The Macroeconomic Implications on Healthcare Expenditures: Challenges Facing South Asian Countries

Goran Miladinov[1*]

[1] Independent Researcher, Macedonia
* Correspondence: miladinovg@aol.com

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Abstract: Rising healthcare costs have become a concern for individuals and governments around the world. Governments try to estimate the balance between the allocation of healthcare costs to improve human health and economic efficiency. The study examined the relationship between public healthcare costs and macroeconomic indicators within South Asian countries. The study used data mainly from the World Bank World Development Indicators for eight South Asian countries from 2000 to 2020. The weighted least squares method and the pool regression were employed in the analysis of the study. The main findings of the study demonstrate that GDP *per capita* and foreign direct investments (FDI) increase public healthcare spending. The inflation and budget deficit showed to be significant determinants regarding healthcare spending, specifically for some of the countries in the pool. Based on the findings, the study recommends that governments jump on policies that improve economic growth and tax revenues, as well as stabilize inflation. These economic policies could increase public healthcare costs because they have a strong relationship with macroeconomic indicators.

Keywords: South Asia; healthcare expenditures; pool; weighted least squares; macroeconomics

1. Introduction

One of the most important values of each country is human health, which is notably affected by the government's obligations in the field of healthcare (Abuselidze, 2021). As health represents one of the key public concerns, attracting the attention of governments and political actors to enhance health is an unavoidable phenomenon (Lacko et al., 2023). Indeed, rising healthcare costs have become a concern for individuals and governments around the world. In addition, governments try to estimate the balance between the allocation of healthcare costs to improve human health and economic efficiency. Health policymakers and planners in developed and developing countries are worried about growing healthcare expenditures and are interested in determining the key factors that influence this spending (Awais et al., 2021). Therefore, governments are making efforts to increase public healthcare spending with the main goal of improving the health of the population (Zhou et al., 2020). Improving population health is a subject matter of great concern globally (Zhou et al., 2021). Accordingly, nowadays, people are even more aware of the importance of the healthcare sector, whose weaknesses were manifested by the COVID-19 pandemic. The experience with the coronavirus disease 2019 pandemic and the challenges of the rapid population aging showed that nations need strong and flexible health systems. In recent decades, the health expenditures in the countries increased mighty, not just in absolute numbers but also as proportions of their GDPs (Chen et al., 2021). Such an increase in health expenditure all over the world is expected to continue over the coming years (Chen et al., 2021; Tur-Sinai 2022). The healthcare systems in high-income countries are distinguished by a large sum of funds allocated to public health financing, except in the US and several other countries, where private health financing exceeds public health financing (Sirag et al., 2017). Each year, the cost of health by the government is increasing in developed countries. In these countries, the health system is based on the principle of public solidarity and most of healthcare costs are covered by the government through health programs or social insurance schemes (Abuselidze, 2021). In emerging economies, the health system is challenged with unstable health costs like gaps in quality, protection, access, and fairness (Zhou et al., 2021). Consequently, Akca et al. (2017) claimed that the process of establishing the exact healthcare expenditures in a country is a process that needs consideration of several factors.

The importance of the role of healthcare financing stems from the idea that health is vital for human well-being as well as economic development as it ensures a healthy and productive workforce for the economy (Sirag et al., 2017; Nghiem & Connelly 2017; Bloom et al., 2022). It is an obvious fact that improving human health can contribute to economic growth, thereby improving the well-being of the population and economic efficiency (Hussain et al., 2022). The most important development matter in question facing the world nowadays is healthcare financing (Zeufack-Nkemgha et al., 2020). Therefore, if a country is spending vast amounts of funds on healthcare, it is an investment whose outcome is often worthwhile (e.g. longer life or more gained years of life), (Zeufack-Nkemgha et al., 2020). Improved population health as reflected in morbidity and mortality rates and life expectancy improves labor supply, labor productivity, and total factor productivity (Kabajulizi et al., 2017). Thus, there is no doubt that healthier people work harder, longer and more productively and are probably more abundant consumers. Healthcare systems have also important macroeconomic implications, an aspect that includes feedback effects on public revenues and expenditures (Darvas et al., 2018). Darvas et al. (2018) emphasize that it is of great significance to note that healthcare systems in different countries are organized differently. Thus, in terms of GDP and population, different countries spend very different amounts on health care. Across the countries, the higher the GDP, the higher the government's shares of health care funding. Even though in many countries healthcare costs have been rising for decades, there have been attempts to reduce costs, especially in times of public finance restrictions (Jagrič et al., 2022).

The study investigates the changes in macroeconomic indicators and their effect on public healthcare expenditure in South Asia using the pool model. Besides the Sub-Saharan region, South Asia also is one of the regions with the lowest annual healthcare costs per capita in the world. This is my motivation why studying this region. Therefore, this paper aims are to explore how macroeconomic indicators of healthcare can contribute to understanding the changes in healthcare costs and thus to develop a research framework to illustrate the relationships between macroeconomic indicators, health and health care. With the building of this research framework, the research work will contribute to considering the overall healthcare costs generated by the modern healthcare systems. The following sections of the research work are organized as follows: Section 2 provides a literature review with a subsection on trends in health expenditures in South Asian countries; Section 3 presents the methodology, data and specification of the model; Section 4 provides empirical results; Section 5 discusses the findings, and Section 6 concludes the study accompanied by implications for policy.

2. Literature Review

A lot of research studies provide evidence of investigation on macroeconomic aspects, public health, and healthcare costs. This Section describes the previous research works related to macroeconomic tendencies and changes in healthcare expenditures that refer to public health and which have meaningful research contributions to the existing literature. A substantial literature analyzes the factors of health care expenditures. Given concerns about the cost impact of aging societies, many papers also have focused on per capita healthcare spending increasing levels with age (Hsiao & Heller, 2007). As discussed by Hsiao and Heller (2007), in the most advanced economies, the population between the ages 65 and 74 typically spends three times more on healthcare than those aged 18-64. This ratio grows four times for the 75-84 age groups. As the population of a country ages, pay-as-you-go (PAYG) methods of publicly financing healthcare will impose an increasing tax burden on the working population. Thus, this burden would influence both the labor market and the national savings rate. An interesting finding on the relationship between age and health expenditures was indicated by Sagarik (2016) postulating that the price of health rises with age. Consequently, the empirical evidence pointed out that an increase in age at the same time decreases health and increases health expenditures. Herewith, Jones (2019) emphasizes that much of the discussion about costs of health and social care budget allocations revolves around the aging population while the size of the nearness-to-death effect has a peripheral recognition. In this regard, in many countries, it is well-documented that over the past four decades about half of the health and social care costs over a person's lifetime occur as death approaches, therefore speaking about the nearness to death effect, which is usually the last year of life, regardless of age at death. Therefore, Jones (2019) suggests that a more accurate forecasting of health care costs would come from the models that incorporate both effects, i.e. age-based healthcare spending with the addition of components based on nearness to death.

The average income of a country is widely recognized as a significant driver of healthcare costs, but it is far from the only one (Darvas et al., 2018; Pakdaman, et al., 2019; Magazzino & Mele, 2012). Furthermore, Magazzino and Mele (2012) emphasize that a lot of studies revealed that in a significant part, the variation in healthcare expenditure through the countries and in time could be explained by variations in GDP *per capita* and mostly it was direct causation as well as reverse causation. In their research study, Canbay and Kırca (2022) found a unidirectional causality relationship from GDP *per capita* to total health expenditures in China, Turkey, and South Africa, and Russia. Consequently, the unidirectional causality relationship was determined also from GDP *per capita* to public health expenditures in Russia, Turkey, India, and South Africa. On the other hand, Canbay and Kırca (2022) indicated that some studies found no statistically significant causality relationship between GDP *per capita* and public health expenditures, e.g. in a study in Turkey for the period 1984–1998; in Pakistan for the period 1972–2006; for 15 OECD countries for the period 1990–2006; in G7 countries for the period 1988–2017; in Turkey for the period 2006:Q1 and 2014:Q4 and; in Nigeria for the period 2000–2016. Annual healthcare costs per capita (in terms of purchasing power parity) vary from about $200 in sub-Saharan Africa and South Asia (two regions with fairly low GDP per capita), to average healthcare spending in the EU at $3,753 and up to more than $9,000 in North America (where GDP per capita is the highest among world regions), (Darvas et al., 2018).

The healthcare sectors have great and positive macroeconomic impacts on the national economy (e.g., Jagrič et al., 2022) and additional spending on healthcare services stimulates job creation throughout the national economy. Macroeconomic variables which include national income, national expenditures, inflation, employment and unemployment rate, budget deficits, foreign debt, boom and recession, influence the healthcare sector (Pakdaman et al., 2019). A study by Behera and Dash (2019) showed that tax revenue is an important source of health financing in low- and middle-income countries, thus tax revenue showed a positive and statistically significant relationship with public healthcare expenditures. This study empirically confirmed that the gradual change of the health budget depends on the nature of revenue mobilization. In addition, the study found that the rate of change in public health expenditure relative to tax revenue was higher in middle-income countries than in low-income countries. Negative health effects due to increased economic uncertainty could be made less severe to some extent because FDI also enables higher tax revenues and thus government spending on healthcare and social services in the host country (Nagel et al., 2019). According to these authors, FDI could also improve the productivity of domestic providers in the host country's healthcare sector through international spillovers of medical knowledge. A budget deficit is considered a deficit in the country's estimated budget where tax revenue will not be sufficient to pay government expenditures and requires another source of financing (Umeh et al., 2019). Thus, since the budget is the government's primary policy-making instrument, a fiscal imbalance can lead to an adverse impact on public health expenditures in the long run as well. Many studies have shown that both developed and developing countries have run into national debt, increased public borrowing interest costs, and increased bond yields as a result of government budget deficit policies (Umeh et al., 2019). An examination of the impact of the economic crisis on healthcare costs in the WHO Eastern Mediterranean countries found that being unemployed and spending out-of-pocket was negatively correlated with healthcare expenditure per capita so that a 1% increase in unemployment was found to decrease health expenditure per capita by $138, and a 1% increase spending in out-of-pocket was associated with a $12 reduction in per capita health expenditure (Iheoma, 2022).

2.1 Trends in Health Expenditures in South Asian Countries

Figure 1 shows the annual portion of health expenditure as a percentage of GDP in South Asian countries for the period 2000-2020 based on the World Bank database. In general, there is a significant increasing trend only for Afghanistan but only after 2012. For all other seven countries, the trend of annual healthcare expenditures just went up and down throughout the 20 years. The spending on healthcare in Afghanistan and Maldives is quite different than in the other countries. As illustrated in Figure 1, it can be noticed clearly that the Maldives and especially Afghanistan are at the top with their public expenditure higher than 8 percent on average. On the other hand, Bangladesh, Bhutan, India, Nepal, Pakistan and SriLanka are all at the bottom with their health expenditure share of GDP between 2.5 and 4 percent on average during the period 2000–2000. Therefore, Bangladesh and Pakistan are the two countries with the lowest average spending as a percent of GDP (2.57 % of GDP), then India with average spending on healthcare of 3.5% of GDP, follows by Bhutan and Sri Lanka with average spending of 3.90 % of GDP and Nepal with an average spending on healthcare with 4.30% of GDP. Figure 2 presents the health expenditures (HCE) per capita in PPP Int. $. It is easy to see that the per capita healthcare expenditures in the PPP of Maldives are significantly higher than those of all other countries (1192.8 $ on average) and the lowest per capita healthcare expenditures on average during 2000-2020 are recorded for Bangladesh (72.6 $), Pakistan (104.9 $) and Nepal (111.1 $). Additionally, the trend of all independent variables can be observed as well (See Appendix).

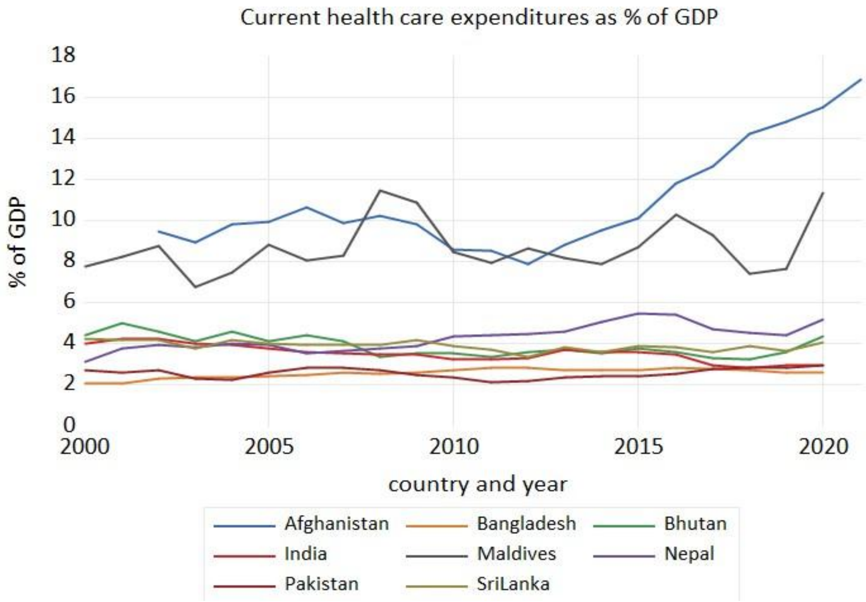

Figure 1. Current health expenditures (HCE) as percentage of GDP in South Asian countries

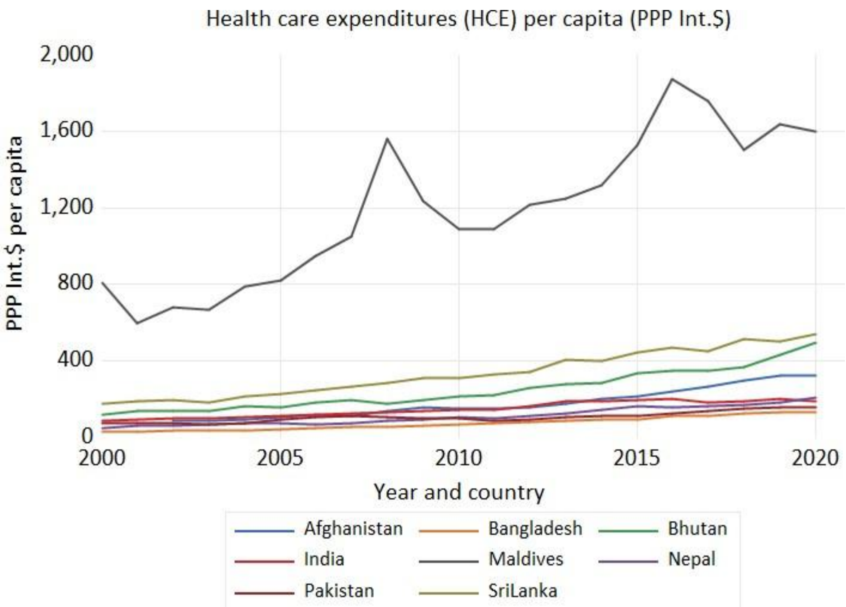

Figure 2. Health expenditures (HCE) per capita (PPP Int. $) in South Asian countries

3. Data and Methods

The dataset utilized in the study is extracted mainly from the World Development Indicators (WDI) of the World Bank Database, (https://data.worldbank.org/indicator), (World Bank, 2023). Besides, to fill the gap of some missing data regarding tax revenue for Afghanistan (2004-2005, 2018-2020); India (2019-2020); Pakistan (2000-2020); and Bangladesh (2000); were retrieved from United Nations University World Institute for Development from the GRD – Government Revenue Dataset, (https://www5.wider.unu.edu), (UNU, 2023). In addition, the data for all countries regarding budget deficit as well as for the tax revenue for Maldives during 2005-2020 came from the International Macroeconomic Data of CountryEconomy database, (https://countryeconomy.com), (IMD, 2023). Furthermore, data for the inflation consumer price index for Afghanistan only for 2003-2004, and 2020 have been extracted from the Federal Reserve Bank of St. Louis, FRED economic data, (https://countryeconomy.com), (FRED, 2023).

Empirically, this study provides time series annual data and cross-sectional evidence for South Asian countries. Therefore, the study countries include Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. Thus, the empirical analysis covers pooled data from eight South Asian countries from 2000 to 2020 based on the availability of data.

This study applied the pooled model. The data for all eight countries were pooled in one combined regression. With pool characteristics, multiple series were analyzed for the same variable, for eight South Asian countries. Data were pooled in a regression with common coefficients for all countries. The fixed effects have also been estimated. In contrast to a pool model, where only the parameters of one equation are estimated, the system estimation, estimates the parameters of two or more equations. There is a long list of estimation methods that can be applied to the system. In our case, the system estimates the results with the weighted least squares method. A version of least squares that assigns weights to each observation is conveniently named weighted least squares or WLS (Startz, 2019). One reason for weighting is to make the subpopulation proportions in the sample imitate the subpopulation proportions in the overall population. Another reason for weighting is to reduce the weight of high error variance observations. Therefore, in this way, individual cross-sectional coefficients for any variable can be estimated as well. The weighted least squares method is presented by eq. (1), (IHS Global, 2020):

$$b_{WLS} = \left(X'\hat{V}^{-1}X\right)^{-1}X'\hat{V}^{-1}y \quad (1)$$

where $\hat{V} = \text{diag}(s_{11}, \dots s_{22}, \dots, s_{MM}) \otimes I_T$ is a consistent criterion of V, and s_{ii} represents the residual variance estimator:

$$s_{ij} = (y_i - X_i b_{LS})'(y_j - X_j b_{LS})/\max\ (T_i, T_j) \quad (2)$$

In eq. (2), i and j are the non-missing common elements. The maximum function of the eq. (2) is created to manage the case of unbalanced data by down-weighting the covariance terms which leads to a consistent estimator of the variance components. When an estimation is specified, there are two choices of which coefficients to use in computing the s_{ij}. If the choice of not to iterate the weights is used, the OLS coefficient estimates will be used to estimate the variances. If the choice to iterate the weights is used, then the current parameter estimates are used in computing the s_{ij}. Whereby, these estimates may be based on the previously computed weights. This final procedure may be repeated until the coefficients and weights converge. The estimator for the coefficient variance matrix is given in eq. (3), (IHS Global, 2020):

$$\text{var}(b_{WLS}) = \left(X'\hat{V}^{-1}X\right)^{-1} \quad (3)$$

Assuming heteroskedasticity but no serial or contemporaneous correlation in the residuals, the weighted least squares method is efficient and the variance estimator is consistent. Thus, one of the approaches to handling with heteroscedasticity is to weight the observations so that the weighted data are homoscedastic (Startz, 2019). It is worth noting that if there are no cross-equation restrictions on the model parameters, the system-wide weighted LS yields estimates that are identical to those obtained by equation-by-equation LS.

4. Results

The pool model in Table 1 contains annual data on healthcare expenditures per capita, purchasing power parity (PPP) Int.$ (HCEPPP) and GDP *per capita*-constant 2015 US$ (GDPPC2015), Inflation consumer prices index, annual % (INFLATIONCP), Foreign direct investments (FDI) as % of GDP (FDIGDP), Tax revenue, % of GDP (TAXREVENUE), Budget deficit as % of GDP (BUDGETDEFICIT), Labor force participation rate, total, % of population ages 15+ (LFP) relative to the South Asian countries: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. The idea to use the pool was to study changes common to all countries. Pool series do not have any special features or any particular restrictions. To enable a different variance for each country, a cross-section weight was chosen. The cross-sectional specific constant captures all the things that make one country different from another but that are not included in the model. Such differences are known as country-specific constants. Country-specific constants are called fixed effects (Startz, 2019).

Table 1. Pool regression results

Dependent variable: log (HCEPPP)

Method: Pooled EGLS (Cross-section weights)*

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	1.4818	0.1860	7.9663	0.0000
Log(FDIGDP)	0.9863	0.1266	7.7871	0.0000
Dlog(INFLATIONCP)	0.0315	0.3055	0.1030	0.9181
Log(GDPPC2015)	0.9947	0.0635	15.660	0.0000
D(LFP)	0.0004	0.0031	0.1538	0.8780
D(BUDGETDEFICIT)	-0.0072	0.0220	-0.3263	0.7447
D(TAXREVENUE)	0.0147	0.0108	1.3540	0.1779
Fixed effects (Crossed)				
AFGHANISTAN_C	-0.6051			
BANGLADESH_C	-0.2244			
BHUTAN_C	0.2759			
INDIA_C	-0.1150			
MALDIVES_C	0.8363			
NEPAL_C	-0.7525			
PAKISTAN_C	0.0293			
SRILANKA_C	0.4924			
Effects specifications				
Cross-section fixed (dummy variables)				
Weighted statistics				
R-squared	0.9656	Mean dependend var		7.4647
Adjusted R-squared	0.9625	S.D. dependent var		3.6684
S.E.of regression	0.2813	Sum squared resid		11.158
F-statistic	304.79	Durbin-Watson stat		0.4445
Prob(F-statistic)	0.0000			
Unweighted statistics				
R-squared	0.9061	Mean dependend var		5.2469
Sum squared resid	12.078	Durbin-Watson stat		0.1998

*Linear estimation after one-step weighting matrix. Cross-sections included: 8.

Sample: 2000-2020. Included observations: 20 after adjustment. Total pool (unbalanced) observations: 155.

Source: Author's calculations.

Bai and Ng's (2004) PANIC (Panel Analysis of Nonstationarity in Idiosyncratic and Common Components) test is considered the first unit root test for panel data with cross-sectional dependence. The assumption of cross-sectional independence may be a difficult task to be justified because the cross-sections are often influenced by common forces, called factors. Tests that include cross-sectional dependence are called second-generation panel unit root tests (Ahn & Horenstein, 2013). The algorithm for computing the PANIC unit root test includes three parts: computing the factor and idiosyncratic components, testing for a unit root in the idiosyncratic components, and testing for a unit root in the common factors (Bai & Ng, 2004; Ahn & Horenstein, 2013). Therefore, The PANIC test is based on a factor model in which non-stationarity may emerge from common factors, idiosyncratic components, or both. Thus, second- generation panel unit root tests with cross-sectional dependence of Panel Analysis of Nonstationarity in Idiosyncratic and Common Components (PANIC) based on Bai and Ng (2004) were performed in our panel group with multiple series. The test selected 7 common factors. The PANIC test fails to reject the null hypothesis that the common factors are non-stationary. The final output of the pooled version of the PANIC test also fails to reject the null hypothesis that all cross-sections are not co-integrated.

The fixed effect estimation was set up in an intercept for each country. The intercept is presented in two parts. The "C" shows the average intercept value for all countries in the pool. The "C" labeled for individual countries provides the country's intercept as a deviation from that whole average. Thus, in our results in Table 1, the whole average intercept is 1.48, and the intercept for Afghanistan is −0.61 (0.61 below 1.48, i.e. 0.87). After the pool estimate specified fixed effects, the Redundant Fixed Effects Test was used to test for country-specific intercepts against a common (average) intercept. According to the value of the F test (215.63) and (7,141) degrees of freedom the hypothesis of a common intercept is widely rejected. This means that the different country-specific intercepts are more significant for each of the countries in the pool than the common (average) intercept. The residuals should be centered at zero. Figure 3 shows that the residuals for each of the countries are not quite centered on zero, whereby the residuals for some countries are mostly positive and other country's residuals are nearly negative. It is an indication that the country equations should have different intercepts.

The results of the pool regression in Table 1 show that only two coefficients are statistically significant at a 1% level of significance. The GDPPC2015 and FDIGDP have both positive effects on the changes in the dependent variable (HCEPPP). However, the F test confirms the joint significance of variables that are included in the pool. Namely, with the increase in GDP *per capita* and foreign direct investments in the mentioned countries, there is an increase in per capita health expenditures in the same countries. Further, the causality results may be explained as well. The study investigated the direction of causality employing Pairwise Granger Causality Tests with two lags. The number of lags has been selected using the Akaike Information criterion as well as the final Prediction Error criterion. The results indicate only the two-way directional causality that goes from GDPPC2015 to HCEPPP and *vice versa* at a 1% level. A one-way directional causality from HCEPPP to LFP, FDIGDP, BUDGETDEFICIT, and to INFLATIONCP was found at 5% level.

Figure 3. Country's residuals

Source: Author's design.

Furthermore, Table 2-3 provides the results of system estimation. As mentioned before, the Weighted Least Squares method was chosen to produce estimates for the eight equations, i.e. for each country. From the individual results for each country's coefficients separately within the system estimation (Table 2-3), a statistically significant positive effect of the FDIGDP on the HCEPPP can be noticed for Afghanistan, Bangladesh, Maldives, and Pakistan. A positive and statistically significant effect of GDPPC2015 on HCEPPP is noticeable for Afghanistan, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. The negative statistically significant effect on the HCEPPP is coming from the impact of INFLATIONCP in Bhutan and Nepal. Interestingly, a negative and statistically significant effect of BUDGETDEFICIT on HCEPPP was noticed for India but positive for the Maldives. In addition, Table 4-6 presents R-squared results from weighted least squares estimation for each of the countries. If look at Tables 3–5 it can be noticed that the highest R-squared is Nepal (0.97). The lowest coefficient of R-squared was observed for Sri Lanka (0.60).

Table 2. Weighted Least Squares (WLS) regression results

System estimation method: Weighted Least Squares				
Country's variables	Coefficient	Std. Error	t-Statistic	Prob.
Afghanistan_Intercept (C1)	1.1314	0.5854	1.9326	0.0561

Afghanistan_FDIGDP (C2)	0.9604	0.2440	3.9357	0.0002
Afghanistan_INFLATIONCP (C3)	-0.8642	0.8120	-1.0643	0.2898
Afghanistan_GDPPC2015 (C4)	0.9048	0.1538	5.8809	0.0000
Afghanistan_LFP (C5)	0.0019	0.0043	0.4373	0.6628
Afghanistan_BUDGETDEFICIT (C6)	-0.0455	0.0365	-1.2450	0.2161
Afghanistan_TAXREVENUE (C7)	0.0527	0.0519	1.0166	0.3118
Bangladesh_Intercept (C8)	0.1380	1.3631	0.1012	0.9196
Bangladesh_FDIGDP (C9)	5.2781	1.1783	4.4792	0.0000
Bangladesh_INFLATIONCP (C10)	-1.8089	6.6372	-0.2725	0.7858
Bangladesh_GDPPC2015 (C11)	-0.4336	0.9266	-0.4679	0.6408
Bangladesh_LFP (C12)	-0.0225	0.0318	-0.7076	0.4809
Bangladesh_BUDGETDEFICIT (C13)	0.0691	0.1061	0.6517	0.5161
Bangladesh_TAXREVENUE (C14)	-0.1261	0.1800	-0.7005	0.4852
Bhutan_ Intercept (C15)	4.1645	1.7712	2.3512	0.0207
Bhutan_FDIGDP (C16)	-0.6493	0.7871	-0.8250	0.4114
Bhutan_INFLATIONCP (C17)	-3.6472	1.4735	-2.4751	0.0150
Bhutan_GDPPC2015 (C18)	0.9830	0.3390	2.8994	0.0046
Bhutan_ LFP (C19)	0.0273	0.0313	0.8722	0.3852
Bhutan_BUDGETDEFICIT (C20)	0.0904	0.0720	1.2549	0.2125
Bhutan_TAXREVENUE (C21)	0.0567	0.0305	1.8558	0.0664
India_ Intercept (C22)	2.7859	1.5094	1.8456	0.0679
India_FDIGDP (C23)	-0.4617	0.5062	-0.9122	0.3639
India_INFLATIONCP (C24)	2.3487	1.4401	1.6309	0.1061
India_GDPPC2015 (C25)	1.0957	0.3792	2.8892	0.0047
India_LFP (C26)	-0.0304	0.0230	-1.3221	0.1892
India_BUDGETDEFICIT (C27)	-0.1394	0.0635	-2.1941	0.0306
India_TAXREVENUE (C28)	-0.0304	0.0583	-0.5212	0.6034

Source: Author's calculations.

Table 3. Weighted Least squares (WLS) regression results: continues

System estimation method: Weighted Least Squares-continues				
Country's variables	Coefficient	Std. Error	t-Statistic	Prob.
Maldives_Intercept (C29)	1.7740	0.5386	3.2937	0.0014
Maldives_FDIGDP (C30)	1.5493	0.2358	6.5717	0.0000
Maldives_INFLATIONCP (C31)	0.1711	0.3401	0.5029	0.6161
Maldives_GDPPC2015 (C32)	0.7301	0.1006	7.2591	0.0000
Maldives_LFP (C33)	-0.0062	0.0079	-0.7840	0.4349
Maldives_BUDGETDEFICIT (C34)	0.0728	0.0336	2.1631	0.0329
Maldives_TAXREVENUE (C35)	0.0149	0.0093	1.5967	0.1135
Nepal_Intercept (C36)	0.6905	0.1713	4.0298	0.0001
Nepal_FDIGDP (C37)	0.7613	0.1946	3.9129	0.0002
Nepal_INFLATIONCP (C38)	-1.4158	0.6603	-2.1442	0.0345
Nepal_GDPPC2015 (C39)	1.1586	0.0931	12.437	0.0000
Nepal_LFP (C40)	-0.0044	0.0070	-0.6242	0.5340

Nepal_BUDGETDEFICIT (C41)	-0.1230	0.0893	-1.3773	0.1715
Nepal_TAXREVENUE (C42)	-0.0599	0.0620	-0.9653	0.3367
Pakistan_ Intercept (C43)	1.1033	0.5903	1.8691	0.0646
Pakistan_FDIGDP (C44)	1.4580	0.4093	3.5622	0.0006
Pakistan_INFLATIONCP (C45)	0.2772	1.7861	0.1552	0.8770
Pakistan_GDPPC2015 (C46)	0.9773	0.2717	3.5971	0.0005
Pakistan_ LFP (C47)	0.0014	0.0084	0.1681	0.8668
Pakistan_BUDGETDEFICIT (C48)	-0.0144	0.0606	-0.2387	0.8118
Pakistan_TAXREVENUE (C49)	-0.0769	0.0691	-1.1131	0.2684
SriLanka_ Intercept (C50)	11.148	1.4307	7.7941	0.0000
SriLanka_FDIGDP (C51)	-1.5006	1.4031	-1.0695	0.2874
SriLanka_INFLATIONCP (C52)	-2.2585	2.3841	-0.9473	0.3458
SriLanka_GDPPC2015 (C53)	-1.3160	0.4577	-2.8750	0.0049
SriLanka_LFP (C54)	-0.0058	0.0097	-0.6009	0.5493
SriLanka_BUDGETDEFICIT (C55)	0.0056	0.0768	0.0735	0.9415
SriLanka_TAXREVENUE (C56)	0.0399	0.1649	0.2416	0.8096

Source: Author's calculations.

Table 4. R-squared results from Weighted least squares: Afghanistan, Bangladesh, and Bhutan

Equation: Afghanistan			
R-squared	0.85	Mean dependent var	5.17
Adjusted R-squared	0.76	S.D. dependent var	0.39
S.E. of regression	0.19	Sum squared resid	0.37
Durbin-Watson stat	1.28		
Equation: Bangladesh			
Observations: 25			
R-squared	0.71	Mean dependent var	4.21
Adjusted R-squared	0.58	S.D.dependent var	0.48
S.E. of regression	0.31	Sum squared resid	1.26
Durbin-Watson stat	0.51		
Equation: Bhutan			
Observations: 25			
R-squared	0.72	Mean dependent var	5.51
Adjusted R-squared	0.56	S.D. dependent var	0.38
S.E. of regression	0.25	Sum squared resid	0.69
Durbin-Watson stat			

Source: Author's calculations.

Table 5. R-squared results from Weighted least squares: India, Maldives, and Nepal

Equation: India			
Observations: 25			
R-squared	0.72	Mean dependent var	4.98
Adjusted R-squared	0.58	S.D. dependent var	0.26

S.E. of regression	0.17	Sum squared resid	0.38
Durbin-Watson stat	1.16		
Equation: Maldives			
Observations: 25			
R-squared	0.88	Mean dependent var	7.05
Adjusted R-squared	0.82	S.D.dependent var	0.34
S.E. of regression	0.14	Sum squared resid	0.26
Durbin-Watson stat	1.13		
Equation: Nepal			
Observations: 25			
R-squared	0.97	Mean dependent var	4.66
Adjusted R-squared	0.96	S.D. dependent var	0.40
S.E. of regression	0.08	Sum squared resid	0.08
Durbin-Watson stat	1.36		

Source: Author's calculations.

Table 6. R-squared results from Weighted least squares: Pakistan and SriLanka

Equation: Pakistan			
Observations: 25			
R-squared	0.68	Mean dependent var	4.64
Adjusted R-squared	0.53	S.D. dependent var	0.25
S.E. of regression	0.17	Sum squared resid	0.38
Durbin-Watson stat	0.59		
Equation: SriLanka			
Observations: 25			
R-squared	0.60	Mean dependent var	5.77
Adjusted R-squared	0.42	S.D.dependent var	0.36
S.E. of regression	0.27	Sum squared resid	0.95
Durbin-Watson stat	0.77		

Source: Author's calculation.

5. Discussion

From the pool results, it seems evident that healthcare expenditures in South Asian countries are influenced jointly, directly or indirectly, by all macroeconomic indicators included in the pool. However, the most statistically significant positive effect on HCEPPP was evident directly from GDPPC2015 and FDIGDP. This means that the macroeconomic indicators do not only affect the economic growth of the South Asian countries but also the healthcare sector including the healthcare costs. Hence, an increase in GDP *per capita* indicates an improvement in the economic growth of a country and accordingly governments can accumulate enough tax revenue to increase their revenue base (Zhou et al., 2020). Therefore, this allows countries to increase the budgets for their health systems by increasing healthcare spending. However, the results of this study pointed out that GDP *per capita* is the most significant determining factor of healthcare expenditure in South Asian countries. Undoubtedly, our findings also confirm that a country's GDP *per capita* is a significant driver of healthcare spending (Darvas et al., 2018; Pakdaman, et al., 2019; Magazzino & Mele, 2012) and very often in direct causality as well as reverse causality with the healthcare costs.

While FDIGDP showed a direct impact on HCEPPP within the pool, FDIGDP was a particularly important indicator for some of the countries as well. Thus, from the findings, it can be understood that public health spending increases as foreign direct investment (FDI) increases in some of the countries, such as Afghanistan, Bangladesh, Maldives, and Pakistan. The reason for this is that foreign investors could help boost physical capacity in the healthcare sector, by increasing financial aid for diagnostic facilities, the number of hospital beds and increasing the supply of specialists (Zhou et al., 2020). Additionally, FDI could make use of modernized health resources and technology to higher standards as part of their corporate social responsibility. This occurs in many developing countries where multinational corporations have built fully equipped healthcare facilities. Moreover, the effect of FDI will increase individual incomes including government income. This could increase the revenue base of the government and thus the resources allocated to the health sector are likely to increase as well.

Furthermore, the results indicate that HCEPPP is negatively affected by INFLATIONCP in Bhutan and Nepal. Therefore, a decreasing trend between healthcare expenditure and inflation in Bhutan and Nepal exists. Although generally negative inflation on the economy may not be a good thing, this means that effects on healthcare could not increase healthcare costs because prices of goods and services related to health are not increasing. The negative relationship of healthcare costs relating to inflation suggests that in monetary terms the value of healthcare costs is stable or decreasing simply because inflation is not increasing prices but more willingly decreasing prices (Zhou et al., 2020).

Additionally, the present study indicated that BUDGETDEFICIT had a negative effect on HCEPPP in India while BUDGETDEFICIT had a positive effect on HCEPPP in Maldives. The negative impact of BUDGETDEFICIT on HCEPPP in India is likely due to very often reduction in health expenditures of the government where these government deficits become not sustainable. Additionally, this may imply that budget deficits in India do not support healthcare sector spending. The budget deficits of the government have a positive significant impact on healthcare costs in Maldives probably because more budget allocations are put repeatedly into health government expenditure (Umeh et al., 2021). Generally, it can be assumed that total spending on the healthcare sector increases as countries become richer. Furthermore, this study identified that the national economy in South Asian countries matters and is relevant to the public healthcare expenditures. Thus, in terms of policy implications, the results may provide solid economic policy measures. These economic policy measures include improving economic growth and tax revenues, as well as guarantees for stable inflation. These economic policies could boost public healthcare costs because they have a strong relationship with macroeconomic indicators. As summarized in Pakdaman, et al. (2019), a very important question here is whether increased healthcare spending improves public health.

6. Conclusion

The study investigated the effect of macroeconomic indicators on public healthcare costs within South Asian countries. An increase was observed in health expenditure per capita in South Asian countries over the last two decades. Using the weighted least squares method and the pool least squares regression, data for the study was obtained mainly from the World Bank's World Development Indicators for eight South Asian countries, from 2000 to 2020. The empirical results show that an increase in public healthcare expenditures is related to an increase in GDP *per capita* and foreign direct investments (FDI). Furthermore, for some of the countries, budget deficit and inflation were also shown to be specifically significant determinants of healthcare expenditures. According to the results of the study, along with increasing resources, the promotion of economic policy measures directly or indirectly will enable an improved healthcare system with efficient healthcare spending.

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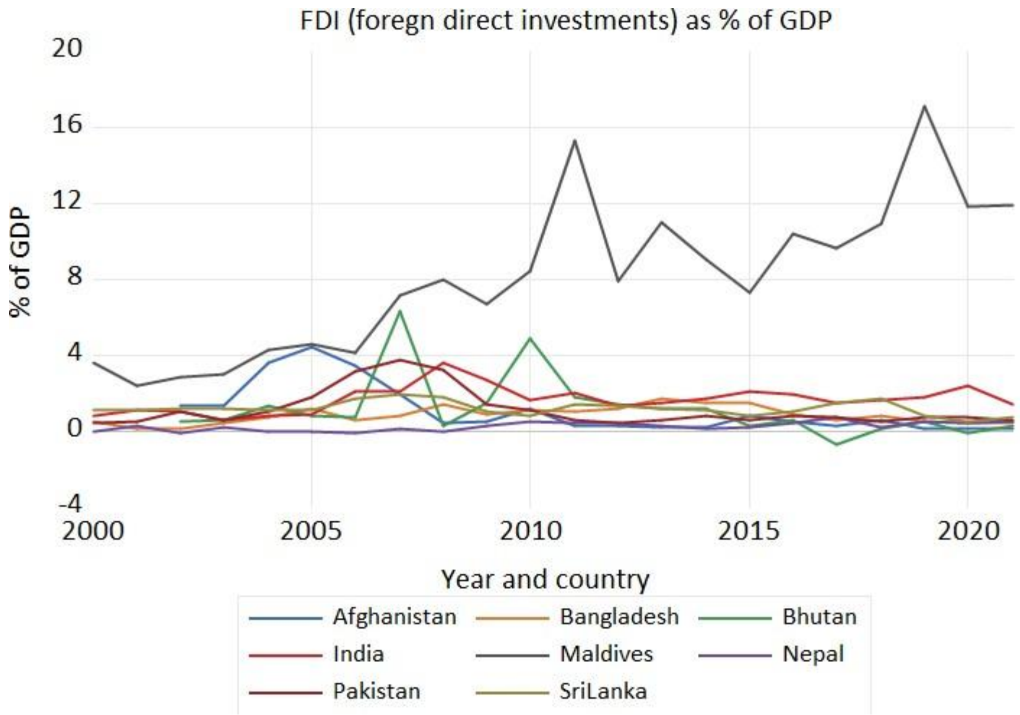
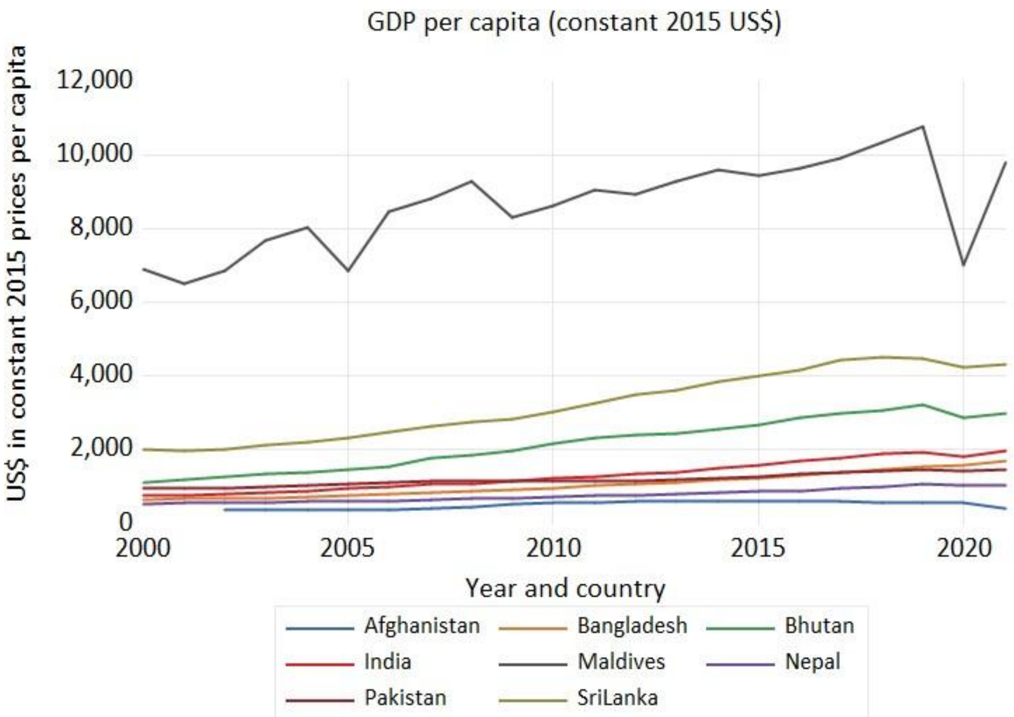
Appendix

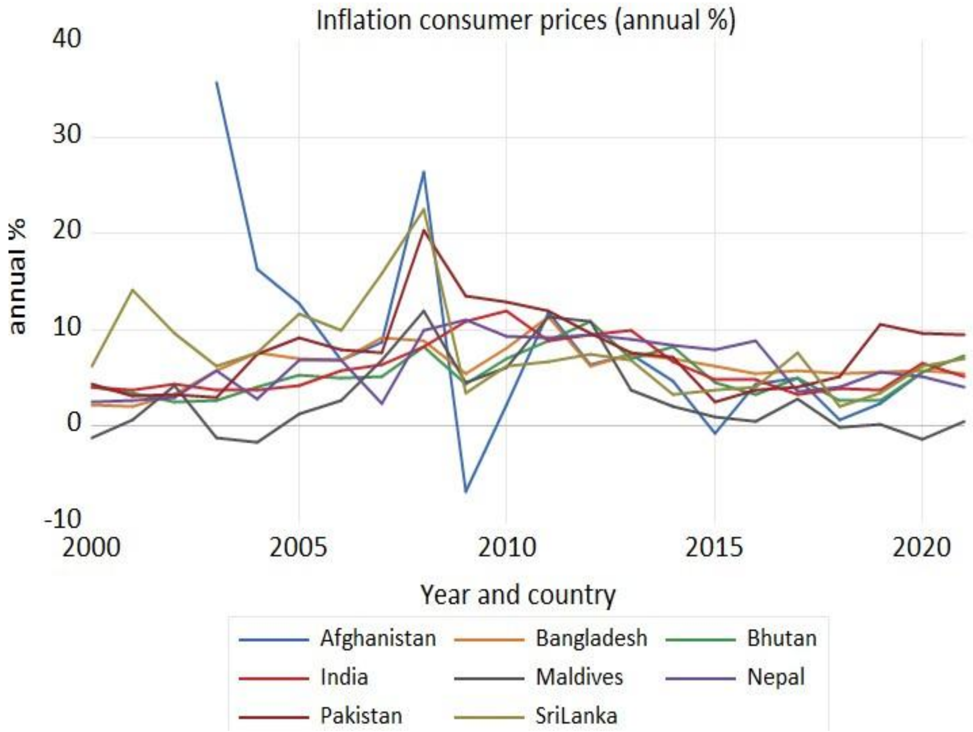
A: FDIGDP, Foreign direct investments as % of GDP in South Asia



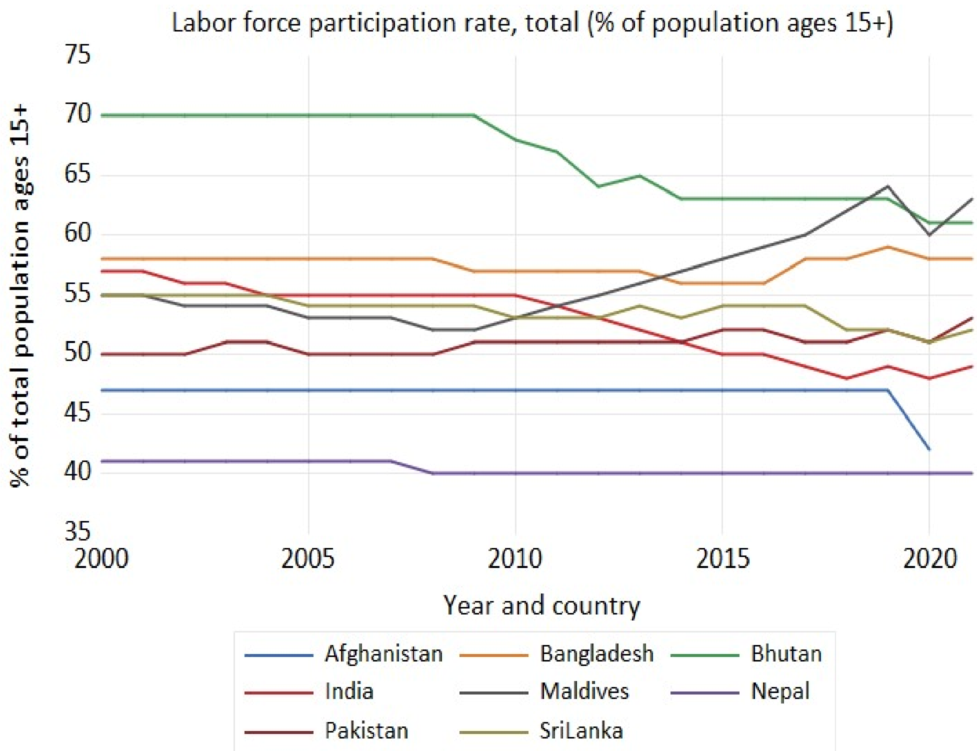
B: GDPPC2015, GDP per capita (constant 2015 US $) in South Asia



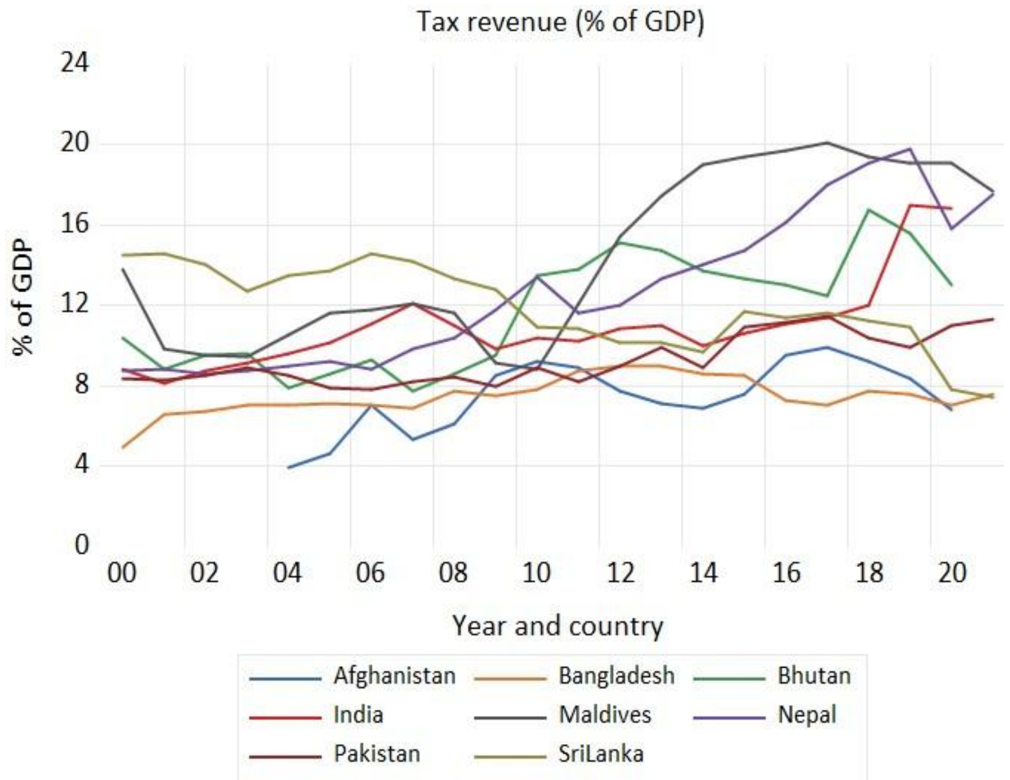
C: INFLATIONCP, Inflation consumer prices (annual %) in South Asia



D: LFS, Labor force participation rate, total (% of population ages 15+)



E: TAXREVENUE, Tax revenue (% of GDP) in South Asia



F: BUDGETDEFICIT, Budget deficit (% of GDP) in South Asia