform well in small sample size. The null hypothesis(H_0) of Levin-Lin-Chu (LLC), and the root unit tests of Im-Pesaran-Shin (IPS) indicate the existence of unit root (i.e. non-stationary variables), the alternative hypothesis (H_1) is (i.e. the variables are stationary).

The LLC and IPS reviews are equated as follows: while

$$\Delta x_{it} = a_i + \beta_i x_{i,t-1} + \sum_{j=1}^{pi} \beta_{ij} \Delta x_{i,t-j} + \mu_{it}$$

Whereas i, t, xi, t, pi and μit Indicates cross sections (country), optimal lags and residuals over time series of countries. LLC and IPS test Null hypothesize: H_0: β=0. LLC check integrates null hypothesis H_0: β = 0 as contrasting to H_1: β<0. On the other hand, IPS tests are implemented based on equation 1, but they can hold β. Because of the heterogeneity among β coefficients for all units in panel, LLC is not as good as IPS. IPS 'null hypothesis has H_0: β_1=0 as contrasting to alternative H_1: β_1<0.

Testing for the identity of Penal unit roots in variables is the first step in the cointegration analysis. The Dickey and Fuller fishers augmented study involves a regression of the series' first differences against the once lagged series, X_{t-1}, and lagged variable terms. It could include a normal distribution α and the following trend term γ_t:

$$\Delta X_t = \alpha\ \beta X_{t-1} + \sum_{1=1}^{m} \gamma_i\ \Delta X_{t-1}\ +\ \varepsilon_t \qquad (2)$$

Where: Δ would be a first-difference operator, m is the optimal level lagged length, γ_t is the time trend and ε_t is the random stationary error

To determine whether a stationary variable pattern or discrepancy is stationary, we use the panel array root test. A panel data containing unit roots is stationary, with an average μ of 0 and a variance of 1. If we deny our null hypothesis that there is a unit root in the time series, then the series is in trend stationary. If there is insufficient evidence to refute the null hypothesis then the sequence is stationary

Using penal unit root tests on differentiated stationary series can decide how regression uses the data. You may note that the first differences of the series are stationary, so the series is said to be built-in order one, and no further root unit testing is needed. If the stationary properties of all variables are calculated using ADF tests, then use the OLS regression method to estimate the long-term relationship between variables. The unit root test has the hypothesis of H_0: β=0, H_1: β ≠1. If the coefficient is statistically different from 0, then the hypothesis that X_t has a unit root is rejected.

Investigates the correlation between health care expenditure and GDP for a sample of 21 OECD countries using recent times-established sidelines cointegration techniques. Unlike previous research, the study accounts for the fact that health care expenditures are not just defined by income. The other driving force is medical growth, which is illustrated by numerous factors such as life expectancy, infant mortality, and the proportion of elderly people. In the extended models, a Cointegration relationship between the variables can be defined. Income elasticity is no different from cohesion, meaning healthcare costs are not a luxury product. This result is robust for alternative therapeutic improvement measures. If alternate Cointegration vector estimators are used, the evidence is unchanged. Controlling cross section dependence does not affect

the key results, as even in a model among non-stationary common factors, cointegration can be found (Christian et al, 2005).

Using this method, we can reject the null hypothesis that unit roots are found in those sequences. In this rapidly expanding field of econometric science, no single test is likely to be definitive; however, our findings help alleviate the concern that panel data analyzes of national health care expenditure are misunderstood. Author links to open panel overlay (Suzanne et al, 1998).

4.8.2. Panel Cointegration Tests

Cointegration tests as certain whether the dependent variable and its regressions have a stable long-run relation. This measure means that there needs to be an adjustment mechanism to avoid the long-run relative relationship variations from getting bigger and bigger.

All existing variables are stationary at level and first difference, after which we test whether there is a cointegration test. We have applied three cointegration tests to verify the cointegration: Analyze health human capital's short-run and long-run effects on economic development. Cointegration coupled with Error Correction techniques was used to achieve that goal. The results show that age dependence, openness, population per bed, enrolment in secondary school, life expectancy and mortality rate affect GDP per capita but health expenditure has no relationship with GDP per capita (Akram 2008).

4.8.3. Cointegration Theory

Consider a VAR6 of order p

$$Y_t = A1\ Y_{t-1} + A PY_{t-p} + BX_t + \varepsilon_t \quad (3)$$

Where Y_t is a -vector of non-stationary I (1) variables, X_t is a d-vector of deterministic variables and ε_t is an innovation vector. This VAR can be rewritten as

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{n=1}^{P-1} \Gamma_i \Delta Y_{t-i} + BX_t + \varepsilon_t \quad (4)$$

Where.

$$\Pi = \sum_{i=1}^{P} A_{i-1}, \qquad \Gamma_i = -\sum_{j=i=1}^{P} A_j,$$

Granger theorem of representation asserts that if the matrix coefficient has reduced rank r < k then there are k x r matrices α and β with rank r each such that = αβ 'and β'Y_t is I (0). r is the number of Cointegrating Relations (Cointegrating Rank) and the Cointegrating Vector for each column of β. α elements are known in the VAR model as the adjustment parameters. The method used by Johansen is to estimate the matrix from an unrestricted VAR and to test whether we can reject the restrictions implied by the reduced range of variables

CHAPTER 5

ESTIMATION AND DISCUSSION

5.1. Introduction

In this chapter, data analysis is applied to selected data of South Asia countries to generated results and interpreted in a comprehensive manner. Firstly, we present the descriptive statistics for showing data summary or overview; secondly, we perform Correlation test to verify how strongly pairs of variables are related, and then perform Granger Causality for the predictive notion of causality. According to Granger causality, if a signal X_1 variable "Granger-causes" (or "G-causes") a signal X_2 variable, then past X_1 variable values should contain information that helps to predict X_2 variable above and beyond the information contained in past X_2 variable values alone. Then we present the Panel Unit Root Test for model or technique selection on the Prob 0.05 bases. The estimation technique of the Panel Cointegration Model for data analysis is applied, if the variables are stationary at the first difference I(1). The empirical analysis in this study is mostly based on the set of standard Panel Cointegration Tools, such as Pedroni Cointegration tests and the Fully Modified Ordinary Least Squares (FMOLS), Penal Least Squares, and Dynamic Ordinary Least Squares (DOLS) estimators.

5.2. Descriptive Statistics of South Asians Countries

Table 5.I Present the number of observations (N) and the summary statistics (Mean, Median, Maximum, Minimum, and Standard Deviation) for all variables that will be used in our empirical analysis. This data set includes 168 observations for all the variables. Some of the values were missing from variables that have been estimated through interpolation. Total numbers of seven (07) South Asia Countries for which data

was collected, which consist of Twenty-Four years of annual observations for the period from 1995 to 2018.

Table 2: Descriptive Statistics

Variables	Mean	Median	Maximum	Minimum	Std. Dev	Obs
GDP Per Capita	1746.56	982.02	10224	203.98	2021.3	168
PHE	2.39585	1.5677	10.8	0.2657	2.1361	168
HDI	0.56573	0.557	0.78	0.3963	0.0974	168
Labor force	61.6939	57.625	86.265	49.22	10.863	168
Life Expectancy	67.9768	67.628	78.627	56.636	5.0215	168
Infant Mortality	43.0738	40.95	97.4	6.4	24.025	168

"Source: author"

In table 2, the descriptive statistics are presented the dependent variable of the study is GDP per capita is measured as GDP per capita (current US$), the mean value of GDP per capita was 1746.56 with standard deviation of 2021.3. The independent variable of the study is public health expenditure (PHE) measured as government health expenditure as percentage of gross domestic product (GDP). It had an average value 2.39585 with standard deviation 2.1361. These variables are included as control variables in the study. While rests of the variables indicate HDI, Total labour, life expectancy, and infant mortality these were taken as independent variables. The variable HDI indicate human development index. The average of HDI 0.56573 with standard deviation of 0.0974, the average for total labor is 61.6939 with the standard deviation of 10.863, the average for life expectancy is 67.9768 with standard deviation of 5.0215, and the average of infant mortality is 43.0738 with standard deviation of 24.025.

5.3. Correlation

A correlation analysis was suggested in the literature to check the multicollinearity among the variables under examination. Multicollinearity originally refers to a situation in which two or more than six independent variables are highly linearly related in a Multiple Regression Model (Panel Fully Modified OLS (FMOLS). If the inter-relationship between six independent variables is greater than 0.09, the labor force exceeds -0.050 then the data shows a strong or significant multicollinearity. Such an analysis measures to what degree the two regressors move together. The Pearson Correlation Coefficient (PCC) sign test on the nature of the relationship, whereas its coefficients calculate the strength of the relationship between the correlations between the pairs. Results of the Pearson Correlation Test Coefficient are reported in the following.

Table 3: Correlation in Variables

Variable	GDP Per Capita	PHE	HDI	Labor force	Life Expectancy	Infant Mortality
GDP Per Capita	1.000	0.750	0.643	-0.050	0.731	-0.619
PHE	0.750	1.000	0.280	0.274	0.370	-0.427
HDI	0.643	0.280	1.000	-0.275	0.930	-0.899
Labor force	-0.050	0.274	-0.275	1.000	-0.160	-0.066
Life Expectancy	0.731	0.370	0.930	-0.160	1.000	-0.905
Infant Mortality	-0.619	-0.427	-0.899	-0.066	-0.905	1.000

"Source: author"

Table 3 shows what the matrix for the correlation of call is. Correlation matrix analysis clearly indicates that labor force and infant mortality are negatively correlated, and thus GDP per capita is positively associated with public health expenditure, HDI,

and life expectancy. Some series of variables are also negatively correlated, and others are positively correlated. The labor force variable is negatively correlated with all the model's variables except infant mortality. The labor force and infant mortality are both negatively correlated with one another. Throughout the study of inter-relationships, we can assume that our data has no problem of accurate or perfect multi-collinearity because none of the PCCs between explanatory variables exceeds the labor force of 0.09 is -0.050. Each cell of this matrix includes the partial correlation for the remaining 6 variables.

5.4. Granger Causality Tests

This test purpose is to verify the direction of causality between our study variables. The null hypothesis of this test states that between the variables there is no Granger Causality. while the alternative states that causality occurs, and it also shows that the causality is unidirectional or bidirectional. Table 4 below displays the results of the Pairwise Granger Causality Check for countries of South Asia and the sample is 2 lags and 154 observations from 1995 to 2018.

Table 4: Granger Causality Tests

Null Hypothesis	F-Statistic	Prob.	Decision
Public health expenditure does not granger cause GDP per capita	1.81738	0.14680	Accept
GDP per capita does not granger cause public health expenditure	2.722110	0.04670	Reject
Human development index does not granger cause GDP per capita	0.94477	0.42090	Accept
GDP per capita does not granger cause human development index	2.90345	0.03710	Reject

Labor force does not granger cause GDP per capita	1.29465	0.2787	Accept
GDP per capita does not granger cause labor force	1.52186	0.21150	Accept
Life expectancy does not granger cause GDP per capita	2.69337	0.04850	Reject
GDP per capita does not granger cause life expectancy	3.48826	0.01750	Reject
Infant mortality does not granger cause GDP per capita	2.00182	0.11650	Accept
GDP per capita does not granger cause infant mortality	0.50498	0.67950	Accept
Human development index does not granger cause public health expenditure	1.24446	0.29600	Accept
Public health expenditure does not granger cause human development index	1.71955	0.16580	Accept
Labor force does not granger cause public health expenditure	1.68019	0.17400	Accept
Public health expenditure does not granger cause labor force	0.93873	0.42380	Accept
Life expectancy does not granger cause public health expenditure	0.40113	0.75240	Accept
Public health expenditure does not granger cause life expectancy	7.63278	9.00050	Accept
Infant mortality does not granger cause public health expenditure	0.07656	0.9726	Accept
Public health expenditure does not granger cause infant mortality	0.12426	0.9456	Accept
Labor force does not granger cause human development index	0.17471	0.91340	Accept

Human development index does not granger cause labor force	0.14511	0.93270	Accept
Life expectancy does not granger cause human development index	1.69911	0.17000	Accept
Human development index does not granger cause life expectancy	2.47129	0.06430	Accept
Infant mortality does not granger cause human development index	1.96454	0.12210	Accept
Human development index does not granger cause infant mortality	2.32390	0.07760	Accept
Life expectancy does not granger cause labor force	0.64070	0.59010	Accept
Labor force does not granger cause life expectancy	4.82969	0.00310	Reject
Infant mortality does not granger cause labor force	0.47904	0.6974	Accept
Labor force does not granger cause infant mortality	0.01009	0.99860	Accept
Infant mortality does not granger cause life expectancy	29.12910	1.00140	Accept
Life expectancy does not granger cause infant mortality	1.91878	0.12930	Accept

"Source: author"

Our results show there is a unilateral causality that runs from GDP per capita to public health expenditure, and that public health expenditure does not cause GDP per capita to granger. Since there is bidirectional causality between per capita GDP and expenditure on public health. This means the multiplier impact of expenditure on public health is rising as GDP per capita. This means that rising public health expenditure can be a very important factor for increasing the quality of human resources and therefore economic growth. Additionally, this is not a direct mechanism in which the increase in public health expenditure translates into the economic growth, the required institutional

framework must be efficient and free to overcome economic growth. The theoretical idea is that economic growth and health are components of a vicious circle or system, as income generates wealth and wealth generates income. This is partly since certain country-specific indicators are essential parameters for the sensitivity of the increased economic growth expenditure on health. Which describes the probability of one-sided causality from economic growth to public health expenditure.

Our results also show a one-sided relationship between labor force and GDP per capita, labor force granger causes GDP per capita but GDP per capita does not cause labor force to granger. This holds true. We see from above the high public expenditure in the countries of South Asia. Our granger causality check also shows that HDI is caused by granger public health expenditure, but HDI does not cause Granger public health expenditure. There is a unilateral relationship running from labor force to GDP per capita while in South Asian countries there is a bidirectional relationship between GDP per capita and labour. This illustrates the importance of labor to the growth of economies in South Asia, so productivity would be greatly improved if sufficient investment were made in health infrastructure and workers in this region.

5.5. Panel Unit Root Test

The panel unit root test findings are outlined in table 5 below. The findings show that the variables considered in this analysis are a combination of stationary I(0) regressors and non-stationary I(1) regressors. After their first distinction the dependent variable GDP per capita and all independent variables were stable, i.e. I(1), with and without terms to the pattern. The results are summarized in table 5 below. To obtain accurate results, Panel Data's stationarity is important to avoid spurious Regression Analysis as it is difficult to make forecasts if the data is non-stationary. The table below

shows the effects of the E-views in the Levin-Lin-Chu (LLC) unit root test on all variables. Results provided at level and at the first difference, without trend and intercept. Inclusion of trend alternative means this model contains a linear time trend.

Table 5: Panel Unit Root Test at the first difference (Levin-Lin-Chu)

Variable	Level		1st Difference		Decision
	Statistic	Prob	Statistic	Prob	
GDP Per Capita	6.89618	1.00000	-2.18967	0.01143	I(1)
PHE	1.16887	0.87880	-13.05560	0.00000	I(1)
HDI	5.35846	1.00000	-2.41380	0.00790	I(1)
Labor force	0.02282	0.50910	-4.82782	0.00000	I(1)
Life Expectancy	-1.29302	0.09800	-6.61844	0.00000	I(1)
Infant Mortality	-3.60315	0.18020	-7.19865	0.00000	I(1)

"Source: author"

The cross-sectional dependence test in Table 5 cannot be rejected at level 0.01 percent, first difference 0.05 percent and second meaning difference 0.10 percent. This implies cross-sectional interdependence is present in our data. To obtain objective estimates of our results, we carried out a diagnostic test with the application of Panel Unit Root Tests in the presence of cross-sectional dependence on the residual estimates (Pesaran, 2007). The results of the panel unit root tests on the residual, as shown in Table 05, show that the residual is stationary at first difference and the stationarity validates the estimates of the results of the Penal Cointegration.

We see the above table 5, that the variables are not stationary at trend of level and intercept. This means that the Panel data's properties (mean, variance, autocorrelation) are not constant, so it is imperative to distinguish and test stationarity again. Our results show that at first difference the properties of the Panel Data are now constant. We see that the properties for the South Asia Countries Panel data which

spend more on health than government expenditure are stationary after the first difference. And we suggest they are order one integrated. This finding illustrates the high probability of a long-run relationship between economic growth and public health expenditure, the probability of these variables being Cointegrated is strong. To verify this, the Residual Cointegration Test of the Panel Pendroni is carried out using the results given in Table 6.

5.6. Panel Cointegration Test

Long-run relationship study of Cointegration has earned significant attention in the current research of the Panel. Throughout this chapter we explain the tools of E-views for estimating relationships with Cointegration using Panel Data. We consider various forms of the residual based Fully Modified OLS (FMOLS) and Dynamic OLS (DOLS) estimators (Pedroni, 2000, 2001) producing asymptotically unbiased, probability distribution estimates of the coefficient.

Table 6: Panel Cointegration Test

Pedroni Residual Cointegration Test		**Statistic**	**Prob.**	**Statistic**	**Prob.**
Within-dimension (panel)	Panel v-Statistic	1.15365	0.87570	2.91141	0.99820
	Panel rho-Statistic	1.450474	0.92650	1.701495	0.95560
	Panel PP-Statistic	8.40233	0.00000	9.59364	0.00000
	Panel ADF-Statistic	3.59048	0.00020	4.86020	0.00000
Between-dimension (group)	Group rho-Statistic	2.767016	0.9972		
	Group PP-Statistic	12.0492	0.00000		

Group ADF-Statistic	3.58533	0.00020

"Source: Author"

Table 6 shows that the variables are cointegrated, panel cointegration test developed by pedroni (Pedroni, P. 1999) is used to test empirically whether there is cointegration. The results of the panel cointegration test for South Asia countries show that six are significant in terms of weighted statistics for the seven dimensional and three inter-dimensional tests with standard statistics, while two are important in terms of the five-dimensional tests. And from these test statistics we can conclude that there is cointegration between the variables. This means regression of the cointegration panel is required.

5.6.1. Penal Regression

This study utilizes three models of panel regression: fully modified OLS (FMOLS), panel OLS, and dynamic panel OLS (DOLS). The findings can be seen in table 8 below. The results show that all three models for South Asia countries have a very high explanatory capacity with more than 93 per cent of the dependent variable variance explained by the independent variables. This can be seen from R-squared and adjusted R-square. Under this respect investing under health is imperative. This research explains the methods used by e-views to estimate and test the Cointegrating relationships of a single equation. Three fully efficient estimation methods are described, including Fully Modified OLS (Phillips and Hansen 1992), Panel OLS, and Dynamic OLS (Saikkonen 1992, Stock and Watson 1993), as well as various cointegrating test methods.

Table 7: Penal Regression (FMOLS)

Dependent Variable: GDP Per Capita				
Method: Panel Fully Modified Least Squares (FMOLS)				
Sample (adjusted): 1996 2018				
Periods included: 23				
Total panel (balanced) observations: 161				
Panel method: Weighted estimation				
Cointegrating equation deterministics: C				
Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
PHE	159.2327	0.0569	2797.303	0.0000
HDI	26098.33	0.0069	3773397	0.0000
Labor force	182.3442	0.0172	10577.64	0.0000
Life Expectancy	186.5659	0.006	30858.17	0.0000
Infant Mortality	89.22237	0.0017	52454.99	0.0000
R-squared	0.936733	**Mean dependent var**		1796.10
Adjusted R-squared	0.931603	**S.D. dependent var**		2048.80
S.E. of regression	535.8131	**Sum squared resid**		4.00E+07
Long-run variance	114346.40			

"Source: author"

Under this respect investing under health is important. Drawing conclusions from the Fully Modified OLS (FMOLS) model as it is best adapted for Cointegrated Panel Regressions, we see that a unit improvement in public health expenditure would result in a 159,2327 per cent increase in GDP per capita for South Asian countries. We see that these countries' all independent variables at positively than those of countries that failed to achieve the challenge. Also significant is a positive relation between independent variables and GPD per capita (DV). It can be seen for the countries of South Asia; an increase in units of the independent variables contributes to an increase in GDP per capita. The relationship is significant for the seven countries in South Asia.

Table 8: Penal Regression (FMOLS, Penal OLS, and DOLS)

GDP Per Capita (Dependent Variable)						
Independent Variables	**FMOLS**		**Penal OLS**		**DOLS**	
	t-Stat	**Prob**	**t-Stat**	**Prob**	**t-Stat**	**Prob**
PHE	2797.303	0.0000	18.57408	0.0000	5.238492	0.0008
HDI	3773397	0.0000	3.964914	0.0001	3.369253	0.0098
Labor force	10577.64	0.0000	1.95218	0.0527	6.12603	0.0003
Life Expectancy	30858.17	0.0000	9.390748	0.0000	-0.61407	0.5562
Infant Mortality	52454.99	0.0000	7.477412	0.0000	2.432775	0.0410
R-squared	0.936733		0.867445		0.999857	
Adjusted R-squared	0.931603		0.862505		0.997395	
Long-run variance	114346.4				212.5721	
Durbin-Watson stat	2.25037					

"Source: author"

The results suggest that for all three models, especially for countries in South Asia, public health expenditure has a significant positive effect on GPD per capita. Across all three models and for countries in South Asia, HDI has a significant positive effect on GPD per capita. In the two models FMOLS and Panel OLS for South Asia, labor force has a positive and substantial impact on GDP per capita and a negative but significant effect on GDP per capita in the dynamic OLS model for South Asian countries. For the two models FMOLS and Panel OLS for South Asia, life expectancy has a positive and significant effect on GDP per capita and a negative and insignificant effect on GDP per capita in the Dynamic OLS model for South Asia countries. Infant

mortality has a significant positive effect on GPD per capita for all three models and for countries in South Asia.

5.7. Discussion of the results

The main results of this study suggest that public health expenditure is cointegrated with economic growth, with a strong positive effect of public public expenditure on South Asian countries. Such results support those of Baldacci et al. (2004), which used a panel of 120 developing countries to conclude that health expenditure has a positive and significant effect on development over a given period. He also emphasized that health expenditure is a flow but not a stock. These findings are like that of Bloom et al. (2004), which estimated a productivity feature and concluded that health expenditure has a statistically significant positive effect on economic growth.

The finding of cointegration among health and economic development expenditure for both sets of studies is compatible with Mandiefe, S. P., & Chupezi, J. T. (2015) who have used the error correction model to test whether the short-term or long-term relationship between health expenditure and economic growth exists. Their results showed no short-term relationship, but the variables have a long-term relationship. Such results contradict the Ogundipe, M. A., & Lawal, N. A. works. (2011), which investigates the effects of public health expenditure on economic development in Nigeria but found a negative and substantial effect. Ogundipe, M. A., & Lawal, N. A. Result (2011), also contradicts Bakare, A. A. & Olubokun, S. (2011), which concluded that health expenditure has a positive and significant effect on economic growth in Nigeria.

The long-term association between health expenditure and other health measures such as life expectancy and economic development is confirmed in this study by Dreger, C., & Reimers, H.E. (2005) on a survey of 15 OECD countries, the cointegration regression committee concluded that there is evidence of a long-term relationship between economic growth and health expenditure and other health proxies. The relationship between health expenditure and economic growth is confirmed by analyzing the direction of causality and whether a long-term or short-term significant relationship between health expenditure and economic growth. The results showed a short-run causality from GDP to expenditure on health but there is a long-run positive relationship between economic growth and expenditure on health. Those findings are evidence of the results of our analysis.

Contemporary debate on how life expectancy affects economic growth is expanded in this study, differing ideas and empirical results have emerged on this subject; Barro, R. J. (1996) used a survey of 84 countries to illustrate the positive and significant effect of life expectancy on economic growth. Bloom et al. (2003) used a study of 104 countries and concluded that increased life expectancy leads to a rise in GDP of 2.65 to 4 per cent. Such authors emphasize the positive effect life expectancy has on GDP per capita. However, the results of this study show a negative and significant effect of the life expectancy on economic growth, this view is supported by other empirical studies such as Acemoglu, D. & and Johnson, S. (2007) showing that healthcare technology improves population growth and life expectancy, but then reduces GDP per capita. Barro, R. J., & J. W. Lee (2010) analysis of latest financial data to show a negative and substantial effect of life expectancy on economic growth.

The fundamental role of human resources in any economy means that health care investment provides high-quality labor-power, which is translated by rising labor

productivity, thus growing economic growth. Regression results show a positive and significant effect of labor power on economic growth, thus transforming economies with young and professional labor power to promote faster economic growth. This outcome contradicts the results of aged Canadian labor force in developed countries with negative effects on economic growth. (Seldon, A. Ed. 2007). Empirical studies show a positive correlation between labor force participation and economic growth of a country (Duval, et al. 2010).

This study confirms Heshmati A., empirical work. The significant and positive effect of public health expenditure on economic growth. Olubokun, S., & Bakare, A. A. Dreger, C., & Reimers, H. E. (2001); (2011); Aguayo-Rico and Iris (2005); (2005) indicating a positive and significant correlation between health expenditure and development. The result of this study and related studies is in disagreement with that of Eggoh, J. Hilaire, E. J. & Gilles, A. S. (2015) (2015), which from 1996 to 2010 analyzed a sample of 49 African countries to evaluate the effect of education and health expenditure on economic growth. Our studies have shown that education and health expenditure adversely affect economic growth.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

The study's main objective determines the nature of the relationship between public health expenditure and economic growth in south Asia countries from 1995 to 2018. The study's problem statement was testing the nature of the relationship between public health expenditure and economic growth? This study dealt with three research questions. Research Question 1 was: How public health expenditure influence on the economic growth? Research Question 2 was: How did human capital accumulation health impact on the country's Economic Growth? Research Question 3 was: What is the relation between public health expenditure and economic growth? Three hypotheses were developed based on these research questions for this research study."

6.1. Summary of the findings

The research findings are compatible with previous literature. The analysis provided different results for the study's proposed hypotheses. From the results of the analysis, 1st hypotheses state that Null Hypotheses (H_{01}) examines that there is no significant impact of public health expenditure on economic growth (GDP per capita) whereas alternative hypotheses (H_{11}) explains that there is significant relation of public health expenditure on economic growth (GDP per capita). From the results of the analysis, hypotheses 2nd, which states that Null Hypotheses (H_{02}) examines that there is no significant impact of life expectancy on economic growth (GDP per capita) whereas alternative hypotheses (H_{12}) explains that there is significant relation of life expectancy on economic growth (GDP per capita). Support was found for the 3rd hypotheses, which states that Null Hypotheses (H_{03}) examines that there is no significant impact of public health expenditure on life expectancy whereas alternative

hypotheses (H_{13}) explains that there is significant relation of public health expenditure on life expectancy."

6.2. Summary of the results

The result of long-run Panel Cointegration shows that mostly variable is positively associated with economic growth (GDP per capita) except GDP Growth, which means that increase in public health expenditure, HDI, labor force, life expectancy, and infant mortality leads to increase in economic growth (GDP per capita). While in the case of GDP growth, an increase in GDP growth will lead to an increase in economic growth (GDP per capita). The following variables were used by Piabuo, S. M., & Tieguhong, J. C. (2017) presented the same result, i.e. GDP growth positively influence by economic growth. All the variables are significant at a 5% significance level."

6.3. Theoretical and Practical implications

The aim of this research is to examine the public health expenditure and economic growth nexus in South Asia. From the arguments and debate as well as from the background of the study it is revealed that the analysis of public health expenditure and economic growth nexus in South Asia, in the theoretical world is a relatively new concept. However, the findings of this relation analysis showed that there is positive and significant relation among public health expenditure and economic growth nexus in South Asia. The conclusion from the relation analysis is that public health expenditure not only has a direct effect on economic growth, but also has an indirect effect."

"The results may have some implications for governments internationally when the issue of effective public health expenditure is considered. Governments must make

efforts to increase in public health expenditure. Consequently, this means that income is an important element in explaining expenditure on public health, thus increasing the general level of income can stimulate an increase in health expenditure. This underlines the possible effect of South Asia healthy labor force on economic growth."

6.4. Limitations

There is no research study without limitations as it is incapable of handling and covering all and everything, so this research study has some limitations as well. This study analysis is based only on perspective of the 07 South Asia countries but not found Afghanistan data from 1995 to 2018 and this big limitation of study, and the implementations of these results are only for these countries. This analysis may not be applicable and generalized to other countries e.g. in developing countries which are not the subject of the current study. These analyses are based on the period from 1995 to 2018 to identify the nexus among the six variables. We have considered economic growth (GDP per capita (constant 2010 US$)), public health expenditure (WHO estimates of public expenditure on health care, expressed as percentage of GDP) but other measurements of economic growth and public health expenditure can be used for further research. Here, from the perspective of future implications, there are very clear directions to make this study wider at the world level to investigate the effects of public health expenditure on economic growth by using different variables; because public health expenditure can't directly affect economic growth, its effects indirectly."

6.5. Recommendations and Future suggestions

"The present study recommends that it can be observed that public health expenditure is the major determinant of economic growth and have a positive and significant impact on GDP per capita in selected South Asia countries. The economic

growth of selected South Asia countries strongly depends on public health expenditure that are badly affected by economic growth the government should make special policies to increase it. The state should also make good policies to enhance public health expenditure that are considered backbone for the developed and developing economies and particularly for these selected South Asia countries. The state should find the root cause of these low expenditure and then it will be easy to recommend new policies, budget allocation, and resource management as well. So that this region becomes a healthy and skillful labor force place for home and foreign investors, and they can invest with full confidence and satisfaction."

"Furthermore, under the light of the evidence of this research study the recommendations that we can be extended this study by looking at the individual component of the public health expenditure and its relationship with economic growth. We can also check the nexus between public health expenditure, HDI, labor force, life expectancy, infant mortality, and economic growth in developing countries. Future analyses might help evaluate how well the public health expenditure performs in terms of economic activities development."

"The study highlights that expenditure output depends on the country's level of growth, its standard of institutional and governance, and macroeconomic policy, as well as political will to change. This study may be considered complementary, providing a broader picture of expenditure efficiency, but a thorough analysis of a country revenue system that takes into account the overall fiscal policy of the country, the needs of public expenditure and the overall level of growth in the Asian region is required for future research. The findings suggest that the tax reform architect must be country-specific, requiring a broad investigation of the country expenditure power, revenue results and organisational framework."

6.6. Conclusion

This research study examines the public health expenditure and economic growth nexus in South Asia. Previous literature and studies have shown positive relationship between health expenditure and growth. Our contributions are as follows:

In this study, we have checked the long-run relation between the variables as we know that public health expenditure indirectly effects economic growth instead of directly. So, in this study we also check the granger causality effect of public health expenditure on economic. Furthermore, several specifications using the Panel Cointegration test and three model FMOLS, Panel OLS, and Dynamic OLS regressions will help to make it possible to conclude that in the most faced with some of the world worst socioeconomic inequities countries there is a higher impact of public health expenditure on growth. Our theoretical model also suggests that the existence of a beneficial effect of public health expenditure in terms of economic growth.

We have extended these investigations by integrating public health expenditure in implementing the empirical work the theory can help us determine how public health expenditure evolves. In conclusion, the “theoretical framework” is not deciding the outcome of public health expenditure but only explaining how and where expenditure feeds. This gives a better understanding of how to increase in public health expenditure.”

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