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Is Healthier Wealthier? Evidence from Member Countries of South Asian Association for Regional Cooperation (Saarc)

Mohammad Taslim Uddin [α] & Hasina Akter [σ]

Abstract- **This paper examines the association between a variety of health indicators and GDP growth rates over the period 1972-2011, using a balanced panel dataset consisting of seven members of the South Asian Association for Regional Cooperation (SAARC), excluding Afghanistan. We explicitly accounted for interactions between survival rates and lagged GDP levels as well as endogeneity issues. The findings revealed that the survival rate and other health indicators are positively associated with GDP growth. Accordingly, investments that promote improvements in health outcomes in South Asian countries could potentially accelerate economic development in the region.**

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I. Introduction

While traditional models of economic growth focused primarily on physical capital accumulation, beginning in the 1960s economists began to acknowledge the contribution of human capital. Initially, human capital was narrowly conceptualized in terms of educational attainment; however, more recent literature began to recognize health status as a crucial component of human capital and hence an important contributor to economic development.

Sustained economic growth requires investments in the stock of human capital through improvements in education and training as well as in the quality of health status which requires not merely healthcare delivery, but also possibly in infrastructure (e.g. higher quality drinking water) and promotion of positive health behaviour (e.g. investment in smoking cessation programmes). The effects of human capital variables imply that higher level of health and better education result in more investment; both these variables evolve systematically according to levels of development, and such changes may be linked to increases in the investment rate (Lopez et al. 2005). Health is instrumental to an individual's or community's capability to undertake desired activities or functions (Sen, 1999). Consequently, when health is jeopardized the achievement of economic objectives may also be compromised and, conversely, improvements in population health can contribute to a nation's economic goals. Indeed, economic evidence confirms that a 10% improvement in life expectancy (LE) at birth is associated with a rise in economic growth of some 0.3-0.4 percentage points a year (Frenk, 2004).

Better health enables the labour force remain effective on the labour market and increases labour force productivity by reducing incapacity, weakness, and the number of days lost to sick leave and thus promotes economic development (Lopez et al. 2005). Furthermore, health indirectly increases worker productivity by facilitating investment in education and training. Additionally, household or community resources that would otherwise be used for preventative health investment as well as for addressing any current health issues can be allocated to other priorities. Finally, a healthier population can be expected to save more, both because illness and disability reduce labour market earnings (Bloom et al., 2004), and also because increasing life expectancy may result alter household rates of time preference. Although improvements in health may lead to a more ambiguous effect on savings, the dominant effect of increased life expectancy appears to be higher savings rates because the effect of increased longevity on retirement income outweighs the effect of improved health on the length of desired working life, thereby increasing the need for retirement income (Bloom et al., 2005).In turn, increased saving accelerates accumulation of physical capital, further promoting labour force productivity and economic growth (Weil, 2005).

Although life expectancy has consistently increased in many developing countries for the past 60 years, it continues to lag well behind levels observed in the developed countries, and many people in low-income countries still encounter poor health (Howitt, 2005). Life expectancy at birth in South Asia is 67 years, which is not only substantially lower than the OECD average (79 years), but also markedlylower than other Asian countries (Asian overall: 71, East Asia: 76, West Asia: 73, South-east Asia: 71, and Central Asia: 68). On the overall health status of the population in the South Asian region, the World Bank's regional Director for Human Development, Michel Rutkowski, has observed that "South Asia is at a crossroad with rising inequality;

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poor people struggling to get access to quality health, education, and infrastructure service; a growing share of the population ageing unhealthily; and with health systems that are failing to adjust to people" (Engelgau, 2011).

Since health is theorized to be a key contributor to economic growth, and given that South Asian nations are classified as lower-income or lower-middle income countries, examining the extent to which economic development in the region is driven by the health of its population is an important area of research. This study therefore investigates the proximate determinants of economic growth in South Asian countries with special emphasis on the health of its population.

The remainder of this paper is structured as follows. Section 2 of the study presents a literature review. Section 3 describes the methodology, which includes a description of data set as well as method used in the analysis and outlines the conceptual framework and econometric model devised by the authors to study the relationship between population health and economic growth. A brief overview of the demographic, economic, and population health features of SAARC countries is provided in Section 4. Section 5 discusses estimation issues, indicates how they were resolved, and presents empirical results. Finally, Section 6 summarizes the key findings emerging from the analysis, and offers a series of policy recommendations to help promote both regional population health and economic development objectives in SAARC countries.

II. Literature Review

A growing body of theoretical and empirical research offers support for the argument that human capital exerts a positive effect on economic growth. Until the late-1990s, human capital was conceptualized primarily in terms of education, although a few authors acknowledged the importance of other factors such as health (Lopez et al. 2005). Mankiw et al. (1992) were among the first to identify health and nutrition as components of human capital. Subsequent authors, including and Barro (1996), then began to explore the relationship between health and economic growth.

Barro (1996) study the relationship between life expectancy (LE), fertility rate (FR), and other relevant variables on growth rate with reference to a panel of approximately one hundred countries over the period from 1960 to 1990, determining that growth is stimulated by higher LE and lower, given an initial level of GDP per capita. While studying the same period, Rivera and Currais (1999) focus specifically on OECD member countries; using per capita health care expenditure to proxy for health status, they showed that nations with larger health expenditures also enjoy higher levels of economic growth. Arora (2001) focus on a still narrower subset of industrialized countries over a significantly larger time span (100 to 125 years). Considering LE at birth, and during childhood, adolescence, and young adulthood as health indicators, the study concluded that nations with better health status experienced 30-40% higher levels of long-term economic growth.

More recent econometric analyses have focused on understanding the nature of the causal relationships between health and economic growth. For example, while failing to identify what instruments used for this purpose, Bhargava *et al.* (2001) attempt to address potential endogeneity and reverse causality. Treating the adult survival rate (ASR) as a proxy for health status, and accounting for the interaction between ASR and lagged GDP, the authors identify a positive relationship between ASR and GDP growth rates. Using data for the period from 1970-1992 and treating health care expenditure (HCE) as a proxy for health capital, Heshmati (2001) estimates the augmented Solow model suggested by Mankiw et al. (1992) to study variation across OECD countries, attributing this to differences in their respective levels of education, and savings and population growth rates. The study furthermore finds that causality between GDP and HCE runs from HCE to GDP, concluding that health care expenditures contribute to economic growth and the speed of convergence.

Mayer (2001) examined Granger-type causality for growth regression considering the probability of adult survival by gender and age group for 1950-1990 as a measure of health status. The study concluded with thirty-year conditional causality from health to income in eighteen Latin American countries in general, and specifically in Brazil and Mexico. One remarkable observation was that the growth impact of improved health was higher for females compared with that of their male counterparts.

Bloom et al. (2004) used panel data for the period 1960-90 and followed a production function approach to estimate the model of aggregate economic growth. They found good health having a positive and sizeable impact on aggregate output even after controlling for experience of the workforce. However, their model captured only the direct effect of education and health on output, while consideration about potential endogeneity between health and income is important.

Based on the cross-country and historical data on average height of adult men, ASR for men, and age at menarche, Weil (2005) used microeconomic estimates of the effect of health on individual outcomes to construct macroeconomic estimates of the proximate effect of health on GDP per capita. The finding of the study that health is an important determinant of income variation was robust to using a variety of different microeconomic and macroeconomic estimates of the return to health, as well as to using alternative estimates of the mapping between different health indicators and

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adjusting for the role of AIDS in affecting mortality in the 1990s. However, this study examined only the proximate effect of health on GDP per worker. Moreover, some indirect channels through which health affects a country's output, such as, the effect of better health in encouraging the accumulation of human and physical capital, population growth, and so on were not addressed in this study.

Based on the panel data for 2001-2009 Peykarjou et al (2011) studied the relationship between health and economic growth in the Organization of Islamic Conference (OIC) member countries. They found higher LE and lower FR to lead to enhanced economic growth in those countries.

It is evident from above literature review that most of the researchers proxied the health variable with life expectancy, mortality rate or health expenditure per capita for different region in the world other than South Asia, a fastest growing region in the world since the last quarter of 2014 and home to a vast array of people. They used different methodologies and different data sets—panel and time series— and most of the studies found health to have a positive significant impact on economic growth. To the best of the authors' knowledge, however, no studies focused on cross-country evidence on the health-growth relationship for SAARC countries, which jointly account for about 40% of Asia's population (or over 24% of world's population) and each of these communities shares some common health and economic attributes together with their country-specific own unique cultures and backgrounds. Hence, this paper is an attempt to fill the gap in the extant literature. It focuses on the scenario of SAARC countries' health status and examines if the SAARC countries manifest the positive impact of health outcomes on economic growth.

III. Methodology

a) Dataset

In this study, we examine how health status (as proxied by survival rate and fertility rate) is associated with economic growth. We employ a balanced panel data set covering the period from 1972 to 2011, consisting of Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka.* The data used were obtained primarily from the World Bank database (WDI series) and Penn World Tables (PWT), Version 8.1 (Feenstra et al. 2015). We use the WDI for data on GDP series, the investment-GDP ratio, and the openness indicator, while relying on the PWT for the remaining variables. Where applicable (e.g., for national income accounts data), data are converted into 2005 constant dollars.

*Due to severe data limitations, Afghanistan (another SAARC member) was excluded from the regression analysis.

b) The Method

The regression analysis has been carried out using standard panel data techniques. "A longitudinal, or panel, data set is one that follows a given sample of individuals over time, and thus provides multiple observations on each individual in the sample" (Hsiao, 2014, page 1). Panel data allows for the introduction of temporal-spatial variables, while time series or cross-sectional approaches may not have this ability (Baltagi, 1995). "Panel data usually give the researcher a large number of data point, increasing the degrees of freedom, and reducing the collinearity among explanatory variables – hence improving the efficiency of econometric estimates" (Hsiao,2014, page 3). Working with panel data provides the analyst with more information, greater validity, less collinearity, and higher efficiency and can better represent adjustment (e.g., matching or correction) dynamics (Somayeh et al. 2014). In addition, panel data models enable us to control for unobserved country-specific effects and thereby reduce estimation biases (Eggoh et al., 2015). Furthermore, the panel data approach can help to disentangle some of the associations between demographic, health, and economic variables and growth, which could otherwise be problematic because the countries included in the sample are at different stages of development (Bhargava *et al*. 2001).

c) Conceptual Framework

Following economic theory we include both health and education in assessing the association between human capital and economic growth. We incorporate two proxies for health status, namely the proportion of the age cohort surviving to age 65 (SR), which accommodates both the life expectancy (LE) and mortality rate (MR), and fertility rate (FR). We also take life expectancy at birth (LE) separately into consideration as a substitute for SR to check for robustness. Life expectancy or survival rate is a broad measure of population health, and does not directly reflect labor force productivity. That said,capital formation—which is central to economic development—requires that a high proportion of the skilled labor force remains active for many years, an objective to which good health clearly contributes. In fact, investments in education and training critically depend on survival expectancies. All these factors, especially the health indicators, are potentially important in explaining growth outcomes (Bloom and Canning, 2000). However, the size of impact of population health status on growth rates is expected to depend upon a country's current GDP; in particular, SR or LE should be more important for explaining economic growth at low levels of economic development (Bhargava et al, 2001). We use school enrollment (secondary) to proxy for the educational component of the stock of human capital a country possesses at any given time. We could, of course, use

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the post-secondary school enrolment for this purpose, but unfortunately data for this category are not available for all countries in the sample.

Following the literature on determinants of growth, we control for other factors to assess the strength of the relationship between human capital and economic growth. We use the sum of exports and imports as a share of GDP to capture the degree of openness of each economy. Two alternative variables have been used as measures of investment in prior studies, namely the investment-GDP ratio and the ratio of gross fixed capital formation (GFC), net increase in the fixed capital, to GDP. Age dependency ratio (ADR) reflects the impacts of demographic changes on economic growth. It can be defined as the number dependents (aged zero to 14 and over the age of 65) to the total population, aged 15 to 64. This indicator gives an insight into the amount of burden (number of people of nonworking age) the population in working age has to face. A higher ADR could retard economic development by reducing productivity growth and investment rates (i.e., as a consequence of lower savings rates), as well as by increasing government expenditures associated with pensions and healthcare expenditures.

d) Econometric Framework

This study investigates how GDP growth is related to key health indicators (i.e., survival and fertility rates) and a range of other variables (i.e., age dependency ratio, school enrolment, openness to trade, investment-GDP ratio, etc.). We used a trans-logarithmic model for economic growth, maintaining a specification as close as possible to that of Bhargava *et al* (2001). In time-series analysis logarithmic transformations are often observed to stabilize the variance of a series, which for many economic variables can result in substantial improvements in the predictive capability of models incorporating those variables (Lütkepohl and Fang 2012). In fact, potential nonlinearity in the relationship between economic growth and the explanatory variables listed above may necessitate such a transformation (Eggoh et al., 2015).However, we also recognize and attempt to account for the possibility that the presence of endogeneity could results in inconsistent parameter estimates.

The model can be summarized using the following expression:

$$y_{it} = \delta_i + \sum_{j=1}^{n_1} x_{1ijt}\beta_j + \sum_{j=n_1+1}^{n} x_{2ijt}\,\beta_j + u_{it}\ (i = 1, \ldots .7;\ t = 1, \ldots \ldots, 40) \quad (1)$$

Here y denotes GDP growth, x_1 and x_2 refer to vectors of exogenous variables (i.e., age dependency ratio (ADR), openness, lagged GDP, and lagged investment/GDP ratio) and endogenous variables (i.e., survival rate (SR), fertility rate (FR), and interaction between SR and GDP), δ_i denotes unobserved country-specific effects, and u_{it} is the error term. Finally, i and t denote cross-sectional units and time periods, while j indicates the number of variables.

As the expression above suggests, we suspect the presence of endogeneity between GDP growth and a subset of explanatory variables. If true, these variables could be correlated with the disturbance term. Applying simultaneous equation techniques would enable us to address this issue. Alternatively, we can include lagged values for each variable, since their past values cannot be affected by the current level of GDP or by GDP growth rates. We choose to adopt the latter approach.

We employ three distinct regression techniques to estimate the parameters of Eq. (1), namely pooled OLS, weighted least squares (WLS), and the random effect (RE) model. We believe this will allow for more robust findings as they relate to the relationship between health indicators and GDP growth rates, especially since South Asian communities are highly heterogeneous with regards to ethnicity, religion, culture, language, demographics, and economic characteristics. Estimating WLS and/or heteroscedasticity-corrected pooled model should enable us to address potential heteroscedasticity. Furthermore, estimating the RE model should allow us to control for unobserved heterogeneity, assuming that individual effects are uncorrelated with the independent variables, whereas the heterogeneity time-constant and correlated with the independent variables. We run the Hausman test to determine if the RE model is more efficient than the fixed effects (FE) model, finding evidence in favor of the former.

Thus, the regression used as the basis for our analysis is the following:

$$y_{it} = \beta_0 + \beta_1 ADR_{it} + \beta_2 O_{it} + \beta_3 S_{it} + \beta_4 \ln(FR)_{it-1} + \beta_5 \ln(SR)_{it-1} + \beta_6 \ln\left(\frac{inv}{GDP}\right)_{it-1} + \beta_7 \ln(GDP)_{it-1} + \beta_8 ln(SR \times GDP)_{it-1} + u_{it} \quad (2)$$

The variables incorporated into the model are summarizes in the table below:

Table 1: Summary of model variables

Variable	Variable name	Data sources
Y	GDP growth rate	WDI
ADR	Age dependency ratio	PWT
O	Openness to trade	WDI
S	School enrolment (secondary)	PWT

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FR	Fertility rate	PWT
SR	Survival rate	PWT
INV/GDP	Investment-GDP ratio	WDI

IV. An Overview of Saarc Countries' Demography, Economy, and Health

The South Asian Association for Regional Cooperation (SAARC) is an economic and political organization of eight countries in Southern Asia consisting of almost 1.7 billion people in an area of 5.1 million km^2 (Giri et. al, 2015). During a summit held in 1983 in New Delhi, India, the leaders of Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka– adopted the Declaration on South Asian Regional Cooperation, agreeing on the following five areas of cooperation (Iqbal, 2006):

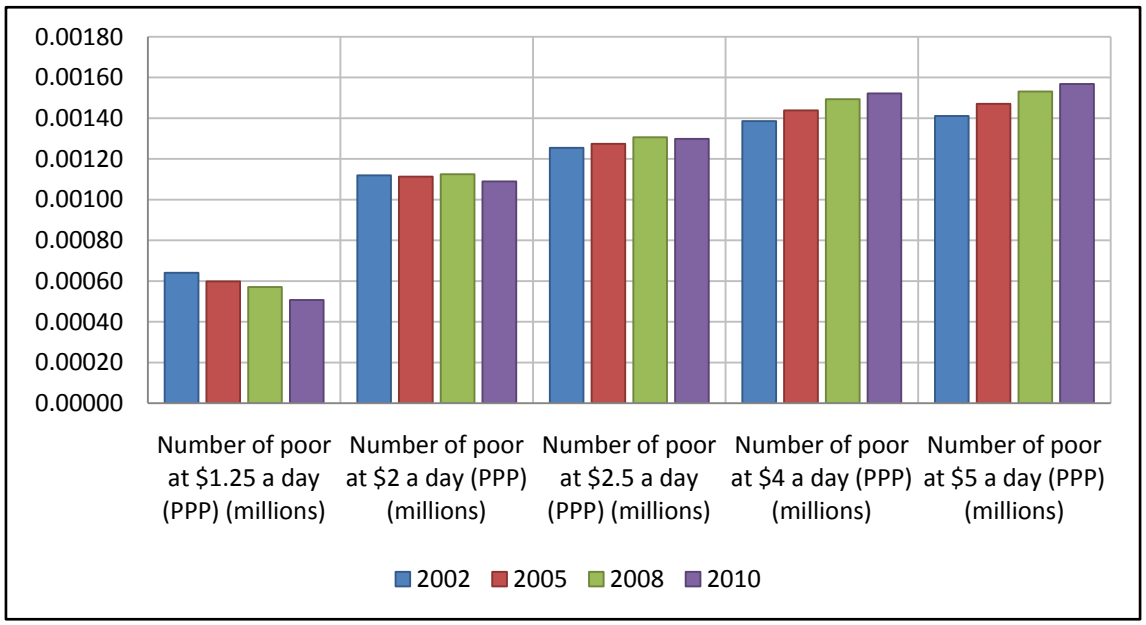
- Agricultural and rural development;
- Telecommunications, science, technology, and meteorology;
- Health and population activities;
- Transport; and
- Human resource development.

Afghanistan is the most recent addition to SAARC, becoming a member in November 2005. Afghanistan joined the SAARC on November, 2005 (Asian Forum for Human Rights and Development (FORUM-ASIA), 2012). The People's Republic of China, the European Union, the United States of America, South Korea, Iran, Myanmar, Australia, and Mauritius are all observers at SAARC summits (Shaheen, 2013).

Despite robust economic growth in recent years, SAARC region accounts for only 3% of world's gross domestic product, and nearly 40% of its inhabitants live on less than $1.25 per day (Rahman, et. al., 2012). Regional cooperation and integration has huge potential for accelerating economic growth and reducing poverty within and across the nations; yet South Asia remains the world's least connected region several decades after the establishment of SAARC due to the multitude of visa, travel, and trade barriers existing among the organization's members. Political instability, fragile democratic institutions, terrorism, religious intolerance, and ethnic conflicts all threaten regional peace and prosperity (Development Study Group, South Asian University, 2014).

a) Overall Regional Profile

South Asia is the world's densely populated region (336.1 people per km^2), containing more than 24% of the world's total population within an area consisting of only 4% of the world's surface. Although the countries in this region are beginning to experience progress in alleviating household poverty, the proportion of the population living below the poverty line is higher in Southern Asia than anywhere else excepting sub-Saharan Africa (WDI, 2014).



Source: World Bank (2014)

Figure 1: Poverty in South Asia

Figure 1 reports the absolute number of residents of South Asian countries living below the poverty line in 2002, 2005, 2008 and 2010. There have been gradual declines in the number of people in South

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Asia living on less than $1.25 and $2.00 over the period of analysis. The values in Figure 1 suggest these individuals are gradually moving into higher income categories.

Some health indicators, including life expectancy, IMR, rates of malnutrition, and the prevalence and incidence of some infectious diseases (e.g., tuberculosis and human immunodeficiency virus [HIV]) appear to be improving, but the regioncontinues to lag far behind other nations on these measures (WDI, 2014). Furthermore, the region is also struggling with a range of issues that make further improvements in population health challenging, including poor sanitation, inadequate access to healthcare services, and high prevalence of malaria,mental health issues, and a range of chronic diseases (e.g. diabetes, cardiovascular disease, etc.).

i *Demography*

South Asia, a region of strategic importance and home to a large and fast-growing population, faces acute public health challenges on a demographic and geographic scale unmatched in the world (Center for Strategic and International Studies, 2010). With just under one quarter of the world's population, its annual population growth is 1.38%—significantly higher than the world average of 1.22% in 2013 (Table 2), although less than that of sub-Saharan Africa (2.76%) or the Middle East and North Africa (1.92%).

Around 68% of the population of South Asia occupies rural areas as of 2015 (WDI, 2017). Demographically, the region is dominated by India, which has a population of 1.252 billion, but the region also contains two other densely populated countries, Pakistan and Bangladesh, with populations of 182.1 and 156.6 million, respectively, in 2013. There are sharp contrasts between South Asian countries with respect to such characteristics as population structure, stage of demographic transition, population density, mortality and fertility rates, urbanization and literacy levels. India, the largest country in this region, itself has major internal contrasts between its 28 states.

In terms of population structure, South Asia is relatively young (Engelgau, 2011), reflecting a combination of high fertility and mortality rates. In particular, the fertility rate was 2.60 children per woman in 2013, compared with a global average of 2.46, while average life expectancy at birth was 68.4 in 2014, which is approximately 3.1 years less than the world average.Between 1960 and 2014, life expectancy at birth in South Asia increased from under 42.4 to 68.4 years (World Bank and UNDP, 2015), suggesting substantial improvements in population health over that period.[+] Yet, the region is lagging behind other region in the World, except for Sub_Saharan Africa.

Table 2: Socio-demographic characteristics of South Asia compared to other regions

	Population in 2013 (Million)	TFR in 2013	Life expectancy at birth in 2014 (yrs.)	Annual population growth in 2013 (%)	HDI in (2014)	GNI per capita, 2011 PPP $ in 2014	Adult literacy rate in 2010
South Asia	1,698.09	2.60	68.4	1.38	0.607	5,605	66.54
Sub-Saharan Africa	948.32	5.04	58.5	2.76	0.518	3,363	60.60
Middle East and North Africa	408.73	2.87	70.6	1.92	0.686	15,722	79.99
Latin America and the Caribbean	619.51	2.13	75.0	1.12	0.748	14,242	92.36
East Asia and the Pacific	2,248.92	1.78	74.0	0.67	0.710	11,449	94.93
Europe and Central Asia	900.86	1.71	72.3	0.65	0.748	12,791	99.00
OECD	1,265.80	1.74	80.2	0.78	0.880	37,658	--
World total	7,176.09	2.46	71.5	1.22	0.711	14,301	85.23

Note: TFR ≡ total fertility rate (births per woman); HDI ≡ Human Development Index; GNI ≡ gross national income (current international $); PPP ≡ purchasing power parity.
Source: World Bank (2015) and UNDP (2015)

[+] With a life expectancy at birth of 60.4 years, Afghanistan lagssignificantly behind the other countries in the region.

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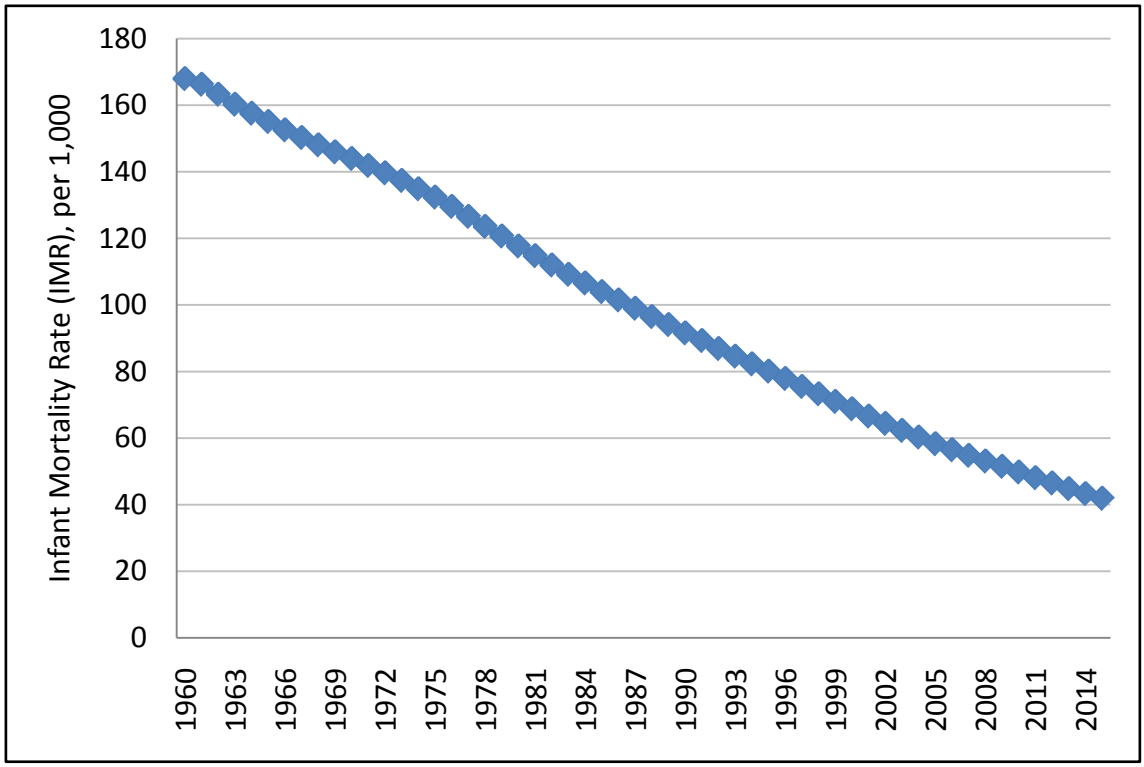
Significant declines in the infant mortality rate (IMR) provide further evidence of regional improvement in the health of the South Asian population over time. As shown in Figure 2, between 1960 and 2014 IMR fell by just under three-quarters (approximately 74%). This is expected to significantly grow the size of the regional labor force as the baby boomers reach working age, thereby might be creating potential for faster economic growth.



Source: World Bank (2015)

Figure 2: Infant Mortality Rate (IMR)

In several respects, South Asia is among the least developed regions in the world. For example, its 2014 Human Development Index (HDI) score of 0.607 was substantially lower than the world average of 0.711. Similarly, its per capita GNI of $5,605 (2011 PPP $ in 2014) was far below the world average of $14,301. Finally, the rate of adult literacy in South Asia was 66.5% in 2010, as compared with 85.2% world-wide.

ii *Economic Growth*

In 2012, 18.8% of the South Asian population lived at or below $1.90 a day, indicating significant improvement over the 1990 figure of 50.6%. However, substantial progress must be still be made to reach the 2012 Global Poverty Headcount Ratio of 12.7%. Despite a long period of robust economic growth, averaging 6.5% a year over the last 20 years, the number of people living in extreme poverty (i.e. under $1.25 a day) in South Asia remains unacceptably high, accounting for just over 77.8% of the extremely poor world-wide. Economic development in South Asia is evidently not sufficiently inclusive or occurring fast enough to satisfactorily address poverty in the region as 2030 approaches.

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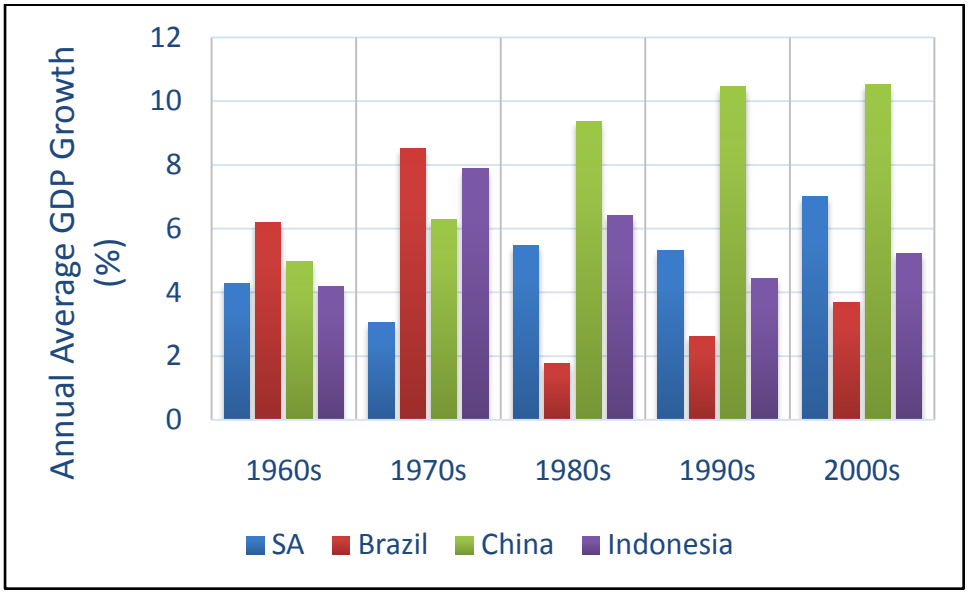
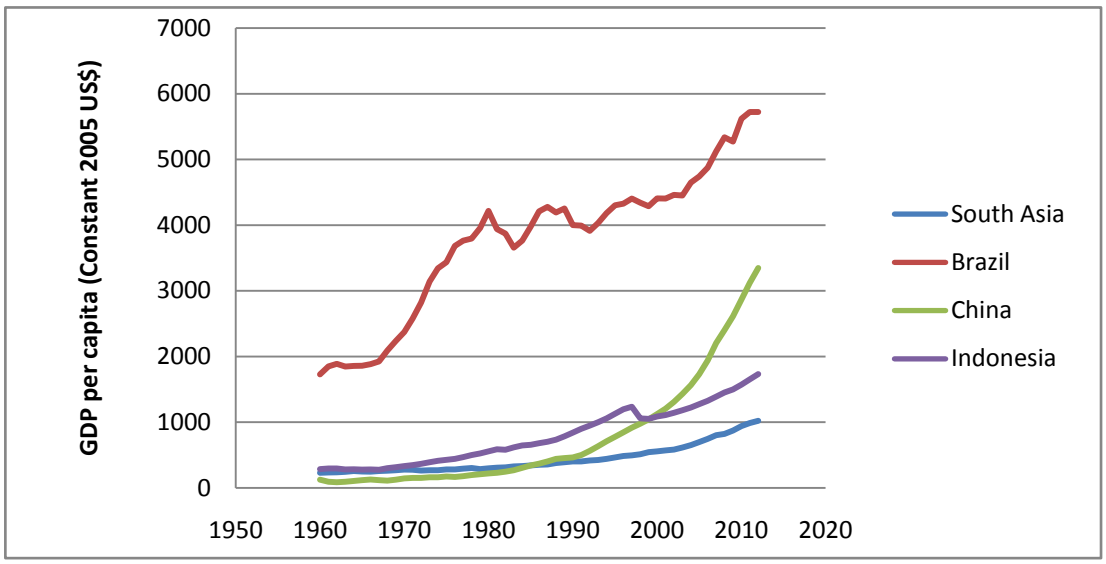


Data Source: World Bank (2015)

Figure 3: South Asia's Rising Economic Growth Rate Lagging behind China's

The region has experienced varying, but generally increasing, annual average GDP growth rates, beginning at 4.3% in the 1960s, declining to 3.1% over the next decade, rising to 5.5% and 5.3% during and the 1980s and 1990s, respectively, and finally climbing to around 7.0% in 2000s. Moreover, South Asian economic growth is expected to accelerate in the near future due to driven by expansion in the Indian economy and favorable oil prices.

However, as shown in Figure 3, these rates have consistently been lower than the corresponding figures for China. Similarly, Figure 4 shows that the rate of economic growth in South Asia is such that GDP per capita has not only fallen well behind China, but has also failed to close the gap with other developing nations, such as Brazil and Indonesia[+]



Data Source: World Bank (2015)

Figure 4: GDP per Capita in South Asia and comparator countries, 1960-2010

[+]This is attributable in part to the strong growth performance of both countries during the 1970s, as well as to the fact that Brazil's GDP per Capita began from a much higher base

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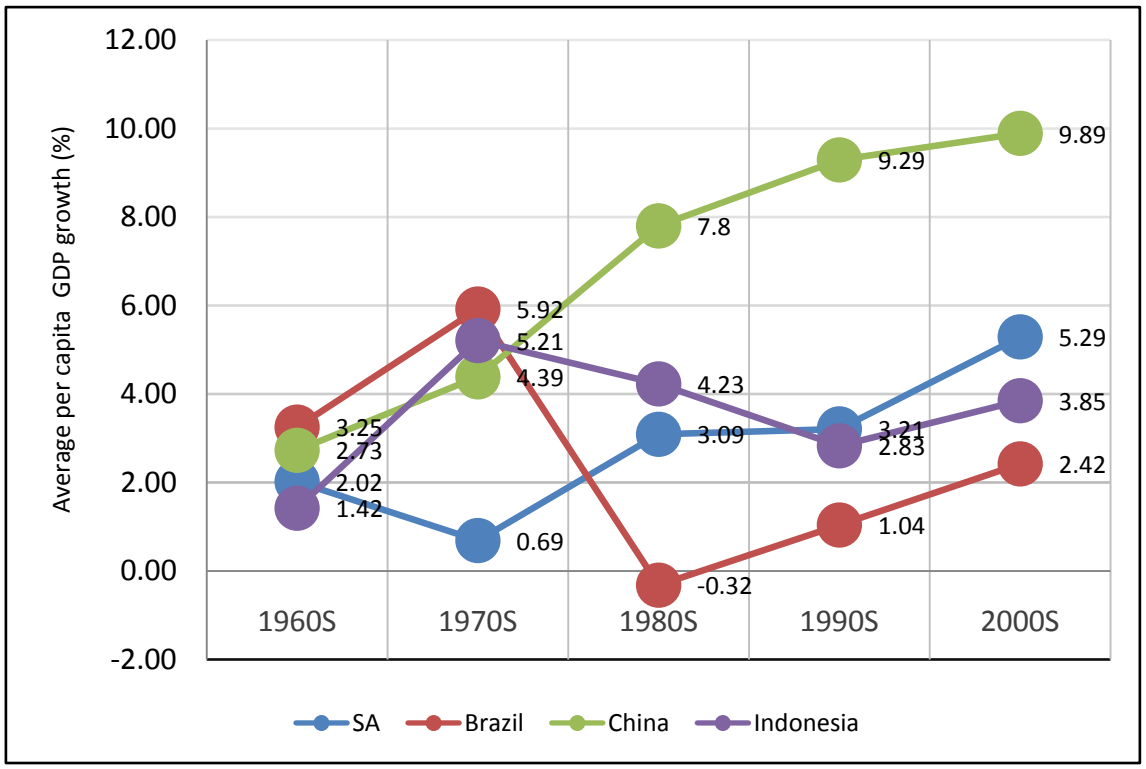
Figure 5 shows that South Asia has experienced variable—though generally increasing—annual average growth in per capita GDP, beginning at 2.02% in the 1960s, but falling to 0.69% in the 1970s before surging to 3.09% in the 1980s. Beginning in the 1990s, South Asia has on average outperformed Brazil and Indonesia, posting annual growth rates of 3.21% over the decade (versus 1.04% and 2.83%, respectively); this trend carried over into the 2000s, during which time the region achieved average annual growth in per capita GDP of 5.29% (versus 3.85% and 2.42%, respectively). However, as with total GDP, these rates have consistently been lower than those observed in China over the same period.

In the early 1970s, the region experienced a brief period of negative growth in GDP per capita (an event commonly referred to as the "South Asian dip"). Sri Lanka rebounded quickly from the downturn and since that time has generally performed better than the other nations in the region, exhibiting averages rates of growth exceeding 6.00% since 2009. While increasing rapidly prior to 1985, Pakistan's per capita GDP has since grown sluggishly, averaging 2.00% since 2000. The economy of Nepal, one of the poorest countries in the region, has been languishing throughout the entire period. Economic data for Afghanistan, Bhutan, and the Maldives is incomplete, but these economies appear to have performed reasonably well since 2005, although the Afghan economy has experienced negative growth since 2013.



Data Source: World Bank (2015)

Figure 5: Relatively Slow Growth GDP per Capita (PPP) in South Asia

iii *Total Health Expenditure (public as well as private) and GDP*

As a proportion of GDP, total health expenditure in South Asia in 1995 was approximately 3.9%. As shown in Figure 6, over much of the next decade the health share of GDP generally exceeded 4%, peaking at 4.3% in 2004. Since that time, this share has gradually declined, which may reflect the strong economic performance observed over this period.

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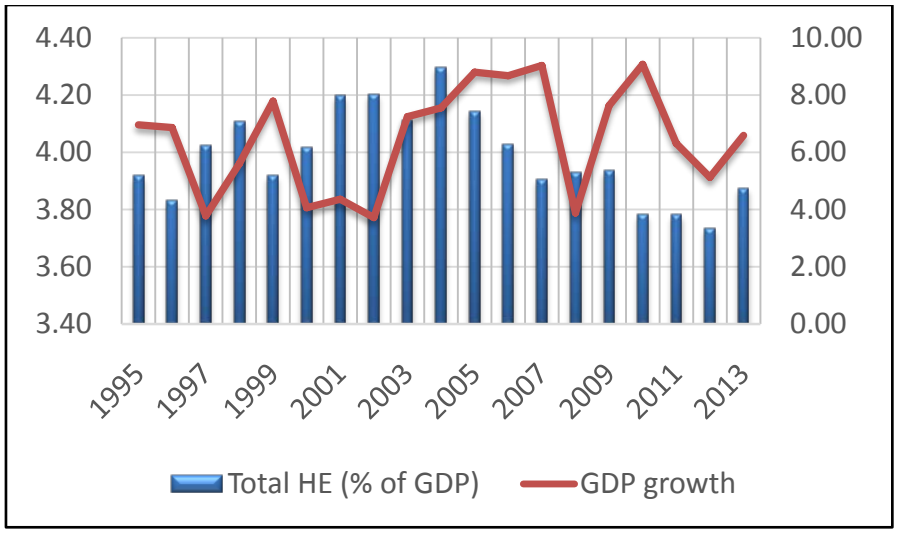


Data Source: World Bank (2015)

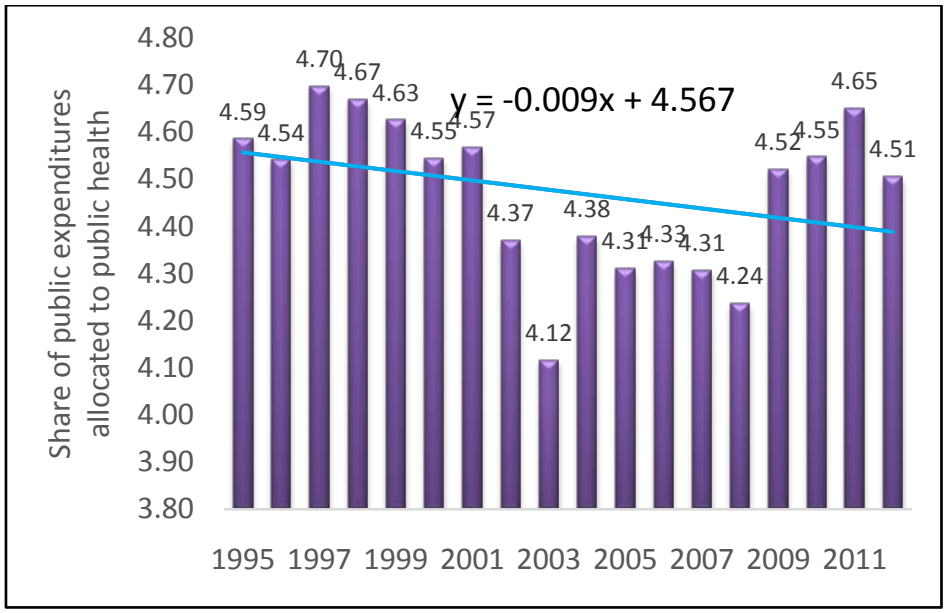
Figure 6: Total health expenditure (% of GDP) and GDP growth (annual %)

Generally, richer countries allocate a larger share of GDP to health expenditures relative to poorer countries. Among OECD countries, for example, the average percentage of GDP dedicated to health spending (12.62%) is more than three times that observed among South Asian countries (4.0%) in 2012. As in OECD countries, growth in health expenditures in many Asian/Pacific countries has over the past decade exceeded economic growth, resulting in increasing shares of each economy being dedicated to health. With the exception of Afghanistan and the Maldives, this has not, however, been true of members of the SAARC.

iv *Public Health Expenditure*

Public health spending typically refers to expenditures for such activities as food and drug safety, health inspections, health promotion, public health nursing, vaccination, occupational health, and initiatives and programs to prevent the spread of communicable diseases.

In 1995, public health spending accounted for about 4.6% of government expenditures among South Asian countries. As shown in Figure 7, the share of government expenditures allocated to public health generally declined over the period of analysis, although a significant reversal of this trend has since taken place.



Data Source: World Bank (2015)

Figure 7: Health expenditure, public (% of government expenditure)

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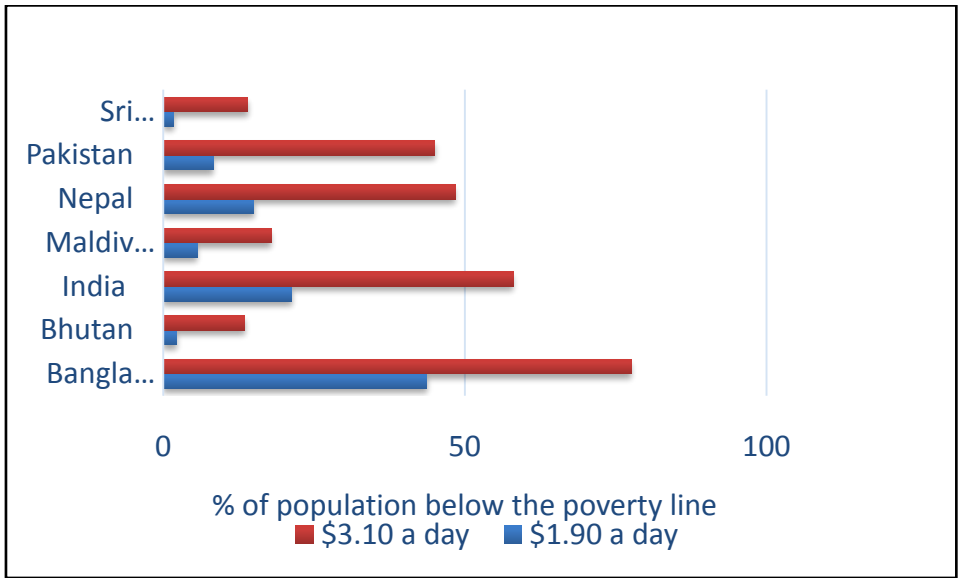
b) Cross-country Profiles

Despite being the member of SAARC, South Asian countries are quite heterogeneous in terms of their level of socioeconomic development. Although South Asia's economy as a whole is growing faster, most of the countries in this region have been left behind the overall economic upturn in Asia. Most of the countries in this region are still struggling with extreme impoverishment; especially, Bangladesh is in most vulnerable condition in terms of percent of population both below $1.90 and below $3.10 a day, followed by India, Nepal, and Pakistan (Figure 8). This extreme poverty translates into bad health outcomes, which in turn may affect growth prospects if the matter is not addressed with special attention.



Data Source: World Bank (2015)

Figure 8: Poverty Headcount Ratio of SAARC Countries, 2012

In fact, it is difficult for poorer countries to provide adequate preventive and curative health services, and poor individuals and households cannot get rid of unhealthy surroundings, buy enough food or use the health services that exist. Most of the countries in this region are categorized as least developed economies and their health status is low in terms of life expectancy and other indicators. Yet some countries, like Sri Lanka, Maldives, and Bangladesh have had progress in some health indicators because they have focused resources on improving the social determinants of health — education, adult literacy, water, sanitation, health promotion, and food security.

Table 3 depicts the latest (mainly 2012) scenario of South Asian country-level profiles for population, economy, and health. Although the factors affecting population growth and size (e.g. birth and mortality rates) are largely outside the control of health system decision-makers, the implications of a growing population in terms of potential demand for healthcare services in the future need to be considered. There is enormous variation in size of population from Maldives to India. Yet, all countries have almost similar high proportions of people living in rural areas indicating that most of the people of SAARC countries are lacking sufficient numbers of healthcare professionals, hospitals, and medical clinics. Moreover, the typical small hospitals in rural areas generally lack high-quality care and equipment. Another problem is the long distance to healthcare center the rural population and ambulance must travel to receive healthcare services and rural residents, as a result, receive medical attention more slowly than their urban counterparts do. In addition, rural areas have an 'aging population' (aged 65 and older) compared to urban areas. This fact of rural age profile adds to the healthcare problems that also must get attention. In sum, the majority of the people in those countries are at a greater risk from different health hazards including mortality compared to urban residents.

Table 3: Demographic, economic, and health profiles for South Asian countries

Category	Indicators	AFG	BGD	BTN	IND	MDV	NPL	PAK	LKA
Population	Total (million) in 2015	32.01	159.86	0.78	1276.20	0.38	28.40	190.40	21.70
	Rural (% of total) in 2012	74.532	68.01	63.63	68.37	57.70	82.48	62.57	81.70
	DR in 2012	95.31	55.93	50.43	54.73	48.71	69.13	67.15	49.76
Economy (2015)	GDP , PPP (billion US$)	63.5	572.6	6.3	7996.6	5.2	70.7	928.0	233.7
	GDP per capita	1,976	3,581	8,158	6,266	14,980	2,488	4,886	11,068

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	GDP Growth Rate (%) in 2014	3.20	6.20	6.40	7.30	4.50	5.50	4.20	7
	Population below poverty line	15.80	31.50	23.70	21.90	16	25.20	22.60	8.90
Health Indicators (2012)	IMR (per 1,000 live births)	71.7	35.3	30.8	42.6	9.2	33.1	70.6	8.9
	MMR	496	214	177	197	76	308	197	32
	CDR (per 1,000 population)	8.10	5.74	6.55	7.94	3.41	6.74	6.98	7.04
	LE at birth, total (years)	60.51	70.29	67.89	66.21	77.57	67.98	66.43	82.38
Health Services	HB (per 1,000 people)	0.5 (2012)	0.6 (2011)	1.8 (2012)	0.7 (2011)	4.3 (2009)	5 (2006)	0.6 (2012)	3.6 (2012)
	Physicians (per 1,000 people) in 2010	0.194	0.295	0.023	0.649	1.415	0.374	0.827	0.68
Health Financing (2012)	HE (total) as % of GDP	8.48	3.54	3.61	3.81	11.37	5.49	2.77	3.11
	PHE (% of total HE)	20.80	31.94	73.38	30.46	57.05	39.50	36.90	39.05
	PCHE	159.10	85.16	263.78	195.57	1283.38	118.42	122.44	269.87

Data Source: Population and Economic data are sourced from the IMF, current as of April 2015 and other data are from WDI, 2012 data series.

Note: AFG = Afghanistan, BGD = Bangladesh, BTN = Bhutan, IND = India, MDV = Maldives, NPL = Nepal, PAK = Pakistan, LKA = Sri Lanka DR = dependency ratio (% of working age population), MMR = maternal mortality ratio (modeled estimate, per 100,000 live births), CDR = crude death rate, HB = hospital beds, HE = expenditure on health, PHE = public health expenditure, PCHE = per capita health expenditure (constant 2011 international PPP$), GDP per capita is in constant 2011 international PPP$.

Life expectancy ranges largely from 66.51 years in Afghanistan to 82.38 years in Sri Lanka in 2012, where approximately 8% of the population is 65 years or older, much higher than the proportion for other countries. This is an important point especially when age related diseases are to be considered. The density of both Physician and hospital bed tend to be low across the SAARC communities, with exceptions in Maldives and Sri Lanka. In 2012, total health expenditures as a percent of GDP is expected to range from 2.77% in Pakistan to 11.37% in Maldives. The public sector is forecast to be responsible only for 31.17% of South Asian health expenditure in 2012. The public sector's share is expected to be the highest in Bhutan (73.35%) and the lowest in Afghanistan (20.80%). Health expenditure per capita varies among countries in part because of different age distributions, population density, and geography. Other factors that affect health expenditure include population health needs, the manner in which health care is delivered, and the ways in which health care is financed (degree of public coverage and private insurance). In 2012, the highest per capita spending among SAARC countries is projected to be in Maldives, followed by Sri Lanka. The lowest per person expenditure is forecasted to be in Bangladesh, followed by Nepal.

Figure 9 shows how South Asian countries managed the financial crisis reasonably well. However, the real GDP growth has moderated and stayed far below pre-crisis levels. Regional growth slowed from 6.31% in 2011 to 5.13% in 2012, driven mainly by the slowdown in India, which accounts for about 80.00% of the region's GDP. India's real GDP growth for 2012 was 5.08%t, down from 6.64% in 2011. Of course, its growth rate started to rise from 2013 and reached a regional high, 7.42%, in 2014. Bangladesh economy, characterized by slower export and investment growth, maintained a GDP growth rate above 6.00% with little fluctuation from 2011 to 2013. Sri Lanka, following prudent macroeconomic policies but facing curbed demand in its main export markets, recorded 6.34% growth in 2012, down from 8.25% in 2011. However, the economy continued to grow above 7.00% from 2013 and reached at 7.37% in 2014. In Afghanistan, real GDP growth for 2012 is estimated at 14.43%, the regional outlier, well above 6.11% in 2011, with a sharp decline to below 2.00%, again, in 2013. In Bhutan, GDP growth was 5.07% in 2012, down from 7.89% in 2011 with further down to 2.04% in 2013 and hence regaining the rising rate at 6.26% in 2014. Nepal and Pakistan recorded higher growth rates in 2014 than in 2011, 2012, and 2013. Maldives experienced a sharp fall in GDP growth from 10.83 in 2011 to 1.49% in 2012, but from 2013, it has been growing nearly at 8.00% (World Bank 2013b).

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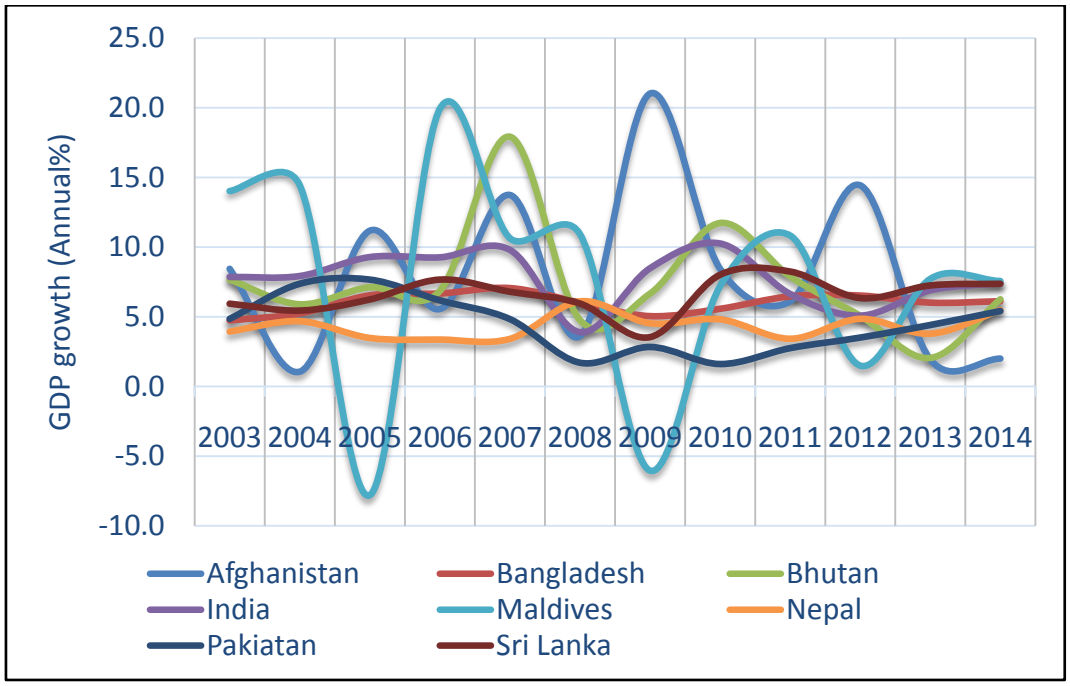
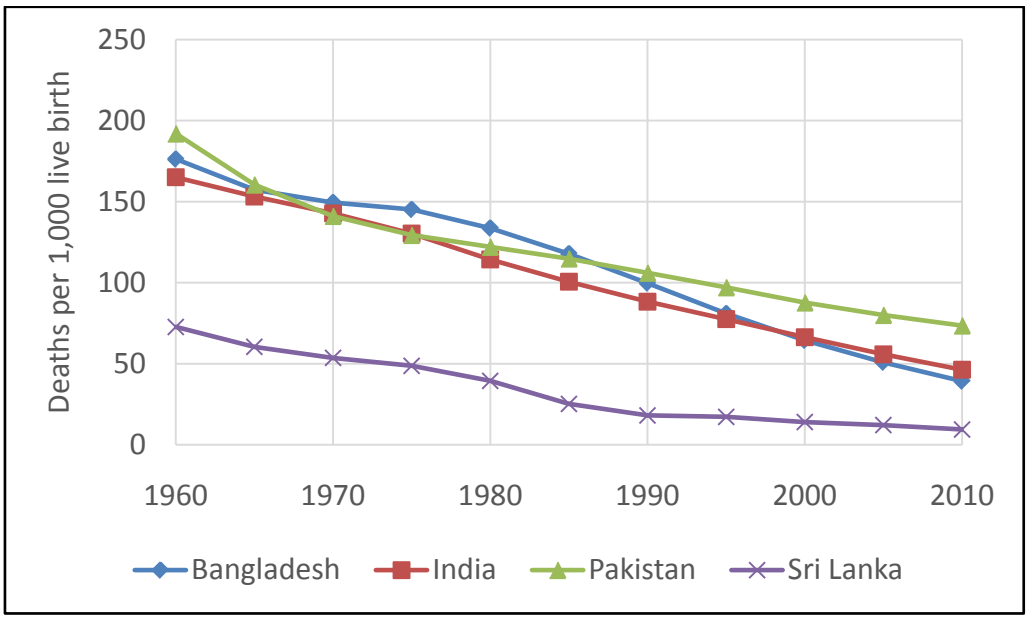


Data Source: World development indicators (WDI, 2014); World Bank (2015)

Figure 9: South Asian Growth has slowed but is stabilizing

A detailed examination of health indicators of South Asia's four largest countries (Bangladesh, India, Pakistan, and Sri Lanka) conveys a sense of health status of this region. Figure 10 shows these countries' trends in IMR. Sri Lanka has been showing low IMR in this region since 1960. Other three have seen substantial declines since 1960, but Bangladesh, which was worst placed until 1985, experienced the most rapid decline and its IMR is now below that of India and Pakistan.



Data Source:UN Inter-Agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA Population Division) at www.childmortality.org.

Figure 10: Declining IMRs in Bangladesh, India, Pakistan, and India

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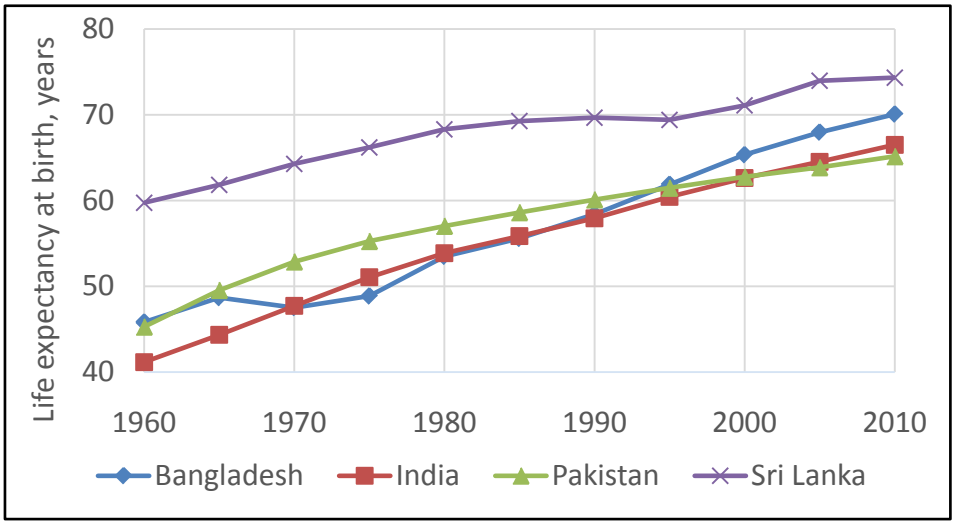
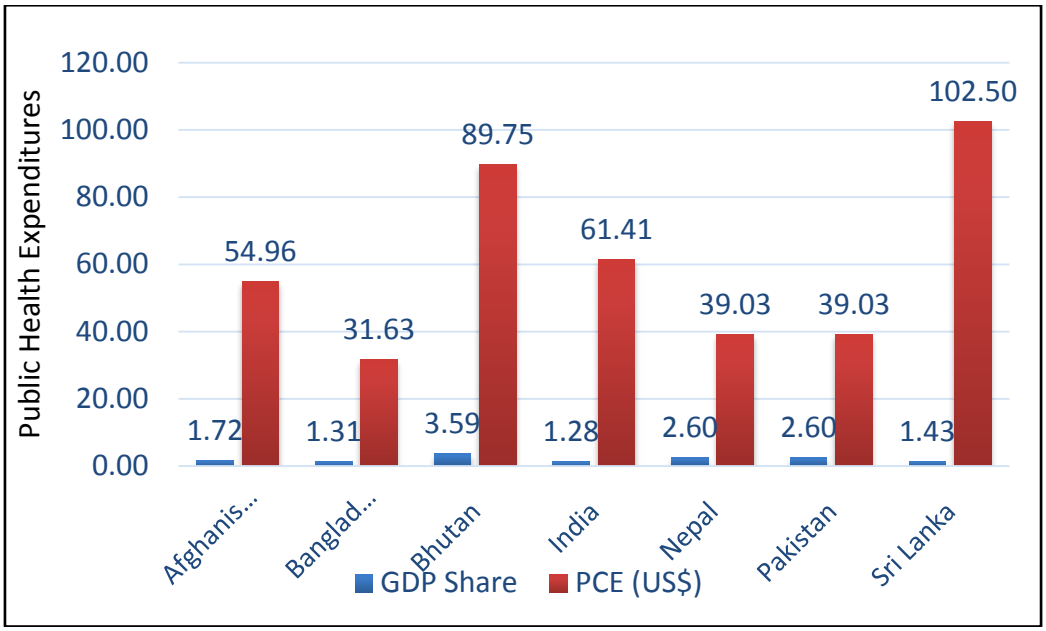
A related indicator of declining mortality is rising trend in life expectancy (see Figure 11). The rise in life expectancy seen in all four countries reflects increases in survival likelihood at all stages of the life cycle. Consistent to the IMR, Sri Lanka has highest life expectancy in this region throughout the period. The most appreciable rise, however, has been in Bangladesh, with an increase of more than thirty years since the middle of the last century. Even in Pakistan, which has seen the slowest increase of other three largest countries, life expectancy grew rapidly, gaining slightly above twenty years during the same period.



Data Source: World Bank (2015). (http://data.worldbank.org/indicator/SP.DYN.LE00.IN)

Figure 11: Steady Rise in Life Expectancy, 1960-2010

Figure 12 shows the country level picture of public health expenditure as a share of GDP and per capita expenditure in South Asian countries for the year 2013. The values are extremely low (except in Maldives where GDP share in public health expenditure is 6.22% and per capita expenditure is $720.46, omitted here to avoid outlier problem in Figure 12). In 2013, the public health expenditure as a percentage of GDP was reported to range from 1.28% in India to 3.59% in Bhutan, considering Maldives as an outlier. Total health expenditure per capita varies among the countries. In 2013, Sri Lanka and Bhutan spent more per person on health care than the other countries, at $102.50 and $89.75, respectively. The lowest health expenditure per capita has been seen in Bangladesh in 2013, only at $31.63.



Data Source: World Bank (2015). (http://data.worldbank.org/indicator/SP.DYN.LE00.IN)

Figure 12: Public Health Expenditure in South Asia, 2013

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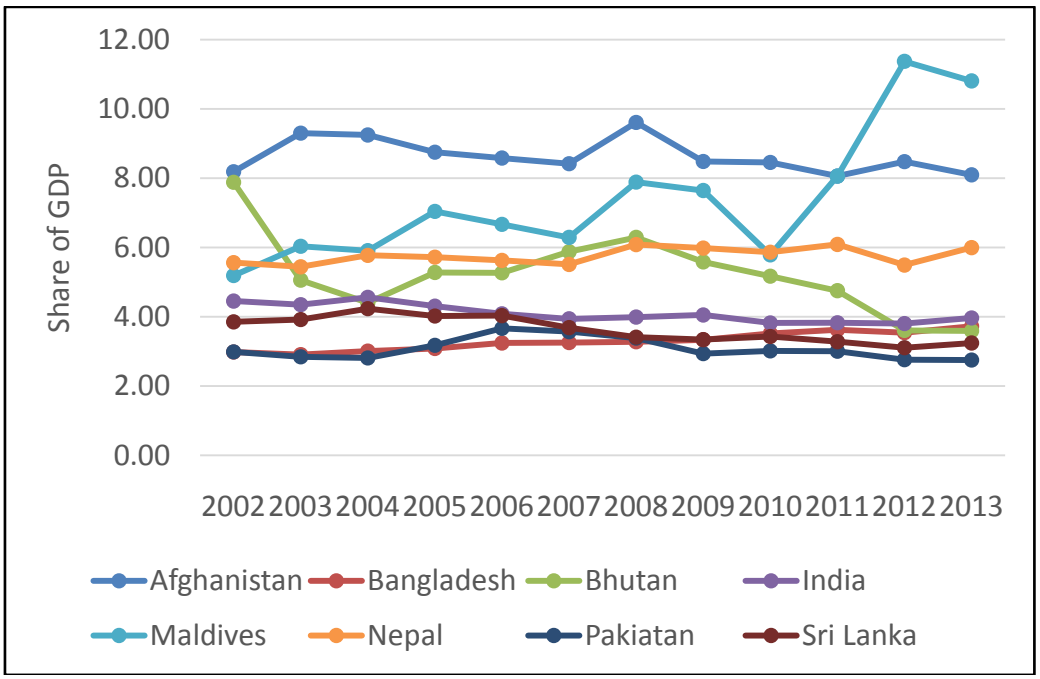
The country level profiles of the total health expenditure as percent of GDP are different, but within the country, variation is very small except a sharp rise between 2010 and 2012 for Maldives and a mild decline starting from 2008 in case of Bhutan.



Data Source: World Bank (2015). (http://data.worldbank.org/indicator/SP.DYN.LE00.IN)

Figure 13: Total health expenditure by country (% of GDP)

This indicator varied from 3.08% in Pakistan to 8.64% in Afghanistan on an average. Note that between 2002 and 2013 the share of GDP allocated to health remained stable in Afghanistan, Bangladesh, Pakistan, and Sri Lanka, while it showed a slight decline in Bhutan and India, and a slight increase in Nepal and the Maldives (Figure 13).

V. Empirical Results for Models for GDP Growth Rates

Table 3 presents the empirical results for GDP growth rates for seven South Asian countries over the period 1972-2011 using the SR as the key indicator. Table 5 examines the similar, but replacing SR by life expectancy (LE). Since GDP series are assumed to be of stochastic nature, it is preferable to model GDP growth rates instead of GDP levels (Bhargava, 2001).

Empirical evidence presented in Table 4 reveals that the ADR has a significant negative effect GDP growth in all specifications indicating that if there are more idle persons in the economy due to age or other factors, then economic growth will definitely be affected adversely.

School enrollment, an important component of human capital variable, has positive and significant impact on GDP growth emphasizing the importance of spreading the light of education to all citizens in this territory. Of course, De La Fuente and Domenech (2001) found the education variable to exert an insignificant impact on GDP growth due, as they suggested, to measurement error in the schooling data. Bloom et al. (2005) instrumented years of schooling by literacy rate to avoid possible measurement error problem; but as the data on literacy rate in SAARC region are very less frequent and also the periods on which data are available are different across countries, we had to rely on year of schooling as a proxy of education.

Table 4: Estimated slope coefficient from the regression of real GDP growth rates using SR as the key indicator of health status, 1972-2011

Variables	Model-1: Pooled OLS		Model 2: WLS		Model 3: Random Effect	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
ADR	-0.145539	0.062	-0.115814	0.009	-.1456333	0.019
O	-0.00530451	0.507	0.00524811	0.517	-.0053153	0.506
S	1.18438e-07	0.011	8.56023e-08	0.059	1.18e-07	0.010
$\ln(FR)$ lagged 1 year	8.98307	0.002	6.75539	0.001	8.98323	0.002
$\ln(SR)$ lagged 1 year	11.1072	0.000	7.05314	0.009	11.11086	0.000

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$\ln(inv/GDP)$ lagged 1 year	0.912765	0.213	1.07307	0.124	.9113396	0.213
$\ln(GDP)$ lagged 1 year	-1.06502	0.001	-0.661464	0.019	-1.066254	0.001
$\ln(SR \times GDP)$lagged 1 year	-2.22253e-08	0.267	-1.45971e-08	0.498	-2.16e-08	0.265
Constant	-29.2269	0.006	-16.4853	0.077	-29.22463	0.005

Source: Authors Calculation Using STATA software.

Unlike Bhargava (2001), the log of FR is positively associated with GDP growth rates and is statistically significant in all model specifications of this study. High fertility rates are common in developing countries and may have negative impact on economic growth if work force and employment opportunity do not increase proportionately with the population possibly due to decrease in the ratio of skilled to unskilled labor and also due to increase in demand on resources for health care and education. However, the sample economies considered in this study are predominantly labor intensive. Moreover, there are employment opportunities overseas, especially in the labor market of Middle-eastern countries for the work force of these countries; fertility rate is thus likely to be positively associated with GDP growth rates.

Survival rate, the key indicator of health status, is found to be a significant predictor of economic growth. Contradictory to the above result, Heshmati (2001) found health indicator to be insignificant in affecting the economic growth for OECD countries. However, many researchers such as Barro (1996), Peykarjou et al. (2011), and Weil (2005) found LE to exert positive effect on real per capita GDP and economic growth. The empirical results are similar when SR is replaced by LE, but the results with LE are not robust to change in regression techniques. This is perhaps not surprising since LE is strongly influenced by child mortality. Because child mortality itself is affected by unwanted FR in developing countries, the FR and SR could be better indicators of health status (Bhargava, 2001).

Table 5: Estimated slope coefficient from the regression of real GDP growth rates using LE as the key indicator of health status, 1972-2011

Variables	Model-1: Pooled OLS		Model 2: WLS		Model 4: Random Effect	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
ADR	-0.048311	0.35970	-0.0759747	0.05254	-.1296323	0.028
S	7.72358e-08	0.10435	6.14167e-08	0.20439	1.24e-07	0.012
O	0.00642157	0.35729	0.012425	0.10359	-.0050468	0.523
$\ln(inv/GDP)$ lagged 1 year	1.41222	0.05296	1.34339	0.05823	.2991911	0.712
$\ln(FR)$ lagged 1 year	4.87177	0.06825	5.16965	0.01179	10.15934	0.001
$\ln(LE)$ lagged 1 year	9.79321	0.03078	6.69038	0.11999	20.46794	0.000
$\ln(GDP)$ lagged 1 year	-0.533317	0.04730	-0.349482	0.16277	-1.075228	0.001
$\ln(LE \times GDP)$lagged 1 year	-1.31617e-08	0.53836	-9.67755e-09	0.67784	-2.30e-08	0.281
Constant	-31.1253	0.08182	-19.2278	0.25958	-71.54191	0.001

Source: Authors Calculation Using STATA software.

The parameter estimate of investment-GDP ratio is positive but, its impact on GDP growth is found to be statistically insignificant. When the investment-GDP ratio is replaced by gross fixed capital formation (GFCF) as percent of GDP, however, the impact is positive as well as statistically significant and robust to change in regression techniques (see Table 5); it implies that the increase in investment for physical capital formation affects economic growth positively.

The coefficient of lagged GDP is estimated with negative sign that is statistically significant implying a tendency of regression towards the mean.

Table 6: Random effect and WLS regressions of real GDP growth rates considering gross fixed capital formation (GFCF) as a replacement for investment-GDP ratio, 1972-2011

Variables	Model 1: Random Effect		Model 2: WLS	
	Coefficient	P-value	Coefficient	P-value
ADR	-.1725739	0.004	-0.107475	0.00526
S	1.06e-07	0.018	6.37556e-08	0.17984
O	-.0112397	0.129	0.00437981	0.55303
$\ln(GFCF)$ lagged 1 year	2.285841	0.008	2.31724	0.00319
$\ln(FR)$ lagged 1 year	10.56417	0.000	7.50525	0.00017
$\ln(SR)$ lagged 1 year	12.11478	0.000	9.99078	0.01048

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$\ln(GDP)$ lagged 1 year	-.9804084	0.001	-0.379297	0.08846
$\ln(SR \times GDP)$lagged 1 year	-2.15e-08	0.262	-1.35361e-08	0.55938
Constant	-42.37661	0.000	-41.9605	0.00805

Source: Authors Calculation Using STATA software.

VI. Conclusioln

Health is considered as the cornerstone of development process forasmuch it plays a role as an instrument for enhancing economic growth, quite apart from being the direct source of human welfare. Appropriate econometric techniques were applied in the analysis to draw inferences about the impact of good health on economic growth. The main finding of the study is that good health has a positive and sizeable impact on economic growth in low-income countries, like SAARC economies. It suggests that an increase in the population's survival prospects of 1.00%, on average, leads to about 0.11% increase in GDP growth rates of the sample countries. This is a relatively large impact, which indicates a policy implication that increased investment in promoting health status results in a number of positive outcomes ranging from a demographic dividend to a more productive workforce. Thus, investment in health with a view to improving survival prospects or life expectancy and other health indexes, even in the low-income countries of South Asia should get priority.

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