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Muhammad Rabiul Islam Liton

Mawlana Bhashani Science and Technology,
University Tangail,
Bangladesh

✉ rabiul388@gmail.com

LINKAGES AMONG CARBON DIOXIDE (CO_2) EMISSION, HEALTH SPENDING AND ECONOMIC GROWTH: A STUDY SAARC MEMBER COUNTRIES

ВЕЗЕ ИЗМЕЂУ ЕМИСИЈЕ УГЉЕН-ДИОКСИДА, ЗДРАВСТВЕНЕ ПОТРОШЊЕ И ЕКОНОМСКОГ РАСТА -СТУДИЈА ЗЕМАЉА ЧЛАНИЦА ЈУЖНОАЗИЈСКЕ АСОЦИЈАЦИЈЕ ЗА РЕГИОНАЛНУ САРАДЊУ *(SAARC)*

Summary: *The present world is on the good track to achieve economic growth though it results in huge environmental degradation. Hence, such economic growth poses serious detrimental impacts on human health, and it causes to increase in healthcare spending. Therefore, the present study aims to depict the relationship among carbon dioxide (CO2) emission, healthcare spending and economic growth for the South Asian countries (SAARC member countries) covering the period 1980-2014. The Dynamic Simultaneous-equation Model is fitted with the data set which is estimated by Generalized Method of Moment for investigating the causal relationship among these variables. The empirical results reveal bidirectional causality between carbon dioxide (CO2) emission and economic growth; and between economic growth and health spending. The results of the study also indicate unidirectional causality from carbon dioxide (CO2) and health spending in case of many SAARC member countries.*

Keywords: *CO2 emission; Health spending; Economic Growth; GMM; SAARC.*
JEL Classification: C *33; D 62; F 64; I 15*

Резиме: *Садашњи свет је на добром путу да оствари економски раст уз велику деградацију животне средине. Дакле, такав економски раст има озбиљне штетне утицаје на здравље људи и узрокује повећање потрошње у здравству. Стога, ова студија има за циљ да опише однос између емисије угљен-диоксида, потрошње на здравствену заштиту и економског раста за земље Јужне Азије (земље чланице САРЦ-а) за период 1980-2014. Модел динамичке симултане једначине је примјењен на скуп података који су процијењени уопштеном методом момента за истраживање узрочне везе између ових варијабли. Емпиријски резултати откривају двосмерну узрочност између емисије угљен-диоксида и економског раста; и између економског раста и здравствене потрошње. Резултати студије такође указују на једносмерну узрочност емисије угљен-диоксида и здравствене потрошње у случају многих земаља чланица САРЦ-а.*

Кључне ријечи: *емисија угљен диоксида; здравствена потрошња; економски раст; уопштена метода момента; SAARC.*
ЈЕЛ касификација: *C 33; D 62; F 64; I 15*

1. INTRODUCTION

The debate about the relationship between economic development and environmental degradation is a growing concern during last three decades. It generates a pressure for nations to consume a balanced level of energy that control the emissions to the environment and at the same time ensuring the country's sustainable economic growth (Saboori and Sulaiman, 2013). However, the most threatening danger to quality of life is the environmental degradation resulted from greenhouse gas emissions. The best known GHG stemmed from human activities is carbon, which is a great contributor to global warming and has adverse effects on human (Ahmad et al. 2018; Wang et al. 2018). Moreover, GHG emissions are increasing and creating an alarming situation for global warming as well as the climate system (Zhang et al. 2017). The impacts of global warming on the

world economy have been assessed intensively by researchers since the 1990s. World-wide organizations, such as the United Nations, have been attempting to reduce the adverse impacts of global warming through intergovernmental and binding agreements like the Kyoto protocol that was signed in 1997 after hefty discussions.

Health is one of the most important factors to decide the quality of human capital whiles $C0_2$ emission affects public health and total production (GDP) (Abdullah et al. 2016). Besides, adverse impact of environmental degradation increases the hospitalization and death rates that badly affect industrial production, labor productivity, and growth of the economy (Borhan et al. 2018). The medical research found different types of mortalities resulted from environmental pollution, for example, small particulate matter causes work loss and bed disability in adults (Ostro and Rothschild, 1989). In contrast, healthy environment would facilitate to get productive results in every aspect of life and will lead to shape a welfare society with healthy and productive labor (Adeel 2016). Hence, Quality human capital promotes economic growth and hence, the strength of economic growth of any state and nation is constructed on basis of health sector (Faridi et al. 2016; Yaqoob et al. 2018). Therefore, Carbon dioxide emissions not only decrease the overall environmental health, but also impose a serious cost of healthcare expenditures. Therefore, the impact of negative externalities emanated from CO2 emissions on economic growth and human health cannot be disregarded.

Desired economic growth is the major policy agenda of every country in the world. This is particularly important for developing countries of South Asia region which is the home for 40 percent of the world's poor (Daily Times, 2014). The per capita GDP of this region (US$ 1,779) is still much lower than that of the middle and low income countries and world which are US$10, 636 and US$ 4, 497 respectively (World Bank, 2019). However, it is inspiring that these countries are growing well in recent years. According to world bank's report, Nepal experienced 7.9% annual GDP growth rate ranking the country 1st, followed by Bangladesh with 7.28% GDP growth rate ranking the country 2nd, India with 6.68% growth rate ranking the country 3rd and Pakistan with 5.70% growth rate ranking the country 4th in the region. Sri Lanka experienced the lowest GDP growth rate in the region which was 3.30% (World Bank, 2019). Considering the current poverty level, sustained and increased economic growth in these countries is very much crucial. The guardian (2012) reports that India's ranking in the world is the 3rd in terms of total CO_2 emissions from energy consumption, followed by Pakistan (33rd), Bangladesh (57th), Sri Lanka (90th), and Nepal (137^{th}) (Rahman et. al. 2020). However, due to rapid economic growth and high population growth among the SAARC member countries, energy consumption as well as CO_2 emission has been on the rise. Therefore, the study aims to investigate the relationship among economic growth, environmental degradation and healthcare spending.

2. LITERATURE REVIEW

Interactions between growth, environment and health spending are multiple, complex and important. Such literature, however, can be divided into three areas of research.

The first area of research is to verify the hypothesis of the environmental Kuznets curve or an inverted U curve between economic growth and environmental quality indicators (CO_2, SO_2, Deforestation, volatile particles, etc.). This hypothesis, proposed by Grossman and Krueger (1995), studied the relationship between the various indicators of the environment and the level of income of a country. They found no evidence in favor of positive relationship among the quality of the environment deteriorates and the growth of the country rather for most indicators, economic growth brings an initial phase of deterioration, followed by a phase of improvement. As regards, Selden and Song (1994) the relationship between economic growth and environmental quality, whether positive or negative, is not fixed along a path of development rather the sign might be changed when a country reaches a level of income at which the application of citizens is to provide an efficient infrastructure and a cleaner environment. Hence, most of the works verifying the environmental Kuznets curve (EKC) on relationship between CO_2 emissions and economic growth is inconclusive. For example, Apergis and Payne (2009), Lean and Smyth (2010), Saboori and Sulaiman (2013), Saboori et al. (2012) have found the existence of the Environmental Kuznets Curve (EKC) hypothesis while Richmond and Kaufmann (2006), found no relationship between environmental degradation and economic growth. By the contrast, some studies (Ghorashi and Rad 2017; Chaabouni and Saidi 2017; Zaidi and Saidi 2018; Chaabouni et al. 2016; Halicioglu 2009; Wang 2011; Chaabouni and

Abdnnadher 2014; Omri 2013; Apergis and Payne 2009; Pao et al. 2011; Yang et al. 2012 and Rahman et al. 2020) found bi-directional relationship between economic growth and environmental degradation. Further, some other studies (such as Polat et al. 2018; Wang et al. 2020; Fodha and Zaghdoud 2010; Lotfalipour et al. (2010); Jalil and Mahmud, 2009; Shahbaz et al. 2013 etc. exposed conservation hypothesis that economic growth significantly influenced environmental degradation through CO_2 emission.

Supporting growth hypothesis some other studies (viz. Menyah and Wolde-Rufael 2010; Mehrar et al. 2011; Ozturk and Acaravci 2010; Saidi and Hammami 2015; Ang 2008; Dinda 2004; Saboori et al. 2012 etc.) explored that CO_2 emission positively influenced economic growth. Thus, sign of relationship between economic growth and environmental degradation is undetermined. In most of the Environmental Kuznets Curve (EKC) hypothesis-supporting literatures it is evident that as output increases, carbon dioxide (CO_2) emissions increase as well until some threshold level of output was reached after which these emissions begin to decline.

The second area of research in this regard focuses on the interaction between health spending and economic growth. The majority of previous studies are interested with the questions of measuring the size of the income elasticity of health care, and on its policy implications for the financing and distribution of healthcare resources. Their results show that there are two hypotheses about interactions between health spending and economic growth. The first assumption is that health care is a luxury goods, which indicates that it is a commodity like any other and it is best left to market forces. The second hypothesis is that health care is a necessity, often to support the views of more government intervention in the health care sector. However, some previous studies (viz. Wang et al. 2019; Chaabouni, and Saidi, 2017; Amiri and Ventelou, 2012; Elmi and Sadeghi, 2012; Chaabouni and Abdnnadher, 2014; Yamaguchi, 2014) found two-way relationship between economic growth and healthcare spending. Some literatures (Ghorashi and Rad, 2017; Polat et al. 2018 and Hartwig, 2010) support growth hypothesis that states that there exists significant influence from health expenditure to economic growth. While some others (viz. Balaji, 2011; Ayubi, 2014; Mehrar et al. 2011; Sen et al. 2015) support conservation hypothesis that indicates that economic growth (GDP) have significant impact on healthcare spending. Devlin and Hansen (2001) support neutrality hypothesis that means there is no relationship between economic growth and healthcare spending.

Finally, the third area of research focuses on the interaction between health spending and environmental degradation (CO_2 emissions). Though, much less attention from academic researchers was paid to this area of research compared to other two fields significant number of studies conducted on the issue. Some researchers (Wang et al. 2019; Wang et al. 2020; Chaabouni and Abdnnadher, 2014; Chaabouni and Saidi, 2017; Chaabouni, et al. 2016; Ullah et al. 2019) found that environmental degradation through CO2 emission have significantly affect healthcare spending. By the contrast, Polat et al. (2018) found opposite direction of the relationship. However, Abdullah, et al. (2016) found no long run relationship between CO_2 emission and healthcare spending. Hence, due to found mixed results in previous studies, the present study wants to depict the relationship among carbon-di-oxide (CO_2), economic growth and healthcare expenditure in SAARC member countries.

3. SCENARIO OF CO2 EMISSION, HEALTHCARE EXPENDITURE AND ECONOMIC GROWTH IN SAARC COUNTRIES

South Asian countries are vitally important large territory and huge population. Moreover, most of the countries in the area have less per capita income. Hence, they are basically less industrialist and emit less amount of carbon. Parallelly, due to being poor they spend less amount for healthcare facilities of the people.

3.1 CO_2 Emission in SAARC Countries

It is observed from Table 1 that South Asian countries produce small share of world's total CO_2 though it increases consistently. During 2001 the region as a whole produce around 5% of world CO_2 emission while in 2015 in it increases to almost 8%. That means during 15 years of time lag the region exposes a tremendous growth in world's share of CO_2 emission.

Table 1: CO_2 Emission in South Asia

	South Asia			World			South Asia/ World (%)
Year	CO_2(mm)	Growth rate (%)	CO_2 (pc)	CO_2 (mm)	Growth rate (%)	CO_2 (pc)	
2001	1197		0.85	24102		3.89	4.97
2002	1218	1.69	0.84	24634	2.21	3.93	4.94
2003	1270	4.26	0.86	25894	5.11	4.08	4.90
2004	1340	5.58	0.90	27107	4.68	4.21	4.95
2005	1416	5.65	0.93	28044	3.46	4.31	5.05
2006	1511	6.67	0.98	29021	3.49	4.40	5.21
2007	1629	7.86	1.04	29513	1.69	4.42	5.52
2008	1798	10.35	1.13	30681	3.96	4.54	5.86
2009	1978	9.97	1.22	29916	-2.49	4.37	6.61
2010	1978	0.00	1.21	31928	6.73	4.61	6.19
2011	2106	6.50	1.27	33091	3.64	4.73	6.36
2012	2286	8.55	1.36	33684	1.79	4.75	6.79
2013	2308	0.95	1.35	33848	0.49	4.72	6.82
2014	2526	9.44	1.46	34103	0.75	4.70	7.41
2015	2645	4.73	1.51	34041	-0.18	4.64	7.77

Source: Author's calculation by using data of the World Bank, 2021

It is also observed from the table that annual growth rate of CO_2 emission is clearly higher in South Asia than world as a whole. Per capita CO_2 emission in SAARC member countries was less than 1 metric ton per year where in case of world as a whole it was around 4 metric tons. Due to increasing growth trend per capita CO_2 emission in South Asia increases to 1.51 metric ton per year while in case of world as a whole it exposes small increase (4.64 per year).

3.2 Economic Growth in SAARC Countries

South Asian countries have shown a significant economic growth during the study period. Table 2 reveals that during these 15 years, total economy in the region increases by 317% while the during same time period the world economy increases by 124%.

Table 2: Economic Growth in South Asia

	South Asia			World			South Asia/ World
Year	Y (m$)	Growth rate (%)	Y (pc)	Y (m$)	Growth rate (%)	Y(pc)	
2001	645870		455.86	33430842		5397.58	1.93
2002	677627	4.92	469.71	34712452	3.83	5533.85	1.95
2003	791003	16.73	538.71	38948208	12.20	6131.76	2.03
2004	917089	15.94	613.95	43874598	12.65	6821.77	2.09
2005	1050585	14.56	691.69	47526793	8.32	7298.62	2.21
2006	1196088	13.85	774.86	51512232	8.39	7813.48	2.32
2007	1504193	25.76	959.31	58043560	12.68	8696.70	2.59
2008	1527473	1.55	959.46	63690178	9.73	9425.78	2.40
2009	1683457	10.21	1041.99	60410287	-5.15	8832.46	2.79
2010	2060781	22.41	1257.50	66125919	9.46	9553.18	3.12
2011	2271838	10.24	1367.31	73460346	11.09	10490.05	3.09
2012	2297332	1.12	1364.42	75161779	2.32	10607.44	3.06
2013	2357132	2.60	1381.86	77316337	2.87	10783.86	3.05
2014	2581823	9.53	1494.42	79453254	2.76	10952.68	3.25
2015	2697258	4.47	1541.80	75217723	-5.33	10249.07	3.59

Source: Author's calculation by using data of the World Bank, 2021

But in terms of per capita GDP South Asian countries clearly much behind though it increases consistently during the study period. Per capita GDP in the region becomes 3.4 times in 2015 compare to 2001 and during same time period the world GDP becomes 1.9 times. Moreover, share of SAARC countries in world total GDP is also indicates continuous economic growth of the region.

3.3 Health Expenditure in SAARC Countries

Most of the South Asian countries are poor and hence, can spend less amount for healthcare of their people. It is observed from Table 3 that per capita healthcare expenditure in SAARC countries was only 18.26 US dollar in 2001 which was much lower than world average (493 US dollar).

Table 3: Health Expenditure in South Asia

	South Asia			World			South Asia/ World
Year	HE(m$)	Growth rate (%)	HE($pc)	HE(m$)	Growth rate (%)	HE($pc)	
2001	25873		18.26	3053428		492.99	0.85
2002	27167	5.00	18.83	3282461	7.50	523.29	0.83
2003	29646	9.13	20.19	3731709	13.69	587.50	0.79
2004	34232	15.47	22.92	4160530	11.49	646.89	0.82
2005	38791	13.32	25.54	4466466	7.35	685.91	0.87
2006	42843	10.45	27.75	4799005	7.45	727.92	0.89
2007	52211	21.87	33.30	5321626	10.89	797.34	0.98
2008	55903	7.07	35.11	5840183	9.74	864.31	0.96
2009	57529	2.91	35.61	5989640	2.56	875.73	0.96
2010	67892	18.01	41.43	6327994	5.65	914.20	1.07
2011	74313	9.46	44.73	6923929	9.42	988.73	1.07
2012	75719	1.89	44.97	7078546	2.23	998.98	1.07
2013	87597	15.69	51.35	7282207	2.88	1015.70	1.20
2014	91666	4.65	53.06	7543078	3.58	1039.82	1.22
2015	96393	5.16	55.10	7331504	-2.80	998.98	1.31

Source: Author's calculation by using data of the World Bank, 2021

After 15 years albeit it increased to 55.1 US dollar till it is so small that it has a plausible explanation of poor health conditions of the region. However, considering growth trend and share of total world health expenditure it is observed that health condition in SAARC countries has been improved though amount of per capita healthcare spending explain a vulnerable condition.

4. METHODOLOGY

4.1 Study Area

South Asia is the southern region of Asia, which is defined in both geographical and ethno-cultural terms. The region consists of the countries of Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka and Maldives. The South Asian Association for Regional Cooperation (SAARC) is an economic cooperation organization in the region which was established in 1985 and includes all eight nations comprising South Asia. The countries as a whole cover about 5.2 million km^2 (2.0 million sq mi), which is 11.71% of the Asian continent or 3.5% of the world's land surface area. Parallelly, it accounts for about 39.49% of Asia's population, over 24% of the world's population, and is home to a vast array of people (Wikipedia). Further, South Asia is the home for 40 percent of the world's poor people (Daily Times 2014). The per capita GDP of this region (US$ 1,779) is still much lower than that of the middle and low income countries and world which are US$10, 636 and US$ 4, 497 respectively (World Bank, 2019). Though producing very small same of Carbon-di-Oxide (CO_2), SAARC countries are affected by consequences from environmental degradation. Moreover, the economic growth of the countries in terms of total GDP as well as per capita GDP is small and they are not capable for spending more for healthcare of their people.

4.2 Data and Definition of Variables

To estimate empirical relationship among CO_2 emission, health expenditure and economic growth the study basically depends on data collected from secondary sources. Required data for 8 SAARC member countries viz. Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, Maldives and Sri Lanka from 2001 to 2015 were collected from World Development Indicators of World Bank.

Parallelly, same data have also been collected regarding SAARC countries and world as a whole in comparison purpose. Other information is collected from published articles, journals, books, magazines etc.

Table 4: Definition of Variables

Variable	Description	Measurement
Y	Gross Domestic Products	Current US$ per capita
Y (-1)	Lag of Gross Domestic Products	Current US$ per capita
CO2	CO_2 Emission	Metric tons per capita
CO2 (-1)	Lag of CO_2 Emission	Metric tons per capita
HE	Health Expenditure	Current US$
HE (-1)	Lag of Health Expenditure	Current US$
LF	Labor Force	% of total population
POP	Total Population	Total Number
UPOP	Urban Population	% of total population
EXP	Total Export	Current US$

Source: World Bank, 2021

Table 4 explores the definitions of measurement variables. Y stands for Gross domestic products measured by per capita US dollar as a proxy of economic growth. CO_2 is stands for carbon-di-oxide emission measured by metric ton per capita. HE is per capita health expenditure measured at US dollar. LF stands for labor force which is measured by percent of total population while POP stands total number of population. UPOP is amount of urban population which is measured by percent of total population and EXP stands for amount of total export measured in current US dollar.

4.3 The Model

The starting point of any growth theory is the production function which exposes the relationship between inputs and the outputs of the production process. For examining the relationship among carbon-di-oxide (CO_2) emission, healthcare expenditure (HE) and economic growth (GDP) the study will apply a Cobb-Douglas production function with constant returns to scale which is similar to Bloom et al. (2004), Hartwig (2010), and Ben Aissa et al. (2014). The non-linear form of followed Cobb-Douglas production function can be explained as follows:

$$Y = AK^{\alpha_1} HE^{\alpha_2} C^{\alpha_3} L^{\alpha_4} e^{u} \qquad \dots(1)$$

where, Y refers to total output, A refers to total factor productivity, K is capital and L is labor. C stands for CO_2 emissions and HE stands for healthcare expenditure while α_1, α_2, α_3 and α_4 are the output elasticity of capital, health spending, CO_2 emissions and labor, respectively. The non-linear Cobb-Douglas production function can be converted into the linear formulation by taking natural logarithm in both side and by dividing both side by population we obtain the equation in per capita terms as follows:

$$LN\left(\frac{Y_{1T}}{L_{1T}}\right) = \alpha + \alpha_1 LN\left(\frac{K_{1T}}{L_{1T}}\right) + \alpha_2 LN\left(\frac{HE_{1T}}{L_{1T}}\right) + \alpha_3 LN\left(\frac{C_{1T}}{L_{1T}}\right) + \mu_{1T} \qquad \dots(2)$$

Then, the production function in equation (2) is used to obtain the appropriate specifications to investigate the relationship between per capita GDP, per capita CO_2 emissions, and per capita healthcare expenditure. Whereas estimating the three-way relationship between per capita CO_2 emissions (C), per capita healthcare expenditure (HE) and per capita GDP (Y); stock capital (K), population ageing (POP), urbanization (URB) and trade openness (TO) will be considered as instrumental variables. However, the study will use lag of CO_2 emission (C), healthcare expenditure (HE) and GDP per capita (Y) for obtaining dynamic relationship.

4.4 Specification of Model (Simultaneous Equations)

It is observed from earlier studies that economic growth, CO_2 emission and Health expenditure are interrelated each other. Therefore, by following Chaabouni and Saidi (2017) and Omri (2013) the study uses simultaneous equations (3-5) to explore empirical relationship among these variables. Further, as it is considered that economic growth, CO_2 emission and health expenditure depends on that of previous year thus lagged of these variables are used in the equations as explanatory variables for estimating dynamic relationship among variables.

$$\ln[(Y]_{it}) = \beta_0 + \beta_1 \ln(Y_{it-1}) + \beta_2 \ln(CO2_{it}) + \beta_1 \ln(HE_{it}) + \beta_1 \ln(LF_{it}) + \varepsilon_{it} \quad \text{... (3)}$$

Equation (3) is used for estimating relationship of CO_2 emission and healthcare expenditure with economic growth. To explore the relationship properly labor force (LF) is used as control variable.

$$\ln[(CO2]_{it}) = \beta_0 + \beta_1 \ln(CO2_{it-1}) + \beta_2 \ln(Y_{it}) + \beta_1 \ln(HE_{it}) + \beta_1 \ln(UPOP_{it}) + \beta_1 \ln(EXP_{it}) + \varepsilon_{it} \quad \text{... (4)}$$

Equation (4) is used for estimating empirical relationship of economic growth and healthcare expenditure with CO_2 emission. In this estimation amount of export (EXP) and urban population (UPOP) are used as control variables.

$$\ln[(HE]_{it}) = \beta_0 + \beta_1 \ln(HE_{it-1}) + \beta_2 \ln(Y_{it}) + \beta_1 \ln(CO2_{it}) + \beta_1 \ln(POP_{it}) + \varepsilon_{it} \quad \text{... (5)}$$

Finally, equation (5) explores the impact of economic growth and CO_2 emission on healthcare expenditure. Number of total population is used as control variable in this regard.

4.5 Methods of Estimation: Generalized Method of Moments (GMM)

Equation (3) through Equation (5) are dynamic in nature which indicates that Generalized Methods of Moments (GMM) are considered appropriate econometric technique for solving the equations. Because this estimation technique allows providing solution to the endogeneity bias and also controls individual and time specific effects. However, there are two GMM approach: the first difference GMM (Arellano and Bond, 1991) and the system GMM (Blundell and Bond, 1998). Due to several reasons system GMM is considered better than first difference GMM. For example, first difference GMM is suffered from weak instruments and provides some limits (Chaabouni and Saidi 2017). These deficiencies can be removed by using system GMM and hence, the study uses system GMM approach of Blundell and Bond (1998) in its estimations.

5. DISCUSSION OF RESULTS

5.1 Descriptive Results

It is observed from Table 5 that South Asian (SAARC) countries are economically poor having less than $1000 per capita GDP which is much lower compare to world's average (more than $8.5 thousand). Therefore, these countries are less capable to expanse on basic needs like healthcare. It is observed that in SAARC member countries per capita healthcare expenditures per year is only $35 where it is $810 in case of world as a whole. Similar scenario is also observed in case carbon-di-oxide (CO_2) emission. As the member countries are basically poor and comparatively less industrialized, thus they emitted less Green House Gas (GHG) like carbon di oxide (CO_2). It is found that SAARC countries emitted only 1.13 metric ton per capita CO_2 per year while in case of the world as a whole the rate is 4.42 metric ton per capita per year. In case of instrumental variable labor force participation rate and share of urban population is also lower in SAARC member countries than that of whole world.

Table 5: Descriptive Statistics of Variables

		CO2 (pc)	HE (pc)	Y (pc)	LF (%)	POP (m)	EXP ($m)	UPOP (%)
Afghanistan	Mean	0.17	38.50	41.36	33.49	27.90		23.36
	Std. Deviation	0.14	15.88	17.97	1.00	3.89		0.88
	Minimum	0.04	16.00	17.00	32.40	21.60		22.17
	Maximum	0.41	60.00	64.00	35.98	34.40		24.80
Bangladesh	Mean	0.35	17.29	701.95	38.14	143.91	17593.72	29.06
	Std. Deviation	0.08	7.60	267.41	1.12	8.14	9785.67	3.27
	Minimum	0.25	8.11	413.08	36.29	130.09	6791.24	24.10
	Maximum	0.47	31.84	1248.45	39.94	156.26	33820.15	34.31
Bhutan	Mean	0.79	61.18	1789.49	46.00	0.67	501.99	33.03
	Std. Deviation	0.30	18.14	716.82	2.40	0.04	242.08	3.80
	Minimum	0.48	36.71	764.44	40.83	0.60	125.22	26.48
	Maximum	1.39	91.11	2752.66	48.80	0.73	750.02	38.68
India	Mean	1.27	38.17	1042.41	37.91	1197.41	277126.51	30.28
	Std. Deviation	0.26	13.81	419.23	0.84	75.62	153028.37	1.54
	Minimum	0.96	19.86	451.57	36.61	1075.00	60963.53	27.92
	Maximum	1.73	58.97	1605.61	39.35	1310.15	472180.00	32.78
Maldives	Mean	2.33	512.15	5858.39	43.87	0.35	3297.72	34.86
	Std. Deviation	0.42	211.53	2058.53	6.32	0.05	109.95	2.99
	Minimum	1.61	229.59	3039.33	33.64	0.29	3219.97	28.86
	Maximum	3.07	852.15	9033.39	52.44	0.45	3375.46	38.53
Nepal	Mean	0.16	23.41	485.00	52.42	26.21	1568.70	16.16
	Std. Deviation	0.06	11.86	204.00	1.59	0.93	449.31	1.47
	Minimum	0.10	10.60	244.72	50.66	24.35	993.88	13.95
	Maximum	0.30	45.14	792.55	55.39	27.04	2488.36	18.56
Pakistan	Mean	0.86	25.29	912.81	31.55	172.04	21359.80	34.59
	Std. Deviation	0.06	7.55	292.01	1.34	17.09	6927.72	0.91
	Minimum	0.74	14.02	483.50	29.64	145.98	10600.27	33.18
	Maximum	0.95	37.89	1356.67	34.06	199.43	30699.24	36.03
Sri Lanka	Mean	0.66	89.24	2187.68	41.33	19.95	10498.97	18.27
	Std. Deviation	0.09	38.47	1142.11	0.68	0.63	3827.14	0.06
	Minimum	0.55	41.32	832.80	40.01	18.91	5773.46	18.20
	Maximum	0.89	151.37	3843.78	41.93	20.97	16937.42	18.37
South Asia	Mean	1.13	35.21	994.19	37.21	1588.44	329355.41	30.13
	Std. Deviation	0.23	12.77	387.97	0.51	106.28	173858.22	1.62
	Minimum	0.84	18.26	455.86	36.58	1416.82	86333.62	27.65
	Maximum	1.51	55.10	1541.80	38.13	1749.42	552008.44	32.74
World	Mean	4.42	810.55	8572.55	45.50	6759.90	16699031.81	50.60
	Std. Deviation	0.29	188.55	1954.70	0.21	365.91	5755402.86	2.18
	Minimum	3.89	492.99	5397.58	45.18	6193.67	7676349.82	47.14
	Maximum	4.75	1039.82	10952.68	45.78	7338.98	23911439.45	53.91

Source: Author's calculation by using data of the World Bank, 2021

Among SAARC countries Maldives emitted highest per capita CO_2 (2.33 metric ton per capita) while Nepal emitted lowest amount (0.16 metric ton per capita). Among other countries Afghanistan and Bangladesh emitted small amount of CO_2 (0.17 metric ton per capita and 0.35 metric ton per capita, respectively). India emitted second highest per capita (though highest in total amount) of CO_2 (1.27 metric ton per capita). The rate for Bhutan, Pakistan and Sri Lanka is 0.79, 0.86 and 0.66 metric ton per capita, respectively. In case of healthcare expenditure, Bangladesh, Nepal and Pakistan spend very small amount for its peoples' health (less than $25 per capita) while Maldives spend highest amount $512 per capita. However, per capita GDP is also highest in Maldives ($5858) which is lowest in Afghanistan (only $41 per capita). Labor force participation rate is almost similar in SAARC member countries. However, it is more in Nepal, Bhutan, Maldives and Sri Lanka than Bangladesh, India and Pakistan. Among SAARC countries Nepal and Sri Lanka are less urbanized where less than 20% people lived in urban areas while Maldives and Pakistan are more urbanized where around 35% people lived in urban areas. In case of Bhutan, Bangladesh and India around 30% people lived in urban areas. In terms of total population and total export India is the largest country followed by Pakistan and Bangladesh. Other countries are relatively very small in terms of total GDP, total population and total export.

5.2 Empirical Results

Before estimating the relationship CO_2 emission, health expenditure and economic growth the study unit root test of used variables. Im-Pesaran-Shin unit-root test and Fisher-type unit-root test are used in this regard and it is found that all variables are stationary at first difference level. Regarding GDP as dependent variable, it is observed from Table 6 that economic growth in SAARC member countries as a whole significantly depends on economic growth of previous year and healthcare expenditure. Previous year's growth makes a perception among the producers, traders and consumers that positively influenced the economic growth of current year. The value of the coefficients shows that if other things remain unchanged then 1% more in previous year's GDP resulted in 0.85% increase in current year's GDP. On the other hand, healthcare expenses make labors more productive and hence have positive contribution in ensuring more economic growth. It is found that remaining all other factors constant 1% increase in healthcare expenditure may increase GDP by 0.08%. Albeit statistically insignificant, other two variables labor force and CO_2 emission also have positive effect on economic growth. Disaggregate analysis reveals that for all SAARC member countries healthcare expenditures affect economic growth significantly. The effect is more in India where healthcare expenditure may be backed by increasing GDP. The rate is quite good in case of Bangladesh and Sri Lanka where 1% increase in healthcare expenditure, remaining other factors unchanged, may increase GDP by 0.86% and 0.70%, respectively. In case of Nepal, Bhutan and Afghanistan the rate is more than 0.50% while in case of Maldives and Pakistan it is 0.38% and 0.36%, respectively. On the contrast CO_2 emission have negative contribution on economic growth in Bangladesh and Nepal where in case of Pakistan the effect is positive. The coefficient values explore that 1% increase of CO_2 emission remaining other things unchanged may decrease GDP by 0.38% and 0.15%, respectively. CO_2 emission may reduce labor productivity and hence, affect economic growth negatively. Interestingly in case of Pakistan, the study found positive impact of CO_2 emission on GDP. However, in case of Afghanistan, Bhutan, India, Maldives, Sri Lanka and SAARC as a whole CO_2 do not have significant effect on GDP. Small amount of CO_2 emission is considered as one of the reasons for such results.

Two control variables i.e. previous year's GDP and labor force have mixed results for different countries. In case of Pakistan, Bhutan and Maldives labor force have positive contribution while it is negative for Sri Lanka and Nepal. Difference in labor productivity among different countries may be responsible for such mixed results. Like SAARC as a whole previous year's GDP in Bangladesh, Bhutan and Nepal affect current year's GDP significantly. It is found that if other things remain unchanged 1% more previous year's GDP may be resulted in 0.36%, 0.34% and 58% increase in current year's GDP Bangladesh, Bhutan and Nepal, respectively. The Sargan test proves the validity of instruments.

Table 6: Results of Panel GMM estimation (Dependent variable Economic Growth)

Countries	Intercept	Y (-1)	LF	CO2	HE	Sargan
Afghanistan	3.376	0.205	-0.090	0.148	0.553*	chi2(18)= 8.23 Prob>chi2=0.98
Bangladesh	6.375**	0.363***	-1.372	-0.375**	0.861***	chi2(20)=11.99 Prob>chi2=0.92
Bhutan	-4.501*	0.340**	1.874*	0.144	0.562***	chi2(20)=13.64 Prob>chi2=0.85
India	-0.712	0.271	0.609	-0.255	1.005***	chi2(20)=14.20 Prob>chi2=0.82
Maldives	1.011	-0.115	1.627***	0.111	0.382***	chi2(21)=13.72 Prob>chi2=0.88
Nepal	12.786**	0.582***	-3.147*	-0.148**	0.660***	chi2(21)=11.26 Prob>chi2=0.96
Pakistan	-7.661**	0.213	3.471***	0.802**	0.358**	chi2(20)=10.50 Prob>chi2=0.96
Sri Lanka	20.236***	0.310	-4.867***	-0.107	0.704***	chi2(20)=9.65 Prob>chi2=0.97
SAARC	0.6344**	0.8559***	0.0406	0.0322	0.0825***	chi2(141)=142.74, Prob>chi2=0.44

Source: Author's calculation by using data of the World Bank, 2021

Regarding CO_2 emission as dependent variable, it is observed from Table 7 that CO_2 emission in SAARC countries as a whole depends significantly on previous year's CO_2 emission, share of urban population and amount of total export. Value of respective coefficients reveals that if other things remain unchanged then 1% more CO_2 emission in previous year in SAARC member countries may increase current year CO_2 emission by 0.86%. The results also found that 1% increase in the share of urban population may increase CO_2 emission by 0.18% if other influential factors hold constant and under same condition 1% increases in total export may resulted in 0.18% increase in CO_2 emission in SAARC member countries. A disaggregate analysis, however, found that previous year's CO_2 emission in Afghanistan, Bhutan, India, Nepal and Pakistan have statistically significant positive contribution on current year's CO_2 emission. It is found that if other things remain unchanged then 1% more CO_2 emission in previous year may increase current year's CO_2 emission by 0.29%, 0.68%, 0.46%, 0.41% and 0.64% in Afghanistan, Bhutan, India, Nepal and Pakistan, respectively.

Economic growth (current year GDP) has great contribution on determining CO_2 emission in Afghanistan and Bhutan and it is found that if other influential factors hold constant then 1% increase in GDP may resulted in 1.47% and 1.00% increase in CO_2 emission in Afghanistan and Bhutan respectively. On the other hand, healthcare expenditure in Nepal may affect CO_2 emission in the country. It if found that remaining other variable constant 1% more healthcare expenditure in Nepal may increase CO_2 emission by 0.98%. Additionally, share of urban population and amount export (amount of total trade in case of Afghanistan) have may positively contributed in CO_2 emission in India and Afghanistan, respectively.

Table 7: Results of Panel GMM estimation (Dependent variable CO_2 emission)

Contribution	Intercept	CO_2(-1)	Y	HE	UPOP	EXP	Sargan
Afghanistan	-41.179	0.285*	1.468**	-0.277	7.593	1.819***	chi2(19)=17.78 Prob>chi2=0.54
Bangladesh	3.027	0.302	0.370	0.433	1.026	0.104	chi2(19)=10.04 Prob>chi2=0.95
Bhutan	2.485	0.676**	1.003*	0.162	-1.173	-0.328	chi2(19)=10.20 Prob>chi2=0.92
India	-10.863*	0.456*	0.224	-0.318	3.255*	-0.018	chi2(19)=11.12 Prob>chi2=0.92
Maldives	-12.212**	-0.571	0.053	0.124	3.359	0.065	chi2(11)=2.49 Prob>chi2=0.99
Nepal	-8.894	0.412**	-0.854	0.984*	0.380	0.425	chi2(19)=10.06 Prob>chi2=0.95
Pakistan	6.418	0.638***	0.048	0.108	-2.106	0.014	chi2(19)=9.10 Prob>chi2=0.97
Sri Lanka	5.275	0.251	0.031	-0.241	-5.333	0.467	chi2(19)=9.23 Prob>chi2=0.97
SAARC	-1.436***	0.861***	0.015	0.082	0.183***	0.018**	chi2(136)=142.09 Prob>chi2=0.34

In case of Afghanistan and Maldives data on trade (% of GDP) is used as a proxy for data of total export.

Source: Author's calculation by using data of the World Bank, 2021

By regarding healthcare expenditure as dependent variable Table 8 explore that healthcare spending in SAARC countries as a whole significantly depends on previous year's healthcare spending and current year GDP. It is found that if other things remain constant 1% increase in previous year's healthcare expenditure may resulted in 0.92% increase in current year healthcare expenditure. In addition, under same condition 1% increase in GDP may increase healthcare spending by 0.09%. On the contrast, number of population and CO_2 emission do not have significant impact on healthcare spending.

A disaggregate analysis found that current year's healthcare spending in Afghanistan, Bangladesh and Nepal statistically depends on previous year's healthcare spending though mixed results are found for different countries and it is found negative for Bangladesh and Nepal and positive for Afghanistan. Per capita GDP have significantly positive contribution on healthcare spending SAARC countries except Afghanistan and Pakistan. In case of Nepal, Maldives and Bangladesh the effect is more influential and if other things hold unchanged 1% increase in per capita GDP may increase healthcare spending by 1.49%, 1.16% and 0.96% in Nepal, Maldives and Bangladesh, respectively. In case of Bhutan, Sri Lanka and India impact of per capita GDP is comparatively less

influential and remaining other factors unchanged 1% increase in per capita GDP may increase healthcare expenditure by 0.45%, 0.38% and 0.33% in Bhutan, Sri Lanka and India respectively.

However, the study found mixed results in influence of CO_2 emission healthcare spending. It is positive for Bangladesh and Nepal; and it is negative for Sri Lanka. It is found that holding other things unchanged 1% increase in per capita CO_2 emission may increase healthcare spending by 0.60% and 0.29% in Bangladesh and Nepal, respectively and reduce healthcare spending by 0.59% in Sri Lanka. It is also found mixed results for total number of population. It is found that number of population have positive effect on healthcare spending in case of Bangladesh, Bhutan, India and Sri Lanka while negative effect in case of Nepal and Maldives.

Table 8: Results of Panel GMM estimation (Healthcare Expenditure)

Countries	Intercept	HE (-1)	POP	Y	CO2	Sargan
Afghanistan	-4.101	0.971**	0.287	-0.102	-0.001	chi2(18)=11.90 Prob>chi2=0.85
Bangladesh	-33.347***	-0.360**	1.677***	0.957***	0.596***	chi2(20)=10.89 Prob>chi2=0.95
Bhutan	-39.938**	-0.270	3.111**	0.454**	0.068	chi2(20)=14.15 Prob>chi2=0.82
India	-74.175**	0.230	3.576**	0.333***	-0.323	chi2(20)=11.05 Prob>chi2=0.95
Maldives	11.002*	0.213	-1.289**	1.158***	0.392	chi2(20)=12.47 Prob>chi2=0.90
Nepal	41.027**	-0.388***	-2.656**	1.486***	0.294***	chi2(20)=13.23 Prob>chi2=0.87
Pakistan	-8.194	0.262	0.410	0.426	0.592	chi2(20)=22.91 Prob>chi2=0.29
Sri Lanka	-125.839***	0.202	7.510***	0.384**	-0.593***	chi2(21)=11.01 Prob>chi2=0.96
SAARC	-0.109	0.921***	-0.009	0.090**	-0.030	chi2(141)=150.31 Prob>chi2=0.28

Source: Author's calculation by using data of the World Bank, 2021

5.3 Summary of Results for All SAARC Member Countries

Table 9 summarizes the above results for SAARC countries. It is found that economic growth is positively determined by CO_2 in case of Bangladesh, Nepal and Pakistan; and in all member countries per capita healthcare spending significantly affects per capita GDP. On contrast, per capita CO_2 emission significantly depends on per capita GDP in case of Afghanistan and Bhutan; on per capita healthcare spending in Nepal. Additionally, per capita healthcare spending is significantly depending on per capita GDP in all member countries except Afghanistan and Pakistan; and on per capita CO_2 emission in case of Bangladesh, Nepal and Sri Lanka. However, per capita GDP in SAARC as a whole depends on per capita healthcare spending and vice versa.

Table 9: Summary of Results

	Dependent Variable Y		Dependent Variable CO2		Dependent Variable HE	
Countries	CO2	HE	Y	HE	Y	CO2
Afghanistan	(+)	(+)*	(+)**	(-)	(-)	(-)
Bangladesh	(-)**	(+)***	(+)	(+)	(+)***	(+)***
Bhutan	(+)	(+)***	(+)*	(+)	(+)**	(+)
India	(-)	(+)***	(+)	(-)	(+)***	(-)
Maldives	(+)	(+)***	(+)	(+)	(+)***	(+)
Nepal	(-)**	(+)***	(-)	(+)*	(+)***	(+)***
Pakistan	(+)**	(+)**	(+)	(+)	(+)	(+)
Sri Lanka	(-)	(+)***	(+)	(-)	(+)**	(-)***
SAARC	(+)	(+)***	(+)	(+)	(+)**	(-)

Source: Author's calculation by using data of the World Bank,2021

In Table 10 it is finally found that there exists unidirectional relationship between economic growth and CO_2 emission in case of Afghanistan, Bhutan, Bangladesh, Nepal and Pakistan. In case of Afghanistan, Bhutan economic growth affects CO_2 emission significantly. Similar result is found in Polat, et al. (2018), Apergis et al. (2018), Wang et al. 2020, Fodha and Zaghdoud (2010), Lotfalipour et al. (2010), Jalil and Mahmud (2009), Shahbaz et al. (2013). On the contrast, in case of Bangladesh, Nepal and Pakistan CO_2 affect economic growth and similar results were found in Menyah and Wolde-Rufael (2010, Mehrar et al. (2011), Ozturk and Acaravci (2010), Menyah and Wolde-Rufawl (2010), Saidi and Hammami (2015), Ang (2008), Dinda (2009), Saboori et al. (2012). The study, however, found no relationship among economic growth and CO_2 emission case of India, Maldives, Sri Lanka and SAARC which is supported by Richmond and Kaufmann (2006), Saboori et al. (2012a, 2012b).

Table 10: Relationship among Economic Growth, CO_2 emission and Healthcare Spending

Countries	Y & CO_2	Y & HE	CO_2 & HE
Afghanistan	Y➔CO_2	HE➔Y	No Relationship
Bangladesh	CO_2➔Y	Y⇔HE	CO_2➔HE
Bhutan	Y➔CO_2	Y⇔HE	No Relationship
India	No Relationship	Y⇔HE	No Relationship
Maldives	No Relationship	Y⇔HE	No Relationship
Nepal	CO_2➔Y	Y⇔HE	CO_2⇔HE
Pakistan	CO_2➔Y	HE➔Y	No Relationship
Sri Lanka	No Relationship	Y⇔HE	CO_2➔HE
SAARC	No Relationship	Y⇔HE	No Relationship

Source: Author's calculation by using data of the World Bank, 2021

Regarding relationship between healthcare spending and economic growth the study found bi-directional relationship for Bangladesh, Bhutan, India, Maldives, Nepal, Sri Lanka and SAARC as a whole. Similar results were found in Wang et al. (2019), Chaabouni and Saidi (2017), Wang et al. (2020), Amiri and Ventelou (2012), Elmi and Sadeghi (2012), Chaabouni and Abdnnadher (2014), Yamaguchi (2014). In case of Afghanistan and Pakistan the study found that healthcare spending affects economic growth significantly. Similar results were found in Ghorashi and Rad (2017), Polat et al. (2018), Hartwig (2010).

In case of healthcare spending and CO_2 emission the study found Bi-directional relationship in Nepal which is supported by Wang et al. (2019), Zaidi and Saidi (2018), Wang et al. (2020), Chaabouni and Abdnnadher (2014). The study also found that CO_2 emission has significant impact on healthcare spending in case of Bangladesh and Sri Lanka. This relationship is supported by Wang et al. (2019), Chaabouni and Saidi (2017), Chaabouni, et al. (2016). However, the study found no relationship between healthcare spending and CO_2 emission in case of Afghanistan, Bhutan, India, Maldives, Pakistan and SAARC as a whole and similar results were found in Abdullah et al. (2016).

6. CONCLUSION AND FINDINGS

The increasing threat of global warming and climate change has been the major, world-wide, on-going concern in the last two decades. The impacts of global warming on the world economy have been assessed intensively by researchers since the 1990s. Carbon dioxide (CO_2) emission causes climate change, which affects public health care and total production (GDP). Therefore, it becomes essential to investigate what potentially causes harm (CO_2 emissions) to quality of life among all living things and how it changes productivity (economic growth) and the cost associated with maintaining quality health-care (health care expenditure). Hence, the nexus between environmental pollutant, economic growth and expenditure on health has been the subject of considerable academic research for both developing and developed countries over the past few decades. Therefore, the study illustrates the relationship among carbon dioxide, economic growth and healthcare spending. However, major findings of the study are as follows:

Regarding relationship between economic growth and CO_2 emission Bangladesh, Afghanistan, Nepal, Bhutan and Pakistan expose unidirectional relationship. In case of Afghanistan, Bhutan only economic growth affects CO_2 emission significantly. On the contrast, in case of Bangladesh, Nepal

and Pakistan CO_2 affect economic growth. The study, however, found no relationship among economic growth and CO_2 emission in case of India, Maldives, Sri Lanka and SAARC.

Regarding relationship between healthcare spending and economic growth the study found bi-directional relationship for Bangladesh, Bhutan, India, Maldives, Nepal, Sri Lanka and SAARC as a whole. While in case of Afghanistan and Pakistan healthcare spending affects economic growth significantly.

In case of healthcare spending and CO_2 emission the study found bi-directional relationship for Nepal. The study also found that CO_2 emission has significant impact on healthcare spending in case of Bangladesh and Sri Lanka. However, the study found no relationship between healthcare spending and CO_2 emission in case of Afghanistan, Bhutan, India, Maldives, Pakistan and SAARC as a whole.

Therefore, it is observed that economic growth has significant impact on CO_2 emission through industrialization. Similarly, through environmental degradation CO_2 emission has significant impact on health care expenditure. On the contrast, in some cases through increasing productivity healthcare expenditure affect economic growth. Thus, the study suggests to increase healthcare expenditure and to reduce CO_2 emission that will ensure more sustainable economic growth.

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APPENDIX A.1

Im-Pesaran-Shin unit-root test

Ho: All panels contain unit roots

Ha: Some panels are stationary

Variable	p-value
Y	0.9882
Y (-1)	0.0000
CO2	1.0000
CO2 (-1)	0.0000
HE	0.9893
HE (-1)	0.0000
LF	0.9992
POP	0.8907
UPOP	0.9663
EXP	0.0706

Source: Author's calculation by using data of the World Bank, 2021

APPENDIX A.2

Fisher-type unit-root test
(Based on augmented Dickey-Fuller tests)
Ho: All panels contain unit roots
Ha: At least one panel is stationary

Variable			
Y	Inverse chi-squared(16) P	6.3497	0.9839
	Inverse normal Z	2.2662	0.9883
	Inverse logit t (44) L*	2.4405	0.9906
	Modified inv. chi-squared Pm	-1.7059	0.9560
Y (-1)	Inverse chi-squared(16) P	73.1145	0.0000
	Inverse normal Z	-6.4121	0.0000
	Inverse logit t (44) L*	-7.1731	0.0000
	Modified inv. chi-squared Pm	10.0965	0.0000
CO2	Inverse chi-squared(16) P	6.0726	0.9873
	Inverse normal Z	3.5432	0.9998
	Inverse logit t (44) L*	3.7667	0.9998
	Modified inv. chi-squared Pm	-1.7549	0.9604
CO2 (-1)	Inverse chi-squared(16) P	138.3556	0.0000
	Inverse normal Z	-8.2659	0.0000
	Inverse logit t (44) L*	-13.5361	0.0000
	Modified inv. chi-squared Pm	21.6296	0.0000
HE	Inverse chi-squared(16) P	7.3563	0.9658
	Inverse normal Z	2.4237	0.9923
	Inverse logit t (44) L*	2.3705	0.9889
	Modified inv. chi-squared Pm	-1.5280	0.9367
HE (-1)	Inverse chi-squared(16) P	81.5282	0.0000
	Inverse normal Z	-6.6125	0.0000
	Inverse logit t(44) L*	-7.9387	0.0000
	Modified inv. chi-squared Pm	11.5839	0.0000
LF	Inverse chi-squared(16) P	21.2759	0.1681
	Inverse normal Z	2.0571	0.9802
	Inverse logit t(44) L*	2.1021	0.9793
	Modified inv. chi-squared Pm	0.9327	0.1755
POP	Inverse chi-squared(16) P	25.7014	0.0584
	Inverse normal Z	-1.2041	0.1143
	Inverse logit t(39) L*	-1.4225	0.0814
	Modified inv. chi-squared Pm	1.7150	0.0432
UPOP	Inverse chi-squared(16) P	63.6977	0.0000
	Inverse normal Z	-0.2596	0.3976
	Inverse logit t(44) L*	-2.7231	0.0046
	Modified inv. chi-squared Pm	8.4318	0.0000
EXP	Inverse chi-squared(12) P	13.4759	0.3354
	Inverse normal Z	0.6851	0.7534
	Inverse logit t(34) L*	0.7335	0.7659
	Modified inv. chi-squared Pm	0.3013	0.3816

Source: Author's calculation by using data of the World Bank, 2021