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Health Capital: Cross Country Investigation of
Economic Growth in South Asian Countries
(Study of Developing Countries Bangladesh,
India and Pakistan)

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Table of Contents

1.1 Background	1
1.2 Importance of Healthy Society in a Country	3
1.3 Economic Welfare and Health Care Awareness	7
1.4 Contribution of Health Sectors for Past Decades	9
1.5 Economic Impact of 'Cost of Illness' COI.....	10
1.6 Water, Sanitation and Hygiene	12
1.7 Issues and Challenges in South Asian Countries	13
1.8 Health Capital and Demographics; Bangladesh India and Pakistan.....	16
1.8.1 Bangladesh	16
1.8.2 India	18
1.8.3 Pakistan	19
1.9 Demographics and Statistical Facts	19
1.10 Key Indicators of Human Capital.....	21
1.10.1 Health.....	21
1.10.2 Education	22
2.1 Educational Awareness, Longevity and Economic Growth.....	33
2.2 Role of Health Education Awareness	35
2.3 Issues under Attention in South Asia	36
2.4 Overview: Performance of Health Sector and Statistical Evidences of South Asian Countries	37
2.5 Global Target and UNICEF South Asia Target for New-Borns Mortality	38
2.6 New-Borns Death Rates by Wealth Quintiles, Mother's Education and Area of Residence (2006-2013).....	39
3.1 Theoretical Framework and Empirical Studies; Human Capital and Economic Growth.....	41
3.2 Data	43
3.3 Data Sources	43
3.4 Variables Identification	44
3.5 Variables Classification.....	45
3.5.1 GDP Per Capita Growth.....	45
3.5.2 Infant Mortality Rate.....	45
3.5.3 Health Expenditure	46
3.5.4 Education Expenditures	46

3.5.5 Total Fertility Rate.....	46
3.5.6 Immunization, DPT (% of Children Ages 12-23 months).....	47
3.5.7 Immunization, Measles (% of Children Ages 12-23 months).....	47
3.5.8 Improved Sanitation Facilities (% of Population with Access).....	47
3.5.9 Improved Water Source (% of Population with Access).....	48
3.5.10 School Enrolment Ratio, Primary, both Sexes (%).....	48
3.5.11 Mean Years of Schooling.....	48
3.5.12 Labour Productivity.....	49
3.5.13 Military Expenditures.....	49
3.6 Research Hypotheses.....	49
3.7 Regression Model.....	50
3.7 Assumptions of SUR Model.....	51
3.8 System of Equations.....	51
Equation 01.....	51
Equation 02.....	51
4.1 Overview.....	52
4.2 Summary of Descriptive Statistics.....	52
4.3 Seemingly Unrelated Regression.....	54
5.1 Conclusion.....	58
5.1 Recommendations.....	59
Table A.1 Variables Identification.....	67
Table A.2 Descriptive Analysis.....	67
Table A.3.1. Continued . . .	69
Table B.1. Human Capital Index Statistics and Demographics 2016.....	69
Table B.2. HDI (Human Development Index) Statistics 2016.....	70
Table B.3. Changes in HDI (1990-2015) and Country Rankings (2010-2015).....	70
Table B.4. Infant mortality rate (per 1,000 live births).....	70
Table B.5. New-borns, Regional Target for South Asia and Global Target for no more than 12 deaths per 1000 live births by 2030.....	71
Table B.6. New-born mortality rate (per 1,000 live births) in South Asia, 2016.....	71

List of Tables

Table A.1	Variables Identification
Table A.2	Descriptive Analysis
Table A.3	Seemingly Unrelated Regression Model
Table A.3.1	Continued Seemingly Unrelated Regression Model
Table B.1	Human Capital Index Statistics and Demographics 2016
Table B.2	HDI (Human Development Index) Statistics 2016
Table B.3	Changes in HDI (1990-2015) and Country Ranks (2010-2015)
Table B.4	Infant mortality rate (per 1,000 live births)
Table B.5	New-borns, Regional Target for South Asia and Global Target for no more than 12 Deaths per 1000 live births by 2030
Table B.6	New-born mortality rate (per 1,000 live births) in South Asia, 2016

List of Abbreviations

BOD (Burden of diseases)

COI (Cost of Illness)

DALY (Disability-Adjusted Life Year)

GBD (Global burden of disease)

GDI (Gender Development index)

HCI (Human Capital Index)

HDI (Human Development Index)

MDGs (Millennium Development Goals)

MPI (Multidimensional poverty Index)

NCD (Non-communicable diseases)

NGO's (Non-governmental Organizations)

OECD (Organization for Economic Co-operation and Development)

PHC (Primary health care)

SDGs (Sustainable Development Goals)

SEARO (South-East Asia Regional Office)

UN (United Nations)

UNAIDS (Joint United Nations Programme on HIV/AIDS.)

UHC (United Health Care)

UNDATA (United Nations Data)

UNDP (United Nations Development Programme)

UNICEF (United Nations Children's Fund)

UNICEFROSA (United Nations Children's Fund Regional Office for South Asia)

UNSD (United Nations Statistics Division)

WASH (Water, Sanitation and Hygiene)

WHO (World Health Organization)

YLL (Years of life lost)

Abstract

The role of health capital in economic growth is analysed using Infant mortality rate as an important indicator along with other demographic factors for the analyses of population health which affect the economic growth. The focus is on human capital of developing countries which has led the literature to derive theoretical background to investigate the effect of infant mortality rates, population access to improved sanitations, primary school enrolments and mean years of schooling on GDP per capita. The primary objective of the thesis is to examine impact of growth in infant mortality on economic growth of South Asian countries including Bangladesh, India, and Pakistan, and for descriptive study Sri Lanka is included in the estimation analysis. The study analysis is on panel data from 1995-2015, 21 years with four cross sections. The estimations show significant relation between Infant mortality rate and GDP per capita growth, an increase in the rate of infant mortality causes negative growth rates, while on the other hand increases in GDP per capita growth will lead to decreases in rates of infant mortality along with other significant variables. In the theoretical analysis we have taken studies that analyse different relationship set-up between health capital and economic growth, where health is defined differently by different authors for their objectives. This thesis provides methodological approaches for deriving results and interpret how health influences economic growth and how economic growth along with other important health indicators affect infant mortality.

Chapter 1. Introduction

“To promote physical and mental health and well-being, and to extend life expectancy for all, we must achieve universal health coverage and access to quality health care. No one must be left behind”. (WHO, 2016, p.3-4)

1.1 Background

Having good health and longevity is essential need of a human being. Generally healthy individuals are more energetic, vibrant and have more affective outlook of life. These characteristics are not only translated into positive influence for social activities, but also affect the economic growth and development. The purpose of this paper is to investigate the impact of health effect on economic growth. Recent global challenges such as globalization, technological innovation, health issues and other socio-economic reasons have let the national and international communities to highlight the fundamental needs of a society. Beside other human capital resources, health human capital is one of the important factor for the economy and the attainment of health capital is necessary for an individual and important for the society. Health capital has been put out of sight in most of the literatures compare to other human capital such as education, labor-training and production etc. Although these are somehow interdependent, focusing on one of these human capitals translates the other. Many studies have been conducted on issues discussing human capital in relation to the investments on education, job training, labor productivity and importance of healthy nutrition's for human body. However, the basic ideas surrounding these studies are the possible effects on economic growth in return for investments in health capital. The role of human health capital is regarded crucial to sustainability of economic growth. As sustained growth depends on considerable levels of human capital, stocks of human capital increases as a result of higher levels of health, better quality of education, and new training and learning procedures. Education and health are considered important indicators for a country economic growth and development, however labor force with the lower levels of education and poor health status results drives the economic growth negatively in long run (Fogel, 2004). Most of the developing countries are not capable of maintaining a sustainable

economic development. However it is evident that the increased in investments on education and health implies higher levels of human capital. Together these variables grow systematically to high levels of development, and these changes are the effect of change in the rate of investments, the rate of investment is linked positively to the levels of both of these variables. A highly educated, skilled and healthy labor force finds it much easier to innovate, use, create and adapt new technologies.

Poor and developing countries have lower levels of human capital and find it more difficult to compete in developmental activities and labor force participation with those nations which have comparatively more developed human capital resources. So in order for those poor economies to come to developed countries levels of human capital they must need to begin converging there levels of human capital with those of richer nations.

Good health is an essential factor in well-being of the society. However, improvements in health capital can be purely correlate to growth in economies. It seems rational assumption that good health promotes higher levels of human capital and therefore in return has positive impact on economic productivity of individuals and a country's rate of economic growth. Good health improves the workforce ability, reducing incapability, and increases market and non-market performance of individuals and also effects the days lost being sick. Individuals of the society get more and more opportunities to get enrolled for paid jobs and there productivity will be much better compare to unhealthy workforce of other countries. Furthermore, better health endorses improved levels of education by increasing level of education and higher schooling performances. This is also an important factor, considering education one of the main driver of resources allocation which would otherwise be used for preventative treatments for health, thus it substitutes the uses of health capital for negative externalities such as poverty rate of society. An adequate understanding of health and wealth accumulation driving health as human capital it is essential to comprehend the causal relationship between the two aspects that concludes good health of society. Both these factors of human capital are interdependent. According to Casasnovas, Rivera, & Currais (2005)

“The main difficulty in any approach to this task lies in the possible existence of endogeneity between health and wealth. While good health may be considered as a form of human capital that has a beneficial effect on productivity, income also

influences health in a positive way. The capacity to generate higher earnings facilitates an increase in the consumption of health related goods such as adequate alimentation or medicines". (p. 4)

Good health is not only demanded but it is also produced by individuals. Health is a stock that is initially inherited by Individuals and with the passage of time it depreciates at a rate but they can pertain there health for a longer time by investing and increase this stock. Many factors might contribute to the production of good health, Healthcare is among one of those factors. So it is obvious fact that the demand for healthcare facilities is derived by demand for health.

1.2 Importance of Healthy Society in a Country

Since human capital plays an important role in economic outcomes and health is an essential factor of human capital, health also constitutes for economic output. At the same time, economic outcomes have an effective role in deriving health. Health can be defined by economic, genetic, cultural, social and environmental factors. So health of population may also, in return will influence the economic outcome growth.

Many studies on micro level have investigated the effect of health on wage rate. Different health indicators are used and range of different measures such as height, weight and BMI, and other measures that were based on individual survey reports such as self- assessments regarding health status, whether these individuals are suffering from any particular chronic illness. These surveys conclude that healthy workers have lower chances to get chronic diseases and they are active and the impact is understandable from their high productive energy and earnings. However as always there were problems related to these kinds of studies which are normally related to measurement errors capturing individual's health status, the heterogeneity of the variables and the diverse feedback among them. So additional to these individual studies some international organizations put forth the idea of verifying and measuring the relationship between health and wealth accumulation.

Commission on Macroeconomics and Health spent two years examining the relationship between these two variables, the impact of health on development was analyse in order to find

the channel through which investments on health might have a positive role in the economic growth and as result have positive impact on equity in developing countries.

Moreover Pan American Health Organization and the Inter- American Development Bank directed two projects that focused on Latin America and the Caribbean. Pan American Health organization held the project of impact of health on long-term economic growth whilst Inter-American Development Bank directed the project of impact of health on household productivity. Currently Pan American Health Organization is carrying out Phase II of Health and Economic Growth project. The idea of the study was to understand the relationship between the persistence of poverty and inequalities and accumulation of capital, and variations in socio-economic growth and development. These initiatives, although generating a vast amount of quality research, have also served to fill conceptual ideas to the existing literature on health capital (Amada et al., 2001).

Existence of health issues relate many aspects of the economy, if not covered at a certain level can cause damages to the economic empowerment of the country. A country losing its health capital can create long as well as short term gaps in the gross domestic production in the country. The most significant characteristics for defining health capital are built on three interrelated developments to create an evolving and dynamic field. As put forth (Gary S. Becker, 2007) in the literature, first comes the analysis of optimal investments in health by individuals, drug companies and in a lesser amount by governments. Secondly, to investigate the value of life which concludes that the willingness of people spending on health improvements at different stages in their life. Lastly, to analyse the importance of complementarities that are linked to health capital i-e; human capital investment, health to education, health to labor supply etc.

The fundamental role of information and communications technology has given knowledge and skills that has consequently develop the social and economic conditions of nations. Human capital has increased the globalisation of these economic activities and also the trends and norms of learning more about the socio-economic factors that stimulates economic growth in terms of human capital. Although as we discussed education for the past few decades has been the most prominent input in economic output of nations, studies suggested education being an important indicator in defining the human capital. However economists and other social activists recognised health being an equitable resource of individuals which directly affects the economic

growth. Education and health plays an interdependent role, this phenomenon is logical and many theoretical and empirical studies have proved it to be valid (Cutler and Muney, 2006). It is more reasonable to say that investing in health creates long-run returns in terms of more educated healthy individual and counter is true which is highly educated persons are more skewed towards investing in health for personal well-being and also for greater social cohesion. Both of them are important for economic growth, good health and labor market earnings of a nation.

In this chapter, we will centre the discussion on the importance of developed health capital, the analysis of possible rationale for investments in health capital and the conditions of health capital in South Asian countries. The primary objective is to carry out the causal relationship between the independent variables “Expenditures on health”, “Infant Mortality” and the dependent variables as “GDP per capita growth”.

The paper will demonstrate the emerging theories of health as a basic entity in the human capital developmental. It would comprise and incorporate various contributions to the health sector by these economies from the last few decades, as well as some new innovative ideas that if brought to implication might improve the human capital as a whole regardless of the other capital resources. The paper exhibits some evidences that can be used as proxies for deriving empirical significance to human capital. According to the human rights approach as a health capital being a right of a person to be healthy; it symbolizes this right as an equitable access to clean drinking-water, proper sanitation systems, and health care underlining other determinants of health. Moreover the availability of adequate supply of clean drinking water and nutritional foods, healthy working and environmental conditions, access to information regarding health benefits and others. It is convincing economic argument for a human to have these rights that can enable him/her to achieve the maximum attainable standards of health for them and their families. Health has been considered as an effective indicator in economic development as acknowledged by WHO commission of health department. According to the commission, ill health undermines economic developments and exerts poverty. Investments in health are essential for economic growth and should be a key component of national development strategies (Schirnding et al., 2002). They propose the idea for achieving the goals of health improvements by focusing on health regulations in the least developed and poor nations. In every culture the concept of health is stated in a context that “health is wealth” in a more influential intellect as well. It is the basic

need of individuals as well as families, for whom health bring the ability for personal development and economic wellbeing in the coming future. Based on the previous idea of health being a human capital makes the root structure of job productivity and the capacity to learn better at schools. Moreover, it contributes in improving the intellectual growth physically as well as emotionally. In the paper of ‘developing countries health and education’, Vogl (2012) gave the theoretical basis for health-education relation in the context of human capital. He proposed that aggregate income growth is not the sole outcome of better human capital, besides human capital have dynamic relations with other components, including good health and wellbeing, role of education on adulthood life, effect of investments on life expectancy and lower infant and maternal deaths.

There are enough empirical and theoretical arguments which relate economic growth driven by human capital but for most of the part education has been put forward as a base for human capital and human capital has been defined narrowly in terms of education. Economic growth of an economy is a long-run steady process in which productivity level increases over a time span bringing rising levels of income and national output. National output and income growth is measured by GDP (Gross domestic Product) in real terms. According to neo-classical economic theory the growth of an economy depends on three inputs, stock of labor, stock of capital and productivity, of which productivity depends on other factors like technological processes and innovations. Theory of neo-classical economics considers technology as exogenous factor but recent economic advances has replace the assumption by taking it as endogenous arguing the possible factor which drives the increases in productivity. Thus technological process became an endogenous process driven by human capital investments, understood as educated and skilled labor. Due to globalization and knowledge of health human capital, many countries struggled to change their investment strategies and policies to concede with the diversification in human capital, per capita income of many countries like Japan, United States and other European countries have increased for past one hundred years. Apparently, the reason to this expansion lies in change in scientific and technical knowledge acquired that raises consequently the productivity of labor and other inputs in production. The outstanding economic records of Taiwan, Japan and other Asian economies in recent decades have dramatically illustrated the importance of human capital to growth (Becker, 1994). According to Becker’s theory of human capital, individuals productivity is raised by investments and productivity is increased in both

market and non-market activities. So, investments in human capital education, health and training play an important role as an incentive for them to increase their earnings in future. However, there are some possible opportunity costs of time in investing in other market goods.

In a literary feature of Health, the health systems in a country should provide both community care using various public health related actions and individual care through medical care. Both of these services are complementary. While medical care relates an individual spending on its care when confronted with sickness. On the other hand the perspective of public health are all the services that focuses on preserving, maintaining and promoting challenges concerning health of the population. There is a plentiful evidence to show that public health is more cost effectual than medical care (WHO report on South Asian countries health Challenges). Yet, in nearly all the countries in South Asian Region, health resources allocated are more skewed towards medical care rather than public health interventions. In another way we could say that these countries are more focused on managing the diseases when it occurs instead of providing an effective solution for preserving, maintaining and promoting health. This inequity needs to be in balanced for a developing country to have thriving inclining economic developments (Haté and Gannon, 2010).

1.3 Economic Welfare and Health Care Awareness

Health is a very relative and generalized concept which has been explained in a variety of ways. To some it means a sense of well-being and absence of disease, to others it means freedom from pain and physical diseases. Recently the concept has been widened to include social well-being as well. There are also cultural settings which put health and diseases markedly different from other cultural settings. Although health whether if it is physical, social or mental is defined differently by different society. Unless the condition or abnormality is labeled by people it is not a health problem in their society. There have been evidence of diseases like malaria and hookworm which were considered by societies as normal conditions. However the terms such as social class, income and utilization of health services clear up the relative definition of health. According to Ettner (1996), if there is adequate income for basic needs and necessities, one can take initiative steps to find cures for their health problems. These steps comprises the treatments for physical disabilities, more hygienic ways for exclusion of mental and physical discomforts,

also they could do regular medical examinations for longevity and better health in the future. Contrary to it, if income is not sufficient, health is likely to be describing as the capability of keep working. Moreover treatments and regular examinations are postponed until certain level of income where shelter and food is surely available beside other needs.

The well-being in most of developing countries is affected by these socio-economic problems. In countries like Pakistan, India, Bangladesh, African countries and other low developing countries the hardship for fulfilling the minimum material needs are operated by a single house whilst other members of the family are unemployed or being unable to join the work force. It is awfully true that the wage earner in the family gets medical care which other members are deprived of due to income constraints, even if there are symptoms of illness. Even though there are consequences to this ignorance which can affect future generations, the hardships of poverty seems to push medical care and healthy society downward in the hierarchy of values. The hierarchy of needs comprises a better place to live, household equipment and some luxuries; health is always farther down in their list. It has become apparent that the concerns for problems of health or diseases cannot be eliminated from such factors such as housing, nutrition, social class, economic status, sanitation system, employment and a host of others. It is imminent that these elements are relevant to the health status of our societies. Gradually, seeking answers to these intriguing questions for survival allow an individual to achieve adequate position to cope with disabilities; rule of government can improve the policies implications for development and abnormal growth to handle the health conditions of households.

In the past, evaluation of population's health conditions was quantitative, that is based on measuring negative features of health status; e-g; death rate, inappropriate statistics of past data collected by federal government and state. Such measures of health status were not valuable to evaluate in their time. They were mostly biased and skewed based on the information, however they are still used as fundamental source of information for deriving conclusions. But due to the socio-economic aspects described above it is understandable to say that it no longer provide enough information to determine and establish good health goal for the nation.

1.4 Contribution of Health Sectors for Past Decades

International organizations such as The Global Fund to Fight AIDS, Tuberculosis and Malaria, World Health Organization (WHO), World Bank, Joint United Nations Programme on HIV/AIDS (UNAIDS) and scientific organization such as The Global Health Network are working globally promoting social aspects of healthy life and awareness around the globe. These financial institutions are investing money and time in health sector to save lives around the world. Some of them have innovative partnership which leads and inspires the world in achieving universal access to HIV treatment, prevention, care and support. World Bank is providing a vital source of financing and technical aid to developing countries all around the world to fight poverty and is substantially making investments to improve health. Moreover, WHO is directing and coordinating health authorities of United Nations system that are responsible in providing leadership on global health matters, including shaping the health research agenda. There are many more such Non-Governmental organizations that are working as a global platform for promoting health care and supporting investments to eradicate burden of diseases. WHO SEARO (World Health Organization, South East Asia Regional office) is home to about quarter of the world population which provides leadership and assistance on health matters and proposes evidence- based policies and also monitors health trends and technical support in the region. WHO is promoting health from all perspectives; they define health from peace and shelter to social justice and equality as prerequisites for it.

The WHO in its first four decades have interpreted a broad trend of strategies from specific to general. In the early years, objectives were defined for specific diseases and conventional categories such as child and maternal health services and environmental strategies for better sanitation system for developing countries who have poor drinking water and unhygienic sanitation. WHO-World Bank and UHC are working together; SDGs put UHC at the core in overall health goals which makes UHC progress to target prerequisites for achieving these goals. UHC focuses on the goal that all people and the communities receive health care and support, without to have struggle for financial problems. These three organizations collectively focused on two core objectives; coverage index for essential health resources and financial protection against the cost of medical and health care services.

UN general assembly adopted a new sustainable agenda for development of poor countries including of South East Asian countries such as Nepal, India and Bangladesh. The new Sustainable Development Agenda is named by 'Transforming Our World' by 2030. The so called Sustainable development goals (SDGs) has main goal for significant change by advancing the sustainable development in general and health in specific.

Those MDGs signed by WHO in 2000, had substantial changes in SEAR countries health and also the goals achieve universal health coverage, access to quality health care services, vaccines and medicines for the poor developing countries. The sustainable development goals achievements proposes overall health development strategies 'Ensure healthy lives and promote well-being for all at all ages' (WHO, 2016). Life expectancy and healthy life expectancy are the reasonable indicators used for target goals, because they are not only essential for SDGs but also in other health associated progresses. These indicators reflect multi-sectoral nature of health. There has been a positive trend in life expectancy in South-East Asia increased to 68.9 years. Since 2000 an average gain of 3.5 years per decade is recorded for life expectancy. Moreover, Global life expectancy in 2015 was recorded about 71.4 years. About 12 years difference in life expectancy across South-East Asia countries were estimated in 2015 i-e; from 66 to 78 years, which remain different across member countries however life expectancy for each country is not reported. WHO defines Healthy life expectancy being the years of life lived in full health. In SEAR, healthy life expectancy on average is 8% shorter than the normal or standard life expectancy, but it varies in range across these countries from 4% to almost 15% (WHO, 2016).

1.5 Economic Impact of 'Cost of Illness' COI

In economic analysis COI (cost of illness) is linked to economic impact, cost of illness analysis measures the burden of illness and diseases. The indicators for measuring COI are listed as adult mortality and morbidity, infant mortality, under-5 mortality, Disability-Adjusted Life Year (DALY), YLL (years of life lost), quality of life, life expectancy, healthy-days equivalent and other activities of daily life, these indicators are all measure of disease and illness which are accounted for the measurement of health-economic impact. In the report of cost of illness 'Centers for Disease Control and Prevention' Lane and Soyemi, observed two measures for analysis of cost of illness or disease burden, prevalence based and incidence based analysis:

“Prevalence-based cost-of-illness analysis includes the total costs of an illness or disease within a specified time period, typically 1 year, regardless of when the disease first occurred. But prevalence-based estimates don’t tell us how much can be saved by prevention. They only look at the annual costs of a disease, rather than costs of a disease over the course of a life. In contrast, incidence-based cost-of-illness analysis calculates the value of lifetime costs for new cases of the disease or illness”. (p. 8)

Cost of illness can be subcategorized into medical, non-medical and cost of productivity. Usually cost of medical resources is comparatively high and much easier to evaluate as non-medical and cost of productivity. The value of medical care resources, non-medical resources used in the procedure for treatments and diseases that consequently affect the productivity of society due to illness are all included in costs of illness. The medical resources and costs involves visits to medical care center, emergency departments visits, pharmacy costs for medicines, medical equipment that are used for screening and other health services provided by public or private health department. Non-medical costs include travelling expenses related to the medical treatments, therapy education and cost of cognitive or mental sickness etc. Moreover, we usually consider human capital approach for loss of productivity (labor force productivity), which measures a person potential of production based on the average wages. The standard evaluation method of productivity losses is typically by human capital approach, but it varies country to country. For instance, friction cost method which calculates productivity based on what an employer would have to pay to replace you as an employee, it is an indirect cost measure that related the economic impact of loss in productivity to economic circumstance. Productivity losses in general include days lost from work or other illness associated activities for receiving medical care. In the report of cost of illness ‘Centers for Disease Control and Prevention’ observed two measures for analysis of cost of illness or disease burden, prevalence based and incidence based analysis. (Lane & Soyemi)

Incidence based analysis seems better method for analyzing the cost and benefit ‘what could we save’ through prevention strategies but these methods consequently requires more sophisticated techniques and complex assumptions compare to other methods. From the perspective of health care and support, cost gathered from all medical expenditure might be enough but at the same panel we can have different perspectives varies from individual, employee and society as a

whole. For instance, in individual perspective you can include household productivity loss, leisure and quality of life affected from illness. As an employee, you count the days missed from work as well as days of work present carrying a disease or being sick at work. In societal perspective, all these costs (individual and employee based) are included. However, there are methods for calculating annual direct costs which includes health expenditures, costs of illness, diagnosis and treatment expenditures. Also indirect costs, include costs incurred in earnings or productivity losses due to ill-healthy, disabilities and death.

1.6 Water, Sanitation and Hygiene

Clean water supply and sanitation system has impacts in many areas of life, from health to social status and to time savings. Diseases that are usually linked to water-washed are prevalent in those areas which has scarce supplies of water, people find inadequate amount of water for their daily use including washing their hands, bodies and other environment related cleanliness. Most of the diseases such as diarrhea, skin and eye infections which spread more easily are the reason of insufficient availability of clean water. These transmitted diseases occur by consuming contaminated water and affects oral route causing diarrhea and stomach problems.

Health of a population involves not only medical services and health facilities but also the degree of scientific knowledge and socio-economic factors that can be applied in certain situations accordingly. The knowledge about urban and rural populations' health status, local water and sanitation and hygiene conditions are also necessary. Mortality and morbidity are no longer higher in cities compare to rural areas due to better sanitation and clean water, but this is the case for developed countries where individuals and responsible authorities are more careful about the hygiene. In developing countries of Latin America, Africa and Asia health related issues are more projecting in large cities as compare to rural areas and small towns. These Projections are not always reflected in decline in levels of mortality and morbidity (Johnson, 1964, p. 294). There is deficiency in availability of proper water, sanitation and hygiene as named by international community WASH, and other economic and social factors with a comprehensive study of health status differences in rural and urban populations which corresponds to this issue. Regrettably, countries that need all these improvements in health and related conditions are making very little changes in their policies and their progress towards attaining good health.

GBD (Global burden of disease) assess these factors and the assessment helps them to focus on ten major risk factors in each region of developing world. These factors were attributed to infant mortality and adult mortality in individuals, among which malnutrition, poor sanitation and water supply, domestic and personal hygiene and air pollution were included. According to the study, if these given risk factors were eliminated from the population an essential estimate of burden of disease could be averted from these low developed countries. Disease burden is measured by DALYs (Disability-Adjusted Life years), that measures the number of years lost due to ill health, disability and early death. In general, to investigate DALYs it is necessary to create relative risk levels for each of these causes and disabilities linked to the risk factor, distributing levels of exposure accordingly in the population by regions.

In the rural parts of developing countries it is most often difficult to have access to latrine or clean place to defecate, access to sufficient clean water, excreta free surroundings, and also in such environment it is hard to have proper hygienic lifestyle. For poor nations, these issues require suitable care and government involvements to overcome these population hazards to promote healthy society. The developmental term uses WASH for water, sanitation and hygiene which are brought together for the health development by many international organizations. The three categories are interrelated, for instance water resources might be at risk if there is improper sanitation system, microbiological contamination is the possible cause for diarrhea and other water-washed diseases. Moreover, insufficient availability and clean water can result in poor sanitation systems, for example: water for flushing after defecation, cleaning and washing hands before meals and other daily uses can neglect the health benefits of improved hygiene, transport human waste diseases into the individuals bodies. In the study “Menstrual hygiene in South Asia” Mahon and Fernandes (2010), suggested that the WASH sector has a varied range of methods for health care, including (but not limited to) water supply, school water and community sanitation, water treatment, household and sanitation, solid waste management, hygiene promotion, and sewerage. (p. 99)

1.7 Issues and Challenges in South Asian Countries

In recent years a number of different studies have been linked to find the cost of illness and various approaches were used for policy making in order to control the diseases in urban as well

as rural areas of developing countries. International communities and health sector organizations are trying to eradicate the problem of un-safe water, improper sanitation and poor hygienic methods through certain programmes. The WHO is working on health and health education for the past few decades in South-East Asian countries, assembling meetings, workshops and training with the local communities in these regions. The MDGs and SDGs goals clearly indicate the struggles and goals for Polio eradications, controlling Malaria and providing health tips and Anti-malarial drugs to cure it, Health promotion, workshops on tobacco control, international health regulations for water, sanitation and hygiene, control on quality vaccines, and training on HIV/Aids care. According to Tabibzadeh et al. (1988), mostly towns and cities have more educated personnel and better communications system as compare to rural areas. However, evidence is contrary to the proposed concept; there has been wide-ranging shortage in the availability of primary health care services in urban developing countries. Mostly the only source of health care services available to these poor urban and rural individuals is from outside source, international Non-governmental organizations arrange the medical as well as nutritional facilities to them. These communities often have had adverse experiences with government public health departments and there are difficulties in collaboration between community and government agencies. Though underlying relationships are not equally established as a consequence poor health has positive association with malnutrition, poverty, inadequate sanitation, poor housing, pollution, economic and psychological stresses, as well as with inadequate health services.

It is certainly true that urbanization has increased the access to daily life needs, but it has far more affected individual healthy life. Urban population growth has increased to double from 1950-1985 in industrialized countries creating urban revolution however at the same spectrum poor policies and few funded projects available for health sector inhibits negative health outcomes.

There have been large increases in economic output and human capital in OECD countries, it is witnessed that OECD countries have improving standards of living and working conditions for labor markets, as well as educational and health attainment. They have focused health capital being one of the essential requirements of capital resources for socio-economic growth. According to OECD report on “The well-being of nations, 2001”, levels of poverty and health deprivations have declined in OECD countries since 1950s. Followed in OECD policies, that economic growth has not been the only policy objective but also to exclude poverty, exclusion of

poor health levels and improve standards of living. They had targeted more the quality of economic growth and sustainable levels of well-being, which has positive impacts on human and social environments as well as natural and physical ones. (OECD, 2001)

Each country assigns resources to different sectors of economy which can be the indicator of both their priorities and needs. Thus, the amount of resources they assign to health sector as percent of GDP can function as a tool to indicate the relative size of that sector and its importance to the economy. This amount of resources differ for different countries depending on their GDP and human resource sectors, also it involves the priorities of government decision and understanding of investments in different sectors.

Many of the urban poor in south Asian countries are living below the poverty level; citizens in slums are more exposed to health challenges and environmental hazards. For example, those living in unhygienic and overcrowded resident conditions are more exposed to high risks of communicable and transferable diseases. For instance air pollution, improper sanitation systems in houses, un-hygienic food and water, insufficient facilities for habitual physical activities present severe and chronic disease risk. Availability of unsafe housing conditions and access to inadequate healthcare facilities let the urban poor vulnerable to care for injury and ill health. Besides that, constant use of drugs, tobacco use, alcohol addiction and other substance abuse are common to happen in the poor urban environment. More than half of the workers and industrial labors in this region are possibly engage in susceptible employment conditions causing chemical, physical and other biological risks. (WHO Report, 2015)

Considerable improvements in the levels of health in those poor areas of Asian countries will have a substantial impact on the social wellbeing of the population and would also show some significant result for the economic growth in long term. It can also be linked to reduction in poverty level based on the investments and resources allocation. Similarly, WHO report on Epidemiological and demographical characteristics illustrates Asian countries health conditions, demonstrating their Human development index which is of rising importance for low and medium-income level countries. Illnesses whose appearance became frequent has led the advances in the health care to control these epidemic diseases, as shown by the reduction in infant mortality and increased life expectancy in Bangladesh and India (Alam et al., 2013). The main function regarding the investments of these public funds for health brings up the issue of

allocation of these resources efficiently in the health sector, considering the intrinsic and instrumental values of health. These concepts reflect the notion of Health as an asset defined by economists as “human capital”. Here we can analyze the investments in health sector by these Asian countries, the amount and allocations as well to conclude the impact of potential investments in health improvements on the economic developments. According to the Millennium development goals World Bank report (2001), monetary costs of preventable diseases, when considered are high and these diseases reduce the annual incomes of individuals affecting their families and also when taken in long term values it do affect negatively the lifetime incomes of individuals of the population. That causes negative prospects in economic growth. The losses might be high percentage (in dozens) of GNP for the poorest countries every year, which when translates into monetary terms costs hundreds of billions of US dollars.

1.8 Health Capital and Demographics; Bangladesh India and Pakistan

1.8.1 Bangladesh

According to demographics, Bangladesh is one of highest populated country in the world (third in South Asia). Human capital and Human Development indices are low, although there have been some improvements for the past decade but the levels of health and education are relatively lower. A large number of populations in rural areas live by farming and agricultural output as there source for income. Besides some gains in economic growth indicators, the country still faces social and financial challenges, including overpopulation, corruption, poverty, inadequate health and education facilities. According to the World Economic Forum reports; Bangladesh has made significant progress in HDI (Human Development Index) and has gain noticeable gains in several important indicators compare to its neighbouring countries Pakistan and India. Health care system of Bangladesh is divided in to four key actors which define the structure and function of this system; Government or public, NGO’s (non-governmental organizations, private sector and other donor agencies. The government sector has important role which by constitution make it responsible for policy and regulations as well as provision of comprehensive health services. Being a nation of high poverty rate, lower quality of public health services and their

inability to provide health services to entire population a large and vibrant NGO has emerged as “provider of health facilities” in the region. The role of these non-governmental organization has significantly increased for the past years due to funding from different channels.

According to “Bangladesh Health System Review”, in 2007 about 9% of total expenditure on health was delivered by NGO’s which has shown increases from 6% in 1997. Consequently, the external and internal investments has resulted partnership of both sectors, which has subsequently improved the overall health gains, financing, service delivery, planning, monitoring (Ahmed et al., 2015). The statistics in the report provides the recent updates about the amount of investment Bangladesh spent on health, about US\$ 2.3 billion or US\$ 16.20/ person, which contains 64% external investment. On the other hand, according to WHO estimates, the country spends US\$ 26.60/person per year. However, public expenditure on health should cover all costs and entire population of the country which is not fulfilled properly. Every year many people are left untreated or they die due to insufficient financing for treatments.

Bangladesh has better PHC (Primary health care) infrastructure of public sector however people do not get adequate facilities and other resources such as medicines, instruments and supplies for surgeries. During 2007 to 2013, the number of hospitals and total number of beds in the public hospitals has gradually increased. In conclusion, there is one bed allocated to every 1699 population, which is still insufficient. Meanwhile, to initiate health assistance for primary health care at the doorstep of the community, there are now clinics for every 6000 population. Even though there are these issues regarding health care but still Bangladesh has shown some major improvements for the past few years, including decreases in maternal, under-five and infant mortality rates and has imminent decline in total fertility rate. Bangladesh is on track with MDGs to reach 2015 and onward targeted declines in these mortality rates. However, prevention of some communicable and non-communicable diseases like malaria, diarrheal sickness, TB and HIV-Aids are still going to improve with time. Overall the quality of health care and support in public and private sector are still poor, low levels of professional knowledge application are still poor. Bangladesh, therefore, still requires time and facilities to walk a long way to reach universal requirements of health coverage.

1.8.2 India

Since independence in 1947, life expectancy of male and female at birth collectively has increased to 65 years. Compare to china and other Asian countries, India has experienced many demographic and epidemiological transitions. Although there have been evidences of gradual decline in infant mortality in recent decades but still the mortality rate is about 37 per 1000, maternal mortality is 174 per 100,000 live births (WHO, 2015). Adult mortality rate in India remains about 217 male and 145 female per 1000 people (World Bank statistics, 2014). Moreover the rate of Life expectancy at birth remains around 68 years compared with 70 years noticed in other countries such as US, Japan and China (UNDP, 2015)

According to the report on “Health and Health care” in India, about 40% of all deaths are still caused by infectious diseases. However, the rest of the 60% includes non-communicable diseases such as cardiovascular diseases, chronic respiratory problems, diarrheal sickness, skin diseases, lungs cancer, TB and cancers. Currently, the burden of diseases estimated for infectious diseases have impact on Indian society equivalent to a potential loss of welfare, in terms is about 12.5 percent of GDP and cost of about 12.5 percent of GDP for non-communicable diseases (Gill and David, 2013). Moreover, the risks and causes of non-communicable Diseases will gradually rise in relative significance in future, specifically if tobacco consumption does not fall significantly, and other uses such as substance use and medicine to reduce disorders such as hypertension, emotional distress and anxieties. About 1.4 percent of its GDP is spent on publicly funded health care. This is considerably lower than most of other comparable countries. Public health expenditure is estimated over 1.4 percent of GDP, the spending has shown gradual increase in the past two decades from 1.1-1.4 percent of GDP. Still about 400-600 million poorest Indians lack provisions of essential medicines. Percent

Evidence exists in “Report on National Commission on Macroeconomics and Health” that when sick, poorer groups are less likely to seek care than rich groups, and nearly one-quarter of the poorest 20% in India’s rural areas forgo treatment when reporting sick and when sick needing hospitalization go to the public hospitals. Perhaps the most important characteristic of ill health is that its impacts are likely to persist across generations. Not only is the next generation at risk from effects such as poor nutrition, inadequate housing, or insufficient hygiene and sanitation,

but even after birth, children become more susceptible to many diseases and ailments than their parents were (Government of India, 2005).

1.8.3 Pakistan

Pakistan is also being one of the countries with epidemiological transitions, about 40 percent of BOD (total burden of diseases) account for communicable and infectious diseases. About 6.75 percent (5.27 percent of total deaths) of DALYs (Disability adjusted life years) is related to diarrheal, lower respiratory and other common infectious diseases. Moreover, 2.33 percent of deaths are caused by chronic respiratory diseases. Other diseases include acute respiratory infections, malaria, hepatitis B&C, tuberculosis and infant immunization diseases. Compare to Bangladesh and India, Pakistan has shown significant decrease in maternal mortality rate, from 1990-2015 the ratio of maternal mortality has declined from 431 to 178 per 100,000 births.

Non-communicable diseases (NCD), caused by environmental pollution, behavioural traits and other unhealthy hygiene, dietary habits, smoking etc. put risks for cardio vascular diseases, diabetes and different kinds of cancers which accounts for almost 10 percent of Burden of diseases in Pakistan. Moreover, infant mortality has some major improvements for the past 15 years, which was around 106.1 in 1990 and is now reduced to 65.8 in 2015 per 1000 live births (United Nations Development Programme).

1.9 Demographics and Statistical Facts

The population of South Asian countries is very high as compare to European and Scandinavian countries and the rest of Asia except china. Bangladesh, India and Pakistan are more populated which resulted for the region to face many socio-economic difficulties. Human capital performances in these countries are considerably poor and many other issues arises by neglecting it. We have in the chart below the country profile and Human capital index of 2016 for the three countries. Human capital index ranks countries based on how well they are in developing and how effectively they are utilizing their human capital resources, mostly it investigates infant mortality, percentage of immunized population, health expenditure, educational and vocational skills and employment etc. The goal for ranking is to analyze the country human capital

performance whether they are wasting or leveraging their human capital potential (World Economic Forum).

In Table B.1, we can see the ranking of these three nations, which are very low in human capital index, Bangladesh at high (104/130) and Pakistan (118/130) at low in the three countries HCI chart. India being the most populous country has high index of GDP per capita and public spending on education compare to Bangladesh and Pakistan. Labour force participation is higher in Bangladesh (62.2%) compare to India (53.8) and Pakistan (54.1). Overall we have comparatively better human capital indicators of Bangladesh and India in the region with high human capital index and high HCI scores, Public spending on education (India), labor force participation (Bangladesh). These indicators shows the need of each country where they have to expand their preferences on spending and to focus more on health and education because these indicators are the basic entries in economic growth and development. Each of developing countries in deciding health resources allocations keep the description of diseases, injuries and those risk factors which are the possible causes of morbidity and mortality. However the data and descriptions on the health of populations and the related risks are not always consistent and often fragmented. Many international organizations such as UNSD (United Nations Statistics Division), UNDP (United Nations Development Programme), UNDATA (United Nations Data) and WHO are working across the globe collecting, disseminating, and organizing consistent and unbiased data on the basis of which many academic and non-academic researches take place. Health and welfare of the society are facilitated by actions of these organizations. Public health sectors use these global and regional data for important health related decisions and for evaluation of population health risk factors. Moreover certain reports are annually published to educate the local as well as governance communities about the policy implications they need to address to health sector, cost effective strategies which involves mostly safety precautions, health care and support contrary to treatment afterwards. It is particularly more important to educate people about health, proper hygiene and other daily life measures before exposure to health risk factors. In long-run it is more effective and cost-saving phenomenon.

We will proceed further in the analysis by explaining fact sheets and figures in to this chapter. We will investigate demographics of Bangladesh, India and Pakistan in the following part. We

will make relative figures from data for the countries and cross comparatively analysis by graphs.

First, human development index of these countries are taken in to consideration. HDI (Human Development index) is summary measure of average achievements as key aspect of human development, comprises healthy and long life, decent standard of life and being acknowledged of the health perspectives. Furthermore, HDI is geometric normalised mean of indices for each of these dimensions.

It is evident from Table B.1, where India has high HDI ranking and score compare to Pakistan and Bangladesh. However, Bangladesh has better life expectancy, low MPI (Multidimensional poverty Index) and has also good GDI (Gender Development index). Pakistan remain being the lowest scorer in these three countries with low HDI, low expected years of life, low number of years expected for schooling and also inequality adjusted is low from both of these other countries.

It is noticeable from Table B.3, that there have been improvements from 1990-2015 in the average annual HDI as well as ranking of these countries from 2010-2015, India has come up with 4 rakings change and Bangladesh with improve HDI compare to India and Pakistan. In statistics of HDI (Human Development Index) from period 1980 to 2014 (UNDP, 2016), it is evident that India has increasing trend of HDI the whole period, while Bangladesh Until 1995 has lower HDI than Pakistan which tends to increase gradually after 1996 till 2014 and is moving parallel along India's Human development index.

1.10 Key Indicators of Human Capital

1.10.1 Health

Some of the important variables of Human capital that leads an economy towards growth and development are high rate of Literacy rate, high rate of Life Expectancy, lower infant mortality and maternal deaths (Healthy Individuals), high value of GDP per capita, Employment to population ratio and safely work conditions at work. All of these are important indicators for deriving the human capital score and human development index. As in this study we will discuss

the importance of these components of the economy for Bangladesh, India and Pakistan, and would also focus on the issues and problems which are still unresolved.

There is correlation between economic growth and health indicators, is it obvious to say that investing more in health might affect the returns, and led to high economic growth? Scholarly view proposes that if a country allocates more budget to health expenditures from its GDP, there will be lower rates of mortality and lower risks of chronic diseases, people will allocate more to health and would be more biased towards investing in health. Economist and other academics suggested many channels for defining the causal relation between economic growth and infant rate, which is not only limited to individuals but also affect growth through other externalities. Highly develop economies uses investments and innovative technologies that promote new ways of educating society, which in returns affect economic growth and development increasing income of individuals.

1.10.2 Education

Pakistan has lower literacy rate compare to India (highest) and Bangladesh relatively. There are many issues regarding the lower literacy rate in Pakistan which includes social, religious, financial constraints and government policies constraints. Most parts of the country doesn't have access to schools due to lack of transport facilities and some of the areas doesn't prefer to spend on education as their means of income depends on agricultural or other form of income generation which isn't sufficient for them to spent on their children's education. Moreover the same reasons exists in India and Bangladesh, the literacy rate of female age 15 and over are lower compare to male. There are many other aspects to this rate, which comprises population, high number of family members, societal reason for uneducated females and lastly a nation's education expenditure.

Table B.1, B.2, B.3, B.4, B.5 and 06 will present some basic education statistics of these countries, government expenditure on education(percent of GDP), Gross enrolment ratio, primary school both sexes (percentage) and expected years of schooling respectively, Infant along with Under- five mortality rate.

India and Pakistan have higher education expenditures though India having highest among the given three countries. It is obvious from the literacy rate as well; India has significantly high literacy rate and expenditures on education, and are similarly expenditures on primary education of male and female. Pakistan and Bangladesh have lower percent of GDP expenditures for education shown in Table B.1, but there have been few increments in the spending for the last decade.

According to 2015 statistics in Table B.2, Bangladesh has high percentage of primary school enrollment (both sexes), as compare to India (second highest) and Pakistan (lowest among the three). The gross enrollment ratio both sexes represent the public spending on education of children, in the long run it shows the decline in inequality in education outcomes in these developing countries. However, with a given income level and determined demographic structures of these nations, the decreases in education inequality then depends on the way at which the public spending are distributed across the education sector.

In Table B.2, we have the expected years of schooling enrolment rates which persist throughout the child's life. All of the three countries have increased no of years through these years, while India and Bangladesh has significant and persistent increase throughout these years. It indicates the better allocation of educational resources as well as high ratios of governments' expenditures for education attainment shown in Figure 04.

Chapter 2. Literature Review

This chapter introduces theoretical and empirical framework that should provide structure guide to the subsequent evidences and results. As mentioned in the first chapter, it has been suggested in many texts that human capital is an important factor for economic growth on individual as well as aggregate level. The reasons and issues behind developed and underdeveloped human capital is described in the introduction. However, the idea of human capital and its correlation with economic outcomes has been narrowed down to certain factors which are essential. For instance education is regarded alleged key component in human health capital outcome. Health as an additional but very important component of human capital which was not so much focused in the past, which play an effective role, and has been recognized important driver in economic growth.

In the 'Health as a Human Capital', H. Gardner and Delworth Gardner (2001), explains the paradigm of human capital. In their work they suggested that health human capital provides a suitable conceptual model for organizing health benefits because people are unexceptional. They regarded human beings as a stock of capital, which provides a flow of services that is utilized with time. This capital can be used in work and employment activities to generate income and rewards or in other way it could be utilize for leisure and quality of life (p. 1). As with physical capital, labor work or employment there is need for quantity and quality of human-capital stocks, which could be increased through investments. Those investments could either be used for training and education or for prevention of diseases and treatments of illness. In the book 'The economics of social insurance and employee benefits', Butler (1999) explains the costs of losing health due to different injuries or illness at work, he proposed that different health conditions might affect the firm specific and general human capital that depends on how it is being analyze by individual, firm or society. In all of these three cases, the key question to it is that which opportunities could be lost by the respective groups and this is how economists' defined opportunity costs (p. 4).

Tomer (2016) proposed three important internal factors of individual's human capita; social capital, personal capital and health capital. These factors are individual's endowments for human capital development. Certain approaches linked the importance of these human capitals to human

capital development and economic welfare. In the development approach, investment interventions increase individuals' performance to a level where it can help in growth progress from one stage of development to the next stage. According to him, the reason of the development progress is not merely due to addition of an input such as knowledge but the development occurs along these three capital approach through non-educational pathways. Although education is well known approach but healthy progress along with other indicators of health facilitates intervenes a person's development and prevent events that might leads to illness and retarded human development. Consequently, if an individual development along one pathway is promising, it will enable developments along other development pathways as well. To empower human developments, it is important to acknowledge that human development depends on the social life and healthy prospects. In developing countries the role of human capital is insufficient due to poverty, low literacy rate, inability for better provisions of quality life and rule of governments which lacks administrative strategies to provide health care and support in poor areas of the country. Other factors are also responsible for the low stream of development which includes corruption, high population growth and lack of technological phases of developments.

Schultz (1961), emphasized that although it is clear that people learn useful skills and knowledge but it isn't obvious to consider these skills and knowledge a form of capital, in the sense to take it as a deliberate investment. In western societies this concept of capital investment is growing much faster than conventional capital and is considered a distinctive feature in developmental economics. It has been extensively perceived that the increase in national output is the result of increases in land, work-hours and other physical generated capital. The author suggested the idea that what we consider consumption constitutes investment in human capital. These consumptions are expenditure on education, health and medical care, the earnings by students who attended schools, or earning by trained workers are clear examples. Mostly, the leisure time spent to improve knowledge and skills is unrecorded in national accounts however the quality of individual's effort can be greatly enhanced and moreover the real earnings per worker will increase. Income and health has an important relation and somehow they are correlated empirically. Richer and high educated people live longer as compare to poor and less educated people (Angus Deaton, 2009). In his report on 'Health, income and inequality' he focused on the calculations from National longitudinal Mortality to survey of mortality rate, which suggested

that families whose income was greater than \$50,000 had a life expectancy (all ages) longer compare to families with income level less than \$5,000. It is obvious that any positive indicator in socioeconomic status has inverse relation with mortality and morbidity.

To some scope, income and wealth supports directly better health. As discussed in the previous paragraph, a wealthy person can afford to pay for health resources and improve its health while low income people tends to allocate their wealth for future needs, the reason to it is the paid job that does not allow an individual to spend on their health insurance and well-being programs. These low income people cannot afford medical care and are not able to have a healthy lifestyle due to lack of access to care and affordability. It is more often that poor patients are less likely to get recommended health care such as cancer tests or immunizations. Other factors includes nutritional care which is certainly less preferred and observed in a low income society, affluent people afford to care about nutritious meals while for the poor it is rarely a convenient option. As a result they are more expose to food insecurity (Woolf et. al, 2015). Many economists have associated correlation of mortality and morbidity with education level; they attributed high level of education with better health information and are described the population who utilizes health care system. The contrary is opposite, unhealthy life and low interest for health care. They also argued that there exists negative correlation between socioeconomic status and behavior that are risky; smoking, improper hygiene, un-safe water and lack of exercise. All these factors have impacts on social life, mechanism like health to earnings, labor productivity, education and health. Suhrcke, Rocco and Mckee (2007), analyzed socio-economic factors which have impacts on quality of life. They proposed that good health is the result of favourable economic status for individuals as well as for country. In their report they observed that poor people and poor nations lack the adequate resources to improve their health life, or they don't have enough money to buy quality food. It is more likely that poor people are malnourished and immune-deficient and consequently are more exposed to infectious diseases and remain unhealthy. The poor communities live in overcrowded places with improper hygiene and sanitation systems; they are suffered from different kinds of communicable diseases such as diarrhea, respiratory problems and digestion problems. In developing countries, mostly the rural areas don't usually have health care facilities, people live far from pharmacy, doctor's clinics and dispensaries which make it difficult for the residents to seek help. They are more likely to remain untreated and suffer of ill-health due to these reasons. Suhrcke et al., (2007) concluded that poor people are less educated,

and education is an important contributing factor of health for reducing health risk, adoption of new health technologies and improving intense social support. As a consequence these issues affect the economic status of the people and they are living under worse health situations. In the empirical results for labor productivity and health status of individual (Suhrccke et al., 2007) observed that individuals compensate the illness of family by increasing their own work hours. The loss on health expenditure of family members is mitigated by the individual increases in labor supply. Ill-health does reduce labor productivity to a substantial level, however individual attempts to increase their labor work hours which affect the significance of expected productivity and self-report for illness by individuals. Consequently, ill health of individual will reduces wages significantly, according to their estimates, average hourly wage of healthy labor is 16 percent higher than labor with poor health (p.110).

This chapter highlights the role of healthy society in economic growth. In particular, it focuses on the possible linkages between ill-health and economic outcomes in South-Asian countries (Bangladesh, India and Pakistan). The idea of negatively effects of ill health on the economy and the contrary concept of contribution of high economic status impacts on health. The analysis demonstrates the impacts of unfavourable health conditions resulted from weak governance policies, which plays an imminent role in economic cost and achievements of healthy life of people of these countries. Suhrccke et al., (2007), argued that health conditions can be improved by appropriate health related policies, which contributes to expected sustainable economic growth, and the reverse link of high economic growth and developments that translates improved health status or development. Health and economic growth in traditional view is considered as a by-product for economic development, the relationship runs both directions and it is bi-directional relation. So, in order to achieve one goal it is essential to improve the other simultaneously. If governments need to increase the standards of social life and economic life of its people, it must invest in both health and economic sectors instead of just one sector. Health is an important indicator for such economic development, improvements in health is considered as improvements in economic growth. According to (Bloom and canning, 2008), there is a link between health and GDP per capita which is essential in policy making. Health have a positive relation with GDP per capita and they suggested health to be significant for developing countries (p. 9). The extent to invest in health is considered important priority in poor developing countries. In some studies health is observed as a direct source of human welfare as well as for

raising income levels and economic development. Health can affect income positively and increases the productivity of labor, improve children's education and other demographic structure. Moreover, ill-health on the other hand could affect inversely the prospects of life expectancy, increase infant mortality and life cycle behaviour. Improper nutrition and ill health can affect maternal health and physical and cognitive developments of an adult. Though macroeconomic evidence of growth is mixed, some studies have evidences of large effect on growth, but empirically, population with better levels of health reflects high levels of national income and developments (Bloom and Canning, 2003). It is expected that high income promotes better health, with improved nutrition, and access to proper sanitation and clean water. Furthermore, high level of income enables individual's ability to spend more on health care. The non-governmental organizations promote low cost interventions for health which make the impacts on population health more promising and help the economic growth of developing countries. The developing countries in our study have low priorities for tackling down "neglected diseases", these disease have comparatively lower mortality rates but have significant effects on levels of productivity. In Bangladesh, India and Pakistan infant mortality rates are very high compare to other Asian countries which depends on their demographics and government policies in allocation of health expenditure for health care. In the case of health, willingness to pay or willingness to accept is the amount of money an individual pays to get improvement for health care. Role of health human capital (low infant mortality rate and better living hygiene) is a significant indicator for generating economic well-being. Nevertheless, any influence of health on human welfare can be included in direct welfare benefits of longevity and better health of U-5 children and maternal health. Similarly, (Strittmatter and Sunde, 2011) analysed causal effect of infant mortality growth on economic growth, for reverse causality effect they used two different instrumental variables to avoid the problem. Instrumental variable 'Universal public health care' in terms of health insurance and public subsidies for health. The empirical results of the study for 12 European countries estimation results show that introduction of public health systems (data 1820-2010), has significantly reduced mortality rate of infants and crude death rates which are the variables proxies for overall health improvements. Furthermore, the estimates show that improvements in health conditions have positive effect on economic growth and population growth. Moreover, in their data on adult mortality taken from WHO, UN and world bank for

cross country investigation qualify that increase in rate of infant mortality negatively affects GDP per capita growth.

Besides maternal mortality and income variable, studies have found that there have been gender inequalities in provisions of health care for women and men, it has causal relation with health and consequently on health life of women. In the study on 'Gender and Social Inequities in Health' Wamala and Lynch (2002), explains the hierarchical ordering of society in labor market, they suggested that labor market opportunities and participations is an important issue of gender inequality with men and women having different kinds of jobs disproportionately. The work participation by men and women do play an essential role in determining their social position, which in turns is related to income, empowerment and status. All of these related factors creates gender inequality and affect significantly the life style and living standards, and they can have a positive role in influencing health conditions. In lower developing countries women faces disadvantage in hiring standards, less preferred for training, less qualified for decision makings and are paid less comparatively. As a result, these reasons make the competitive behaviour less effective and women are not generally able to compete with men, and negatively affect the social position of women and their chances for good health. It is more common in developing and under developed countries, where women have less privilege in terms of decision making and family responsibilities. In Bangladesh, India and Pakistan there are numerous studies about women rights violation and freedom of choice of women. Women are less empowered and are generally housewives with low literacy rate, lower access to health care. They are dependent individuals of the society, with ill-health, lower empowerment. Consequently, these are the factors which are hurdles for these economies to grow fast such as western societies where women are considered equal partners and play a substantial role in decision makings. In the book 'Gender and Health' by Bird and Rieker (2008), attempted to analyse the decision making and resource allocation choice differences among men and women, where they focused on the issue that approached the prevailing public health inequalities which comprises an individual's personal choices and behaviours in improving or enabling a long and healthy life. They argued these choices made by men and women are to a certain extent inhabited by role of other individuals of the society such as families, employers, and society or government policies. In the long future, these indirect contributions reflected as gender- based health disparities in an individual's choices creates underlying biological and mental differences in health of the people.

The global transformations have witnessed transitions in health bringing improvements in the quality of living, people living longer, healthier and are more productive. New technologies for treatments, vaccines for cure of chronic diseases and medical advancement has made it possible to save more lives than before (WHO, 2014). Despite population size and structure, health care has shown great improvements in developed countries such as Maldives, Bangladesh and Sri Lanka, they are moving towards economic growth. On the other hand, developing countries of South Asia such as, Bhutan, India, Nepal and Pakistan are still struggling to achieve the optimal level of health care, education and control on mortality rate. Between 16th and mid of 19th century life expectancy in the world fluctuated, and average life expectancy were recorded to be under 40 years which didn't showed any upward trend, however the life spans gradually increased in the second half of 19th century and then in 20th century it increased markedly for European, East Asia and Pacific and Central Asia (Bloom, Canning & Jamison, 2004). With more health education, health care awareness, new antibiotics and in-time vaccination the infant mortality and maternal mortality has declined significantly, people of rural and urban areas have better understanding of hygiene in many developing countries. Studies have shown that investment on health have positive effect on longevity and reduction in Under-5 mortality rates. Bloom et al, (2004) underlined that people invest in health for two reasons. First, it would leads to increase in life expectancy and secondly, it allows them to have a better life at any time of their life, it act as a source of utility for them. The investment provides insurance for old age, in many countries the investments on health is considered an essential part of individual, with new information and access to medical care has enabled people to allocate their resources effectively for future prospects.

With rapid increase of urbanizations in recent years in under developed and developing countries have increased risks for chronic and respiratory diseases. The burden of disease has increased in cities; level of living has declined significantly in lower-middle-income economies such as Bangladesh, Bhutan, India, Indonesia and Pakistan. It is considered that, if early and adequate measures are not taken about the recent urbanization issue, the large number of inflow of people into the cities of these countries will considerably overpopulate those municipal facilities and will compromise the sole purpose of maintaining and improving health and social standards (Johnson, 1964). It is understandable for a nation not to rely only on scientific knowledge, medical services and other health facilities, but for the problem such as urbanization there is a

need for changing the conditions of social and economic factors as well and a comprehensive study of transformations in health status between urban and rural populations. Unfortunately, few of the developing countries have made progress for improving their Human Development Index; certain issues in these nations are still unresolved and the ratio of infant mortality, primary education, and maternal deaths still exists. Poverty and corruption plays a significant role in slowing down the developmental phases in these economies. Globally, it is the economic wealth which is an important determinant of the population. The differences in the economic wealth affect the region's mortality rate, countries who managed to overcome the economic downfall in crises were able to manage the increase in mortality rate however those economies who were severely hit by economic crises have suffered the most. Health and economy relationship runs both ways, as discussed previously, they are bidirectional as discussed previously, Low levels of health reflect poor economic situation and improvements in future economic growth and sustainability rely on better health projections (Johnson, 1964). Health of an individual is not only important for the family and social life but is also an important indicator for economic development. In developmental economics, wage function estimates the market returns to education which is different for different economies depending on the per capita income (Strauss and Thomas, 1998). There are wide range of studies on education role on nonmarket outcome, among those effects of health on underage and adults are more prominent. Health is a significant indicator of human capital like education, which might be a significant driver in labor market success. The link of Health and labor market outcomes has received considerably less attention in empirical contexts. However, a substantial improvement has been advocated in the field in recent years to understand the complexity of interrelationships among the two factors of economic developments. As hypothesized by Bloom and Canning (2005), that high income levels encourage individuals to avail goods and services such as better nutrition, sanitation and clean water which is held accounted for better health and longevity. According to their analysis there has been possibility of income and health correlation which runs both ways i-e: from health to income growth and from income growth to health improvements.

Besides the income and health correlations, health has a substantial effect on labor market productivity in developing economies which is of special interest to social economists. There are reasons to this theory, first the traditional theoretical models that are based on nutrition efficiency wages in developmental economics. According to Leibenstein (1978), increases in

food strengths as well as the increases in strength is reflected in increases labor effort capacity. It is imminent from the statement that healthy and proper nutrition plays a vital role in strength of individuals. People with better nutritious diet are able to perform better comparatively to under-nutritional individuals, a healthy body needs a better nutrition for better and desired output. As hypothesized by Leibenstein (1957), a workers who consume higher amount of calories will be much more effective, productive and efficient as compare to productive level of ill-nourished workers, he linked better nutrition to high productivity. From employers' perspective, they are more interested in cost effective working environment; they have incentive to hire efficient workers with above minimum wage and to exclude those with poor health and productivity because it is reasonably cost-benefit scenario. In Bangladesh, India and Pakistan, not only the levels of health are lower but also the incidence of diseases tend to be high compare to other developing countries. Knowledge of the type and extent of the relationship between health and labor productivity is important in policy making. Furthermore, if health expenditures and public health interventions yields positive outcomes in terms of high productivity levels or economic growth then these are effective interventions belongs to policy making for public health. The possibility that productivity of poor labor will increase significantly, the certain solution with developing countries is to enhance the health policies and investments. It suggests for developing countries to revive the poor health conditions, which have affected more the poor workers who cannot afford health care relatively to workers who can afford it. The fact relies in the productivity differences among the two classes.

Despite the social class differences, rural and urban environment counts for differences in behavior of the residents. According to Johnson (1964), the availability of medical care and health facilities to urban dwellers are considered more adequate in every instance compare to health care and facilities provided to rural inhabitants. However, the evidence suggest that there are more poor people living under poverty level in urban areas, worldwide there are more than 100 million people homeless and in India the number of homeless people is considerably very high, about 1.77 million people live without any shelters (Somesh, 2016).

The advantage of living in urban society does not usually reflect the differences in mortality and morbidity rate in urban and rural areas. There are certain other factors that relate the rate of morbidity to urban and rural communities which affect their health. Among those, two of the

causes for poor health in underdeveloped countries are improper sewage systems and contaminated drinking water. These are significant reasons for infectious and intestinal diseases in underdeveloped and urbanized industrialized countries (Johnson, 1964). There is a wide range of studies on health capital (Infant mortality) effect on economic growth, social economist are focusing more on the issue such as under-five mortality rate, maternal health care and infant mortality risks to address the economic growth and developments. There are ways by which health progresses can affect economic growth such as its impacts on labor market participation, productivity of labor, investments in human care, reduction in rates of fertility, increases in savings and declines in population age dependencies ratios. Although worker quality in the form of human capital evidently contributes to economic growth, in most cross countries empirical evidence identifies human capital with education (Bloom, Canning & Sevilla, 2004). This concept ignores the importance of healthy workforce in growth and development of economies. However, in general healthier workers are crucially energetic and robust at both physical and mental work. Illnesses and disabilities decreases the wages per hour subsequently and it is more common issue in developing countries where manual laboring are more comparatively. (Bloom et al., 2004)

2.1 Educational Awareness, Longevity and Economic Growth

With advance studies in developmental economics, economists identified empirical evidence and studies about good health that affects economic output in a country. According to Weil (2005), one of the direct channels to observe between these two indicators is that healthy people are better workers. They argued that the indirect channel through which the outcome increases in response to improve health are primary schooling, health expenditures. As the investment in education human capital increases the long-run progresses in social life, individuals are able to acquire more health care and can save from the income they are earning to utilize it later in their life for themselves as well as for the family. Thus investments in education are accounted for longer working life. Moreover, Weil reiterated the fact that health care results in lower rates of mortality which in return leads to more savings in the life span, thus positively affect the physical capital per worker. In his research Weil (2005), identified that the link between economic outcome and health whether at individual level or national level has usually two ways

of measures; inputs put into health and health output observed in economic growth or development. These inputs are generally physical factors which influence individual's health such as proper nutrition in various stages of life (infant and adulthood nutrition), control on exposure to unhygienic water and sanitation and availability of medical care. He proposed examples of probable improvements including increase in life expectancy, height, cognitive functioning and ability to work hard. In the national income context for productivity outcomes, he explained how health can affect the individuals working ability across different countries if national income increases significantly.

As Strauss and Thomas (1998) in their paper 'Accounting for the effect of health on economic growth' focused on two substantial issues which are important to derive the impacts of health on outcome. First, the direct contemporaneous feedback, which is observed in terms of increase working hours (increase in income and productivity of labor) which resulted from considerable better health results. And in turn, the higher incomes are invested in health augmented inputs, buying more calories, health insurance policy, medical care and filtered or clean water etc. Secondly, measurement of health inputs which are essential to derive the economic output function, it includes the prices of health inputs (expenditures on health care, vaccinations, exercises, safe drinking water, and diet) health infrastructure (Hospitals, bed per person) and disease burdened environment (un-hygienic, poor sanitation systems and inappropriate medical care). Weil used structural function for these microeconomic estimates for the direct effects on individual income growth and health inputs measurements for countries with different incomes. He concluded his paper by presenting his remarks about the relation between health and economic growth. According to his estimated empirical results, health on income has economic significance and was smaller than other estimated indicators from cross country data regressions. He proposed from the results that health is an important determinant of economic output variations that is strongly affected by other microeconomic and other estimates of return to health. Strauss and Thomas (1998), results concludes the fact that health has proximate effect on GDP per worker, which is labor working hard, intelligently and longer in their life span. In his research he approached two channels (direct and indirect health effects), in which he pointed out that indirect channel of health effects such as better health for encouraging physical and human capital have positive impacts on the income, which were approximately same as the growth in income from direct channels. Furthermore, Weil observed one indirect channel that was opposite

in relation to GDP per capita, population growth, an increase in population have negative significance with GDP per capita growth, lowering the GDP per capita income.

2.2 Role of Health Education Awareness

Just like health income relationship, health has also a significant relation with health education. Adult health education has been a significant topic in the education sector; it comprises health education as well as other general training and education programmes which for the past decades have been made essential in the curriculum of education sectors in most developed and developing countries. In the 'fifth international conference on adult education' of UNESCO (1997), education projects offered courses on general health education, healthy lifestyle, specific chronic diseases, communicable and non-communicable diseases and their treatments as well as instructions for nutrition. Improving people's knowledge and literacy about certain health education programmes is a major component of academics. UNESCO in the conference focused on importance of women hygiene, hygiene of families and importance of clean drinking water, family planning and nutrition plans for infants were also part of these programmes. These programmes were offered on micro-credits or micro-financing and skill training of women for generating income and to empower women. Besides learning in formal institutions, other opportunities of local self-help and community workshops or non-formal organization are providing health care education for promoting social well-being (UNESCO, 1997, p.4). Furthermore, there are funded television programs and learning's advertisements and parents taught programmes. However it is known that education is an important determinant for health, it was observed by Schultz (1992), that those poor individuals who suffer the most from ill-health are not only poor but are also the one's with lower education level. It was concluded in the report of UNESCO that literacy rate and non-formal education programmes in both developed and developing countries shows significant improvements in general well-being and health of people's and also their families.

With new technological innovations and enhancement in educational studies such as developmental studies and environmental studies, educational sector has put more emphasis on health education, and the changes in the academic courses reflects the fact that it has high relevance with recent socio-economic issues. The focus of developed nations to promote health

education is one of the reasons to find the relation of health care and its impacts on other indicators of the economy. Macro and micro studies have pursued the understanding part of human capital in structuring modern economic growth, where each field used different estimates (Weil, 2005) and theoretical propositions (Schultz, 1992) to identify the assumption of how analogous activities and education affect the total factor productivity. In specific terms, the link between diet, nutrition care, disease risks and labor productivity all these indicators imply that aggregate growth theories must seek to integrate health to education to increase human capital growth.

In the study on nutrition's intake and farm productivity Strauss (1986) finds his empirical results, that nutrient intake in the form of calories results in increase in farm labor productivity in Sierra Leone Africa. The effects were not so significant at lower intakes of nutrients, however effects were observed with moderate intake. In his study he proposed that Sierra Leone agriculture labours demand more physical fitness and nutrition's to provide effective output, better nutrition is considered essential and the results understated the importance of healthy nutritious food and its positive impacts on productivity and output supply. In his analysis he elaborated the hypothesis that current, annual calories intakes have cause higher productivity. However, there are other reasons for the probable correlation between the productivity and calorie intake, such as height and weight which are the genetically. Moreover, Strauss underlined the fact that there are differences of calorie intakes among male, female and child labor, and consequently have varied results of productivity and market earnings.

2.3 Issues under Attention in South Asia

In South Asian UN, WHO, UNHCR and other international organizations are focused more on infant mortality and maternal health programs. United Nations financing for development calculated that approximately \$ 25-30 Billion global investments per year are required to achieve the MDGs worldwide. However it is more difficult to categorize the investments for each goal where 4 and 5 (infant mortality and maternal health) varies from region to region. In countries, who have poor governance and corrupt health systems, the additional public health expenditures would have little impact on health indicators. To overcome health related obstacles, low income countries can make significant efforts to achieve the MDGs related to poverty, health, mortality

rate and hygiene by adequate policies and actions (United Nations, 2007). Akseer et al. (2016), highlighted that poverty, absence of proper nutrition's and lack of women empowerment are the most rampant barriers to change in the social and economic position of a country. In their report on 'South Asia progress on Maternal and Child health', Akseer and her colleagues analysed the MDGs for poverty and Health (1990-2015), they summarized how the goals have achieved the change in maternal and child health as well as economic development for the past 25 years. Despite the declines in maternal mortality ratio across South Asian region, in many countries mortality rates are still high such as Afghanistan, Nepal and Pakistan. Even with antenatal care and vaccinations, certain disparities exist among the wealth groups and there are differences in the health care systems across rural and urban regions of South Asia (Akseer et al. 2016, p. 1). The health systems, social determinants and policies are essential contributors to observed improvements in the economic growth and development of a nation. High populated countries like Bangladesh, India and Pakistan faces too many social and economic issues, including conflicts and insecurity of life, gender inequalities, multi-dimensional poverty, lack of women empowerment, life below global poverty level and malnutrition.

2.4 Overview: Performance of Health Sector and Statistical Evidences of South Asian Countries

With the launch of Global Every New-borns Action plan 2014, problems related to new-borns have received more importance. The Action explored the issues which causes the infant mortality in South Asian countries. It was proposed in the plan to overcome the new-borns mortality rate it is necessary to increase antenatal care visits, skilled attendance at birth and also training initiatives for early breastfeeding. Furthermore, skilled birth attendance and new-borns delivery facilities link closely to increases in chances of survival of new-borns. Despite the importance to health of baby and mother, skilled attendance are around less than 50 percent in Bangladesh and Afghanistan, more than 50 percent and 60 percent accounts in Nepal, India and Pakistan. Figure 05 illustrates the gaps of lack in skilled attendance at new-borns, some geographical areas have lower rate ranging from 1.1 percent to 84.5 percent in some areas in Afghanistan (UNICEF South Asia, 2016). Clearly universal health coverage facilities are required to control these issues. But, this doesn't mean that the services are same for all regions of this subcontinent, the

most deprived areas shall be facilitated more comparatively to those who are better off by low budgets, and there should be a disproportionate attention given to the rural and urban areas regarding health expenditures, infrastructure and human resources allocation.

The statistics from the figure shows that India and Pakistan have high rate of new-borns deaths, and are considerable higher compare to other developing countries and countries in south Asia. India remains the highest in all with 695,852 in 2015, Pakistan with 244,746 new-borns death. However, Afghanistan has shown better results in reducing under-five mortality and new-borns mortality with only 36,242 new-borns deaths. Sri Lanka, Maldives and Bhutan have lower rate of new-borns mortality in South Asian region.

The statistics in shows that Bangladesh, Bhutan, Maldives, Nepal and Sri Lanka have improved preventing under-five mortality, whilst India, Pakistan and Afghanistan still need to achieve the goal of low child mortality rate. These populated countries such as India and Pakistan have to implement health care interventions to achieve the sustainable development goal by 2030. In Table B.5 we can see the new born death rates of 2015 and the predicted death rate for 2021, 2025 and 2030 after achieving SDGs of lower child mortality and lower rates of poverty in developing countries.

2.5 Global Target and UNICEF South Asia Target for New-Borns Mortality

UNICEF estimated there Global target goal to reduce the new-borns deaths to 12 per 1,000 live births by 2030. And they estimated to reduce new-borns deaths from 32 per 1,000 live births to 25 per 1,000 live births by 2017. According to their report predictions, it will save additional 300,000 lives (UNICEF, 2016). According to the UNICEF report (2015), about 5.9 million global under-five mortality was recorded which is about 16,000 per day, 700 per hour and 11 per minute. The findings proposed that 45 % of deaths are usually occurs in the first 28 days after birth. However, UNICEF has done many initiative programmes in every developing and under-developed country to prevent the deaths and mortality rate of under-five and new-borns. Since 1990 to 2015, both the number of under-five deaths and rate of under-five mortality have fallen from 12.7 to 5.9 million. In other words the under-five deaths in 1990 were about 91 per 1000 live births, which have declined to half in 2015 about 43 per 1000 live births (UNICEF, 2015).

The data in Table B.6 is the prediction of current trends if maintained by south Asian countries and possible the values expected to decline to SDG (Sustainable Developmental Goals) by 2030. The average mortality rate of new-borns in south Asia 30.8 is higher compare to European countries, East Asia and central Asia. The target of about 12 per 1000 live births is estimated to be accomplished by 2030, in order to move towards eradicating child mortality and achieving MDGs (millennium development goals), UNICEF (2015). In the appendix we have the figure for SDG target and predicted countries 'maintaining trend' till 2030.

We have the analysis of three countries (Afghanistan, India and Pakistan) that have suffered from child mortality. There are numerous reasons to link child mortality in these regions however mostly the issue that causes child and infant mortality in these regions are unskilled birth attendance at child delivery and new born delivering facilities, lack in pre-delivery safety acknowledgements, lack of primary and secondary education for girls, lack of empowering women, unhygienic food and water, improper sanitations and besides that most importantly cultural restrictions in all of the mentioned countries, which have the concept of not allowing pregnant women to have treatment or delivery from male doctors (UNICEF, 2015). There are huge gaps in new-borns death rates by wealth quintile, mother's education as well as the residence (Rural or Urban) in South Asia. A child born in a poor family, to an uneducated mother and in a rural area is much more likely to die in first 28 days after birth.

2.6 New-Borns Death Rates by Wealth Quintiles, Mother's Education and Area of Residence (2006-2013)

According to UNICEF report on new born death with, their mortality is associated with the poverty level, education and area of their residence. Wealth quintiles proposed the classes of society with higher and low wealth divided in quintiles (20%), whilst mother's educational level is described in three levels, no education, primary education and secondary or higher education levels. Moreover, new-borns health and mortality has been at risk more in the rural areas with improper pre-birth hygienic deliveries in compare to urban areas (UNICEFROSA, 2015). According to UNICEF regional office south Asia report skilled birth attendance is one way to prevent the high rate of new-borns mortality, and save many live births in south Asian countries. However there are many inequalities constraints which exist between as well as within a country.

For instance, in Sri Lanka almost all new-borns births are delivered by skilled health staff while in Bangladesh only two in five births are attended by skilled health staff. Except Maldives and Sri Lanka, all of south Asian countries have discrepancies in skilled birth attendance in rural and urban areas, rich and poor and also educated and uneducated individuals.

Highest (poor) in terms of wealth quintile accounted for 52 per 1000 live births and lowest (rich) in wealth quintile recorded about 26 per 1000 live births from 2006-2013. The no of new-borns deaths associated to mother's educational levels are 53, 42 and 30 per 1000 live births with no-education, primary education and secondary or higher education respectively. About 82 deaths per 1000 live births of new-borns were caused due to the area of residence, 48 per 1000 were recorded in rural areas and 34 per 1000 were recorded in urban areas. The charts below demonstrated the statistics.

Chapter 3. Methodology

3.1 Theoretical Framework and Empirical Studies; Human Capital and Economic Growth

This chapter establishes the methods of empirical analysis, theoretical and statistical basis for the objective of study. The chapter includes the variables of interest which have correlation and significance with the identified objective and also other variables which cause the dependent variable to move in either direction. Health capital is a socio-economic study which investigates day-to-day activities, voluntary or involuntary by individual agencies or government agencies. Problems' relating social aspects like life expectancy or education depends on certain variables which have correlations with one or other indicators of social-economic growth.

In this study the main objective is to analyse human capital approach by taking the important variables relating health capital and economic growth. Health capital includes physical abilities, behavioural aspects and environmental factors. Physical or mental abilities can be sub-divided into education level, literacy rate or employment status and healthy body free of diseases and immune from chronic or non-communicable diseases. Behaviour aspects such as health care, hygienic way of life are important indicators of health capital. Environmental factors include access to clean drinking water and access to proper sanitation and better labor working conditions for workers. Authors have used different approaches to define the significant relation between health and economic growth or health and labor productivity. Bloom and Canning (2005), modelled country specific effects on long run steady state TFP (total factor production) which comprised a number of other observable characteristics of those countries, they used fixed effect model for the unobservable factors and analyse its effects on TFP. In their analysis they used dynamic panel GMM method, the resulted estimates didn't show any significance and the standard errors were very large. They observed the possible insignificance due to higher correlations between inputs, they removed the fixed effect and instead they used instrumental variables by taking lagged values of these inputs. Some microeconomics variables play a significant role in defining the human capital. In the study of 'The effect of health on economic growth' Bloom, Canning and Sevilla (2001) discussed the important health indicators which are

affected positively by income and education. And their study analyse the cross country life expectancy and average years of schooling, and the estimates suggested that both these factors of health capital are affected by income gaps across countries. They used aggregate production function model, GDP was the depend variable and the inputs on the right hand side were TFP, labor force and human capital which included education, experience and health where life expectancy was taken as a proxy. There results produces evidence that life expectancy is statistically significant input in total productivity of labor which in returns leads raises in GDP output, one extra year of life expectancy raises the productivity of labor by 4% in output. They used Fixed Effects Model to analyse the factors that have significance with TFP.

Strittmatter and Sunde (2011) based their analysis on finding the causal effects of changes in health on economic development by using long panel of 12 European countries. They analyse GDP per capita growth along with population growth and aggregate GDP growth against mortality rate by taking infant mortality and crude death rate as proxy for it. They used simple OLS regressions to find the correlations of GDP growth and GDP per capita on the measures mortality rate (infant mortality rate and crude death rates). They further investigate the economic growth and mortality rates relation using specification of log lag of these variables (GDP per capita log-lag, GDP growth log-lag and Population growth log-lag) which accounts for deviations long run equilibrium. According to their findings, 1 % point reduction in infant mortality growth increases GDP per capita growth by 0.6 % points, furthermore a point percent reduction in Crude death growth has some marginal positive or no significance effect on economic growth (p. 18). The two stage least square method was used for further analysis of mortality rate and economic growth, 2SLS estimation has found negative significance between the two indicators. The results from panel 2SLS suggested that 1 % point increase in infant mortality growth results leads to about 1.5 % points reduction in GDP per capita growth, and 1 % point increase in Infant mortality growth reduces GDP growth by 1.7-1.9 % points, the overall empirical results of their study concluded that the effect of Infant mortality rate on GDP growth and GDP per capita is negative and they didn't find any causal relation between infant mortality rate and population growth (p. 19). Although there are other dimensions of public health and developmental economic indicators that are crucial to the health and economic growth relation. Husain (2010), recommended COI (cost of illness) being an important methodology to analyse the health impact on economic output, by considering labor productivity (essential to define

health status of labor or productive labor force) and economic output. (p. 25) The economic dimensions of these illnesses which corresponds to COI, or burden of diseases has let the policy makers to account illness a significant influence on labor output. However, the causality relation between these health measures with economic outcomes are limited due to the issues and challenges of estimation methodology. For instance, Suhrcke et al., (2005), proposed that cost of illness which is measured in the study analysis do not imitate the overall economic costs linked to the specific type of disease or other risk factor, and the resulting average COI doesn't imply a macroeconomic impact on economic development. However, it is merely the marginal contribution of health in the production or incentives of investments in human capital which reflects the economic importance of health (p. 38).

3.2 Data

In this study we have discussed health capital and challenges resulted from poor health status of our interest countries. We have theoretically analyse three countries of South Asia which are Bangladesh, India and Pakistan. Our primary objective was to have the health analysis of these countries. However, we added another country in the analysis which is Sri Lanka, being one of the developing countries and have some health challenges. In order to have better outcome for cross country investigation the four countries were put together for data and statistics.

We construct panel data for these four countries Bangladesh, India, Pakistan and Sri Lanka. The data is taken annually for 21 years, time period 1995-2015. We have total 4 cross sections and 84 observations. For the data we don't have any truncated sample, and all the data sample has variables with complete data sets.

3.3 Data Sources

The data is secondary, and most of the variables data are taken from World Bank open data, World Health Organization and International labor organization. Most of the variables such as economic growth (GDP per capita growth, annual %), fertility rate total (births per women), Mortality rate, infant (per 1,000 live births), Expenditure on education as % of total government

expenditure (%), Immunization, DPT (% of children ages 12-23 months), Immunization, measles (% of children ages 12-23 months), Improved sanitation facilities (% of population with access), Improved water source (% of population with access), all of these variable data are taken from World Bank national accounts data, and OECD National Accounts data files. However, variables such as Government total Expenditures on education, Gross enrolment ratio, primary, both sexes (%) are taken from United Nations Educational, Scientific and Cultural organization and UNESCO Institute for Statistics online database.

Moreover, data on economically active labor force indicators such as labor productivity (GDP per person employed, constant 2011 PPP\$) and Labor force participation rate for ages 15-24, total (%) (Modelled ILO estimate) are taken from International Labor organization (ILO).

Statistics, Tables and Figures on the health status of the these three countries given below in appendix, which shows the effected sectors of the populations, conditions of health facilities, communicable or non-communicable diseases, profiles of these countries (WHO, South Asia) illustrates the burden of diseases and risk factors which causes the growth in mortality and morbidity in rural and urban communities. These info graphics of countries health profiles, explained in this paper are from WHO health statistics and information system in South Asian region. Some of these figures and illustrations are not included in the text, however they are explained thoroughly in text. Information's on Global burden of diseases are derived from the famous VIZ hub, which comprises all data visualizations and graphs of health indicators by country profile, wealth quintiles, causes or risk factors. Moreover data on YLDs and DALYs are illustrated for every disease and risk factor.

3.4 Variables Identification

The variables for this study comprises health indicators, education factors and micro and macro variables for economic growth. Some of these variables which might significantly change GDP per capita affecting economic growth. However these variables also could affect human capital significantly increasing or decreasing rate of infant mortality. For simplification we will generate new short names for the Excel sheet variables to make the estimation compact. Below in

Estimation Analysis Table A.1 we have the short names for endogenous and exogenous variables which are used for the analysis in the SUR Model.

3.5 Variables Classification

3.5.1 GDP Per Capita Growth

GDP growth is the percentage growth rate at market prices based on local currency, it is weighted average and is based on constant aggregates of US\$ 2010. It is calculated without making depreciations and taking depletions or environmental factors into consideration. This macro-economic indicator is highly significant, and economic growth by GDP growth which measures any changes in the output volume or real income of people. GDP growth rates and its relevant components are calculated using LS method, and a constant price data in US\$ or local currency (World Bank data).

3.5.2 Infant Mortality Rate

Estimates for Infant mortality are developed by the UN (inter-agency) group for Child mortality (World Bank, WHO, UNICEF). These rates are usually used as a tool to identify the prevalence of diseases and health risk factors, which are usually challenging to estimate. Mostly the data are not frequently available or the measures for such vulnerable mortality rates are un-usual due to demographic changes and social modifications. The mortality rates, such as infant mortality, maternal mortality, under-five mortality and neo-natal mortalities, all of these factors has influence on the socio-economic development across countries. Infant mortality captures the significant effects of malnutrition and gender discrimination in many developing and also developed countries (World Bank data).

3.5.3 Health Expenditure

Health expenditure is the total public health spending by government, includes recurrent and capital investments of government which accounts the proportion of local budgets, grants and other external borrowings. The out-of-pocket investment are also included in the estimation of health expenditures, borrowings from non-governmental organizations and international agencies. It covers the health provisions, activities of family planning, preventive or curative health services and also nutrition activities. However it doesn't includes water and sanitation expenditures (World Bank data).

3.5.4 Education Expenditures

Education expenditure includes operating expenditures in education, current wages, salaries but capital investments in equipment and buildings are excluded from in the weighted average calculation. The data of indicator is taken from United Nations Educational, Scientific and Cultural organization and UNESCO Institute for Statistics online database (UNESCO, World Bank).

3.5.5 Total Fertility Rate

Fertility rate measures the number of children born to a woman in her child bearing life till end of that period and represents the annual fertility rates of the individual fertile women at specific age. It is measured annually by aggregate method. Fertility rate is an important and very imminent indicator of the economic development. Countries with higher HDI (human development index) are usually linked to lower rate of fertility. The reason of such relation, is the human capital investments priorities. In developed countries increases in human capital investments leads to decline in fertility rates. However, if human capital are high, investments in the capital will get higher returns which in general effect the investment disbursements and encourages population of the society to have more investments in human capital while lower investment in having offspring's, high fertility rate reduced the growth of economy (Li, 2015, p.40). Furthermore, reproductive health is a physical state and mental health which is correlated

to the functions of reproductive system processes. Having health education and achieving health services during pregnancy periods are significant to have safe and effective delivery and other affective ways of prevention from sexually transmitted diseases.

3.5.6 Immunization, DPT (% of Children Ages 12-23 months)

Annually weighted measured of immunization for DPT (diphtheria, pertussis and tetanus), which measures the percentage of children age (12-23 months) who received immunization for DPT. In most developing countries, where lack of facilities and lack of education leads to cause high rate of deaths from it. Children are considered adequately immunized against these three infectious and bacterial diseases (World Bank data).

3.5.7 Immunization, Measles (% of Children Ages 12-23 months)

Measles is one of the primary cause of death in under-5 children. According to WHO report about 114,900 global deaths caused by measles of which most of affected victims are under-5 children. Immunization of measles is calculated as weighted average on annual basis children of population who receives vaccines for measles, children of age 12-23 months who receives the immunization vaccines before 12 months at the survey time. After one dose of vaccination a child is adequately immunized of measles (World Bank data).

3.5.8 Improved Sanitation Facilities (% of Population with Access)

The data of this variable is weighted average calculated annually. The periodicity of the data records the percentage of population who have access to improved sanitation facilities. Improvements in sanitations means to ensure proper pipe systems from flush to sewers, disposal of human excreta at proper pit latrine or septic tank. Having improved facilities for sanitation have significant developmental role, it can reduced the health risk and disorders which are the causes for diarrheal diseases or other symptoms for children disorders. Most possible impacts of improper sanitation can cause malnutrition and the most common symptoms are worm infections which weakens the children and make their immune system more susceptible to external risk.

Other infections includes measles, malaria and pneumonia which occurs due to improper hygiene and sanitations system (World Bank data).

3.5.9 Improved Water Source (% of Population with Access)

Water is the most important and necessary resource for human body, it provides life supporting services for living beings, people, plants and animals and keeps the sustainability in the ecosystems. The annual data on population access to improved water source is calculated annually. Data provides the information on percentage of people who have access to using an improved and safe drinking water. The connected pipes providing safe and improve water sources e-g; dwelling or yard are used as main source which enables the access to clean water. Furthermore, water facilities from public taps, filtered rainwater collection, protected wells, and tube wells are all other sources of water accesses. It is the weighted average of both rural and urban population access to improved water sources (World Bank data).

3.5.10 School Enrolment Ratio, Primary, both Sexes (%)

The data of total primary school enrolment for both sexes is weighted average calculated annually by dividing the total number of students regardless of age who enrolled in primary school by population of same age group and then to have percentage value multiply it by hundred. The data is collected from UNESCO Institute of statistics annual survey (World Bank data).

3.5.11 Mean Years of Schooling

The average years of schooling calculates the number of years students are enrolled in the education sector for schooling. The data proposes the population of students who are in primary school, this numbers of years shows the proximity level that a student stays for in the primary school. The higher number suggests higher level of school e-g; secondary or higher grade school (World Bank data).

3.5.12 Labour Productivity

Labour productivity constitutes the economic performance, it measure the performance of economy by comparing the amount of goods and services produced in given number of working hours. It is the measure of output by worker in a specific amount of time. Labour productivity is an important indicator of economic growth which depend on the skill, health and other factors of human capital. In long-run terms labour productivity is combination of labour output and capital investments (ILO data)

3.5.13 Military Expenditures

Military expenditure is derived from sub-expenditures, as define by NATO it includes all current capital investments in army. That in broad terms includes defence ministries, peace keeping forces and other expenditures in government agencies to engage in armed forces or military forces defence projects. Other expenses consist of pension's funds or services for retired army personnel (World Bank data).

The data on military expenditure as a percent of GDP is measured annually as weighted average estimated by Stockholm International Peace Research Institute (SIPRI) on calendar-year base, which is estimation method of even rate expenditure throughout fiscal year.

3.6 Research Hypotheses

Theoretical framework and literature provides produce sufficient foundation to build the hypothesis to describe the relationship between the Economic growth and health capital taking Infant mortality as the proxy variable. According to the theoretical analysis we signify the hypothesis for the thesis as below:

- 1) According to the literature, when there is lower health facilities it will cause decrease in health capital (infant mortality growth) and as a result will affect the GDP per capita. So negative impact of infant mortality leads to poor growth of the economy.

2) According to tradition economic theory, growth in economy is often predicts the increases in human capital (reduction in infant mortality rate), thus with the development and economic growth, infant mortality rate will go down and therefore results in increases in human capital. Thus this thesis undertakes the investigation the role of human capital in economic growth objected countries.

3.7 Regression Model

$$y_{ti} = \sum_{j=1}^{k_i} x_{tij} \beta_{ij} + \varepsilon_{ti} \quad \text{--- (General SUR Model for equations)}$$

Where $t=1,2,\dots,T$; $i=1,2,\dots,M$; $j=1,2,\dots,k_i$

We can write the compact form of SUR Model as:

$$y_i = \sum_{j=1}^{k_i} x_{ij} \beta_j + \varepsilon_i \quad \text{Where } i=1,2,\dots,M$$

For two equation system for we get;

$$y_1 = x_1 \beta_1 + \varepsilon_1 \quad (1)$$

$$y_2 = x_2 \beta_2 + \varepsilon_2 \quad (2)$$

Writing the above equation in matrix form we have;

$$\begin{bmatrix} y_1 \\ y_2 \end{bmatrix} = \begin{bmatrix} x_1 & 0 \\ 0 & x_2 \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \end{bmatrix} = X\beta + \varepsilon$$

$$\text{Var} \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \end{bmatrix} = E \begin{bmatrix} \varepsilon_1 \varepsilon_1' & \varepsilon_1 \varepsilon_2' \\ \varepsilon_2 \varepsilon_1' & \varepsilon_2 \varepsilon_2' \end{bmatrix} = \begin{pmatrix} \delta_{11} I & \delta_{12} I \\ \delta_{12} I & \delta_{22} I \end{pmatrix}$$

$$\delta^2 \Omega = V$$

3.7 Assumptions of SUR Model

- The error terms are assumed to have zero mean and to be independent across individuals and homoscedastic.
- The assumption of the model is that error terms ε are independent across time, but may have cross-equation contemporaneous correlations.

There are two important cases where SUR estimates are equivalent to equation by equation OLS, then there is no advantage of using SUR system of equations.

First, when Σ is diagonal matrix, there is then no correlation across equation error terms. Seemingly unrelated regression becomes seemingly related. Second, when each equation contains exactly the same set of regressors, e-g; ($X_1=X_2= \dots =X_m$) such that the estimators become numerically identical to OLS estimators.

3.8 System of Equations

We have the following two equations that we are estimated to get the estimation output for the analysis and investigation of hypothesis.

Equation 01

$$\text{GDP_GRW} = f(\text{INFANT}_{\text{MRT}_{-1}} + \text{DLLED}_{\text{EXP}} + \text{DLLPROD}_{-1} + \text{DLH}_{\text{EXP}_{-1}} + \text{DPSC}_{\text{ENR}} + \text{DMYC} + \text{LIMME} + \text{DLIM}_{\text{DP}} + \text{LFERT}_{\text{RT}} + \text{IMPSA} + \text{LIMWA} + \text{DLML}_{\text{EXP}_{-1}})$$

Equation 02

$$\text{INFANT_MRT} = f(\text{GDP}_{\text{GRW}_{-1}} + \text{DLLED}_{\text{EXP}_{-1}} + \text{DLLPROD}_{-1} + \text{DLH}_{\text{EXP}_{-1}} + \text{DPSC}_{\text{ENR}} + \text{DMYC} + \text{LIMME} + \text{DLIM}_{\text{DP}} + \text{LFERT}_{\text{RT}} + \text{IMPSA} + \text{LIMWA})$$

We have Military Expenditures (% of GDP) in the first equation, while in second equation we have infant mortality rate as endogenous variable INFANT_MRT, to be regressed against the rest of exogenous variables mentioned above, except military expenditures and also including lag of GDP per capita as GDP_GRW(-1) as an exogenous term.

Chapter 4. Estimation Analysis

4.1 Overview

In this chapter, we will analyse the micro and macro studies whether different health indicators have positive relation with GDP per capita or negative relation. On macroeconomic level, cross-country investigation of different health inputs impact on economic output can take on specification problems and reverse causality. However to reduce these issues in regression a better way is to use simultaneous equations to analyse health capital (infant mortality) and education aggregate effects on economic growth and the effects of other health improvements and education indicators on infant mortality. We have taken data on four developing countries of South Asia which includes Bangladesh, India, Pakistan and Sri Lanka and based on HDI and HCI these countries are in the list of developing countries.

For statistical estimations and descriptive output we will use econometrics tools and techniques to suffice the objectives of the analysis. For the estimation output we used Eviews 9.0 software and for estimation results we run system of equation to get estimated output for the simultaneous equation using SUR (Seemingly Unrelated Regression) model. We will describe the economic assumptions and explain econometric results based on economic and statistical theories. To use the system of equations we have to choose and put the equations of our hypothesis in the work file by selecting System from new object in Eviews, we have the SUR estimation output below.

4.2 Summary of Descriptive Statistics

In order to analyse the statistical characteristics of the indicators, we have conducted a descriptive statistics in Eviews for the dependent variable and all the independent variables. The descriptive statistics examine statistical indexes of exogenous and endogenous variables, the most common characteristic of these variables are mean, median, maximum and minimum value, Skewness, kurtosis, Jarque-Bera test statistics with probability values and number of observations of the sample. Below in Table A.2 we have the descriptive statistics of all variables in the sample.

The descriptive statistics in Table A.2 have Mean, median, maximum value and minimum value of GDP_grw is about 4.0 %, 3.95 %, 8.80 % and 0.10 % respectively. GDP_grw is stationary after running unit root test at level, and considering the P-value of the descriptive stats, we have evidence of normal data. The P-value is greater than the standard 5% level of significance which proves the normality assumption. The Jarque-Bera null hypothesis “the data is distributed normally” is not rejected. Infant_MRT has mean of 50.47 % and is not normally distributed according J-B test hypothesis. Furthermore, LEd_EXP and LH_EXP has mean values of 21.66 % and 3.32 % respectively, LPSC_ENR and MYSC which are the important indicators of education remain around 5 % with LPSC_ENR at 4.55 % while MYSC at 5.93 % where the latter is the average number of years. LLPROD mean value describes the average output level of goods and services produced, with the mean value of 9.21 %. We can see from the Jarque-Bera statistics that LEd_EXP and MYSC both have non-normal data and null hypothesis tends towards rejection of normality assumption.

In Table A.3 immunization of Measles LIMME, and DPT3 LIM_DP has mean values of 4.32 and 4.36 percent respectively. This percentage mean of these values shows the average vaccination immunizations to population in percent, both rural and urban. LFERT_RT has mean value of 1.08 %, which means the average number of child a woman is having in her healthy child bearing age. Improve sanitations (IMPSA) and water (LIMWA) has mean value of about 53.30 % and 84.96 % respectively, which demonstrates the percentage of population who has access to clean drinking water and proper hygienic sanitations. Mean of LML_EXP government’s military expenditure percentage of GDP is -0.75 % which shows negative value caused by high fluctuations in military expenditures between the countries. Military expenditure of Bangladesh has less fluctuation for the past two decades, 0.002 % in 1995 and 0.001 % in 2008, while India and Pakistan have more ups and downs in the military expenditures.

As for the Jarque-Bera test statistics we have in the descriptive results LFERT_RT, LML_EXP and IMPSA as non-normal distributions, while LIMME, LIM_DP and LIMWA are all normally distributed at p-value > 0.05.

As per standard deviations, which are statistical term for the degree of dispersion from the mean value. This dispersion could be varied at time in different countries, we have INFANT_MRT that has the highest value of dispersion from the mean followed by IMPSA, LIMWA, LML_EXP,

MYSC, GDP_GRW, LED_EXP, LH_EXP, LLPROD, LFERT_RT, LIMME and finally LIM_DP.

As for interpreting the values of skewness and kurtosis coefficients for the whole sample, we can notice that each of these variables show deviation from normality. As for it is clear from econometrics assumption, a distribution is normal if it has skewness of 0 and kurtosis of 3. A value greater or less than '0' will cause positive (left) or negatively (right) skewed distribution respectively. And a value greater or less than 3 will make the distribution leptokurtic or platykurtic respectively.

4.3 Seemingly Unrelated Regression

Now to investigate further the relationship between GDP per capita and infant mortality rate we have run the Seemingly Unrelated Regression on the equations. To avoid the problem of endogeneity among the exogenous variables we have taken lags of several variables, and also the purpose for using SUR model for simultaneous equation was to restrict endogeneity problem in the regression.

We estimate the parameters of given Equation 01 using Eviews system of equations. From the parameter estimates of variables in Table A.3, we can determine the effect of growth in infant mortality on GDP per capita in the first equation. The results shows that INFANT_MRT has significant impact on GDP_GRW, we can see that one percent point increase in infant mortality decreases GDP per capita growth rate by 11.03. Expenditures on health DLLED_EXP shows very high significance (p-value <0.01) with GDP_GRW per capita. Increases in education expenditures DLLED_EXP leads to higher returns in GDP_GRW per capita with a value of 17.17, 10% increases in Education expenditure will lead to 17.17 % increases in GDP per capita growth. We find that, investments in health is important indicator as shown in the output, DPSC_ENR is positive and significant at p-value < 0.05 (5%), which means that increases in gross primary school enrolments rates has positively affected GDP_GRW rates, increase in primary school enrolments increases GDP per capita growth. In our findings, we can see that IMPSA with a value of is significant at 5 % with a p-value 0.04 which is < 0.05, predicts negative significance. Our findings doesn't conclude that the indicator of improved sanitation

access affect GDP_GRW directly. In the report of 'investing in health for economic development', Lustig and Gonzalez, (2004) analyse that in health sector the most important expenditures are those that are related to food productions, potable clean water, housing and sanitation infrastructures. They focused their study on infrastructure of potable water and sanitation, lack of infrastructure is considered highly responsible for a large share of health related problems from neo-natal to adult and old age health issues. They further concluded that improvements in sanitation infrastructure is an indirect investment in health capital which leads to a more competitive economy (p. 29-51). Now we have the Equation 02 of SUR model, we have estimates of the exogenous variables with INFANT_MRT as endogenous variable. In the regression the purpose to analyse this equation is to find the effects of health inputs on infant mortality rate. We have do not have the exact same variables as first equation of GDP_GRW where we have military expenditures and lag of infant mortality rate with other exogenous variables lags. We can investigate the significant variables from the estimated values, the value of GDP_GRW is an important estimation value of -1.10 with p-value $0.0005 < 0.05$ suggesting a negative significance with INFANT_MRT. The negative impact clarifies that with the increase in GDP per capita growth there will be declining infant mortality rates.

Education is an important factor of the economy, investments in education brings long term changes in the human capital which depends on other factors as well. In our results we have DLLED_EXP (-1) significant with p-value $0.09 < 0.1$ (10% significance level) and estimated value of 175.64. It concludes that expenditures in education sector increases the chances of infant survival, people having more access to education are less likely to confront infant mortality. Health care education is also very important for a better childbearing and pregnancy time as well as having education about the nutritious food which are important to healthy life. Karlsen et al. 2011 find in there study that there is evidence of relationship between high maternal mortality rates and lower maternal education, the lower the levels of education have significantly positive impact on the maternal mortality rates. They signified the issue that a more educated women have autonomous position in the family to make decisions about the number of children they want to have, decisions about healthy nutrition's for their children, before and after pregnancy care of nutrition. Education not only changes the familial relations but have also beneficial reasons to have lower maternal mortality.

LIMME has a significant effect on infant mortality rate, the value of -13.90 with p-value $0.02 < 0.05$ demonstrates the importance of vaccination for Measles, if the percentage of population receiving vaccination increases there is significantly reduction in the infant mortality rates and results in better population health.

LFERT_RT has significant and positive affect on MORT_RT, in developing countries due to gender biases for son, there are more possible infant deaths. Usually are the cases of birth where the infants have death probability of 15% in their first year after birth (Ray, 1998). There are also other factors which can cause the infants mortality due to increases in fertility rate, they might be illness, diseases, children may not have sufficient food and most importantly maternal care are poor in developing countries such as Bangladesh, India and Pakistan. Where the fertility rates are high as well as the maternal and infant mortality rates. These cultural, religious and social factors play a significant role in promoting high fertility rates which are not feasible financially and physical and consequently causes neonatal, infant and under-5 mortalities and morbidity.

Access to health care facilities, clean water and proper sanitation are considered as basic human rights of an individual in a society. In our second equation of INFANT_MRT which is considered as a proxy to health capital. We have estimated value of IMPSA which has high negative significance, with a value of -0.42 and p-value '0' which shows high levels of significance with INFANT_MRT. In the previous equation where we have GDP_GRW as endogenous and IMPSA as exogenous variable with other exogenous variable, we observe that IMPSA has negative significance with GDP_GRW which is not a better estimate and doesn't make the assumption of possible direct relation with endogenous variable. However, IMPSA has now negative significance with INFANT_MRT, which concludes that when the percentage of population accesses to improved sanitation increases, it negatively affect infant mortality causes the decline in the number of infant deaths. The reason as discussed in the literature are the proper hygienic ways for human excreta disposal other facilities ranges from protected pit latrines, flush toilets and proper mechanized sewerage systems. Inadequate sanitations significantly affect health of people and surrounding environment, it is one of the major cause for illness among adults and children's worldwide. The estimation results expect value of infant mortality to decline by 42.52% if the population access to improved sanitation increase by 1%. A proper sanitation can decrease the risk of diarrheal diseases and other disorders which are responsible

for diseases and mortality of millions of children. Further more significant value of LIMWA - 0.14 with p-value significant at 10% shows the importance of improved source of drinking water. Access of rural and urban population to clean drinking water reduces the risks of viral and bacterial diseases which are caused by these microorganisms found in unclean water. The estimated value shows that if population access to improved water source increased by 1%, then the infant mortality rate will decrease by 14.52%.

We have R – Square of first model about 0.6497, which means that the model explains 65% of variations in the values. The model performance is better, with D-W value of 1.77 and S-E of regression about 1.36. second model has R – Square of 0.9787, fitting the model very good, shows about 97 % variation in the model, with S-E Of 4.11 and D-W value of 0.79. in both model we can see the values of adjusted R – Square are lower than R – Square.

Chapter 5. Conclusion

5.1 Conclusion

In this paper we investigated the effect of infant mortality rate on GDP per capita growth, infant mortality rate is taken as an important indicator of health capital in the descriptive analysis. We have significant changes in GDP per capita growth when there are increases in infant mortality rates. However to check the reverse causality of changes in economic growth on infant mortality rate we have considered system of equations with lagged variables of human capital indicators in the equations and inclusion of military expenditure for the first equation in the system. To attain the objective we have used Seemingly Unrelated regression model for analysing the system of equations.

From the estimation analysis we conclude that health capital plays a significant role in the economic growth, increases in infant mortality rates has substantial effect on GDP per capita growth, it has negatively affected the economic growth. And on the other hand increase in economic growth has negative association with the rate of infant mortalities. Moreover, the results find other significant exogenous factors, education expenditures and primary school enrolment have positively affected the economic growth. Other variables such as percentage of population access to improved sanitations and water and vaccinations for measles has significantly showed decreases in infant mortality rates. A country's human capital is as important as physical capital, HCI represents the levels of health and education such that if a country is under-developed its human capital will be lower and vice versa for developed economies. Countries who have health care programmes for maternal and infants care are more biased towards investing in researches for new preventions or treatments for infant and maternal health care. The reasons are the significant results which they get from introducing such initiatives which affect positively the health care of the infants and their mothers. Consequently, a country is considered developed if they have very low rates of under-five mortalities, moreover a country could be considered developing if they have controlled Under-five mortalities for long period of time. The economic growth is then define in terms of health of the new generations, who are having more healthy life and social exposure.

5.1 Recommendations

We can now describe some policy implications for the study, if developing countries need to improve their economic growth and development they certainly need to focus on the health human capital. Government and non-government organizations must focus more on the basic health issues. The investments in health capital shall not only include spending on treatments for the diseases, but allocation of investments are needed for research and development in health capital. From the examination of health-economic growth relationship we observed the important role of health capital in determining economic growth, hence the results implicates that health capital should be a must-include variable in the growth equations.

Bangladesh, India and Pakistan need to strengthen their health strategies, reducing the risks of infant mortality, maternal deaths, chronic diseases and other communicable and non-communicable diseases. All of these problems are due to lack of importance to the health sector and unsustainable health policies and political or socio-economic influences, many portions of the population enjoy maximum human capital attainment whilst some lack the basic human rights such as proper hygienic sanitation, food and water. Many people in these nations are living below income poverty line of \$ 1.90/day. More than 75% of the populations in these countries are working in poor working conditions and at PPP\$3.10/day. Concluding all the problems, these are day-to-day lifestyle activities which are deprived in these nations, there Human Development index is however increasing gradually due to large contributions of United Nations, World Health Organizations and UNESCO funding projects Millennium and Sustainable development goals. Which in the past two decades have shown significant decline in poverty index, improvements in maternal and adult survival rates, reduction in under-5 mortality rates and most importantly the improvements are more observed in deprived rural populations. Governments of South Asian developing countries as well as African countries need to collaborate consistently with WHO, UNICEF and more importantly UNICEF which have its focus on SDGs-2030 target for improvements in children lives. UNICEF agenda have five major sections with sub-sections of targeted goals to be achieved by 2030, which includes child survival, learning, living in a safe and clean surroundings, which the organization have review in 2016, and were implemented at country as well as global levels. Improvements in health capital have long-run prospects, a healthy new-born will have a healthy prosperous life which depended on the maternal health and

income levels of the household, lower mortality rate in under-five have important macro-economic value. The economic developments depends on individual's healthy life.

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Appendix

Table A.1 Variables Identification

Variables	Short Names
GDP Per capita	GDP_GRW
Infant Mortality rate	INFANT_MRT
Education Expenditures	ED_EXP
Mean years of Schooling	MYSC
Gross Primary School Enrolment	PSC_ENR
Fertility Rate	FERT_RT
Total Health Expenditures	H_EXP
Immunization of DPT	IM_DP
Immunization of Measles	IMME
Improved sanitation Access	IMPSA
Improved Water Access	IMWA
Labor Productivity	LPROD
Military Expenditure	ML_EXP

Table A.2 Descriptive Analysis

	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
GDP_GRW	4.004762	3.95	2.05373	0.139727	2.30622	1.958011	0.375684
INFANT_MRT	50.47143	53.65	27.05662	-0.207453	1.78375	5.779981	0.055577
LED_EXP	21.66912	21.1415	1.556375	0.707195	2.28522	8.789913	0.012339
LLPROD	9.214334	9.43908	0.550745	-0.294623	2.23657	3.255152	0.196405
LH_EXP	3.320132	3.32261	0.680367	0.332603	2.4597	2.570466	0.276586
LPSC_ENR	4.557017	4.58031	0.131132	-0.562596	2.70824	4.729138	0.09399
MYSC	5.930952	4.8	2.653299	0.973774	2.31561	14.91466	0.000577
LIMME	4.326628	4.33727	0.2112	-0.295144	1.88038	5.607002	0.060598
LIM_DP	4.369857	4.40672	0.19876	-0.486172	2.14764	5.851887	0.053614
LFERT_RT	1.081637	1.04717	0.26392	0.418171	1.99314	5.996309	0.049879
IMPSA	53.30119	49	21.92554	0.533078	2.0907	6.872311	0.032188
LIMWA	84.96429	86.35	6.170092	-0.318808	2.02014	4.783409	0.091474
LML_EXP	-0.751444	1.02012	3.417512	-1.1379	2.32335	19.7299	0.000052

Table A.3. Seemingly Unrelated Regression Model

	Coefficient	Std. Error	t-Statistic	Prob.
C1 (const.)	-6.031614	10.09722	-0.597354	0.5513
INFANT_MRT	-0.110307	0.033136	-3.328934	0.0011
DLLED_EXP	17.16571	3.459771	5.085681	0.0000
DLLPROD(-1)	-2.627046	6.943451	-0.378349	0.7058
DLH_EXP(-1)	0.613262	1.862277	0.329308	0.7425
DPSC_ENR	0.103174	0.050997	2.023127	0.0452
DMYSC	3.418815	7.190775	0.475445	0.6353
LIMME	3.063941	2.075893	1.475962	0.1424
DLIM_DP	3.973152	3.073417	1.292748	0.1984
LFERT_RT	3.182980	3.142169	1.012988	0.3130
IMPSA	-0.091816	0.018871	-4.865536	0.0000
LIMWA	0.037424	0.030732	1.217772	0.2256
DLML_EXP(-1)	-0.379999	1.737856	-0.218659	0.8273
C20 (const.)	-6.771616	11.19876	-0.604676	0.5573
GDP_GRW(-1)	-1.107995	0.310005	-3.574117	0.0005
DLLED_EXP(-1)	17.64327	10.88937	1.690676	0.0934
DLLPROD(-1)	74.67613	19.56494	3.816835	0.0002
DLH_EXP(-1)	-2.180490	5.991895	-0.363907	0.7165
DPSC_ENR	0.282370	0.151102	1.868734	0.0640
DMYSC	-1.012972	20.38266	-0.049698	0.9604
LIMME	-13.90503	6.193069	2.245258	0.0265
DLIM_DP	-13.20519	9.371690	-1.409051	0.1613
LFERT_RT	78.64923	4.284347	18.35734	0.0000
IMPSA	-0.425254	0.043041	-9.880121	0.0000
LIMWA	-0.145215	0.092075	-1.577144	0.0676

Table A.3.1. Continued . . .

Equation	Obs.	R-square	Adjusted R-square	D-W Stat
01	76	0.650674	0.584136	1.759944
02	76	0.978777	0.975129	0.786092

Table B.1. Human Capital Index Statistics and Demographics 2016

Key Indicators	Bangladesh	India	Pakistan
Human Capital Index Ranking (out of 130 countries)	104	105	118
HCI SCORE	57.84	57.73	53.10
Demographics			
Population, total (millions)	161.0	1,311.1	188.9
Working-age population (1,000s)	107,631	873,678	116,887
Median age (years)	22.5	26.6	25.6
Gross national income (GNI) per capita (2011 PPP\$)	3,341	5,663	5,031
Gross domestic product (GDP) per capita (2011 PPP \$)	3,137	5,730	4,745
Government expenditure on education (% of GDP)	2.0	3.8	2.5
Population, ages 15–64 (millions)	105.6	860.0	114.3
Population, ages 65 and older (millions)	8.0	73.6	8.5
Labour force participation rate (%)	62.2	53.8	54.1
Employment-to-population ratio (%)	54.7	36.4	41.8
Unemployment rate (%)	4.3	4.5	5.9

Source: World Economic Forum

Table B.2. HDI (Human Development Index) Statistics 2016

Key Indicators	Bangladesh	India	Pakistan
Human Development index	0.579	0.624	0.550
Human Development index Rank	139	131	147
Life expectancy at birth (years)	72.0	68.3	66.4
Expected years of schooling (years)	10.2	11.7	8.1
Birth registration (% under age five)	37	72	34
Inequality-adjusted HDI (IHDI)	0.412	0.454	0.380
Gender Development Index (GDI)	0.927	0.819	0.741
Multidimensional Poverty Index (MPI)	0.188	0.282	0.237

Source: <http://hdr.undp.org/en/countries/profiles>

Table B.3. Changes in HDI (1990-2015) and Country Rankings (2010-2015)

Countries	Average Annual HDI Growth (1990-2015)	Change in Rank (2010-2015)
Bangladesh	1.64	2
India	1.52	4
Pakistan	1.24	2

Source: <http://hdr.undp.org/en/countries/profiles>

Table B.4. Infant mortality rate (per 1,000 live births)

Countries Years	Bangladesh	India	Pakistan
1990	99.7	88.3	106.1
2000	64.4	66.4	87.7
2010	39.2	46.3	73.5
2015	30.7	37.9	65.8

Source: <http://hdr.undp.org/en/data>

Table B.5. New-borns, Regional Target for South Asia and Global Target for no more than 12 deaths per 1000 live births by 2030

Years	Maintaining current Trends	SDG 12 by 2030
2014	30.8	29.9
2015	29.9	28.2
2016	29	26.6
2017	28.2	25.1
2020	25.8	21.1
2025	22.4	15.8
2030	19.5	11.9

Source: UNICEF data

Table B.6. New-born mortality rate (per 1,000 live births) in South Asia, 2016

Country	Mortality rate (per 1,000 live births)
Maldives, Sri Lanka	5
Bhutan	18
Nepal	22
Bangladesh	23
India	28
Afghanistan	36
Pakistan	46

Source: State of the World's Children UNICEF (2016), UNICEF south Asia Health Atlas, 2016