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Structural Change, Environmental Pollution and Health Expenditure: Evidence from a Global Panel

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Abstract

This study examined the effects of structural change and environmental pollution on health expenditure, while controlling for globalization. A panel data from 1995 to 2019 for 115 countries was used, while the estimation of results was done based on the Driscoll-Kraay technique. The estimation was conducted for different income levels as well as sub-regional groupings. The results revealed that two components of structural change, manufacturing value-added and service value-added significantly increased health expenditure in the world. Economic globalization and financial globalisation were also found to significantly reduce health expenditure while social globalisation, environmental pollution and interpersonal globalisation were found to significantly increase health expenditure in the world. The income level analysis revealed that manufacturing value-added significantly increased health expenditure in low-middle-income and upper-middle-income countries and in the different sub-regional groupings. The results also showed that agricultural value-added reduced health expenditure in low-middle-income countries and in Latin American countries. Service value added was found to reduce health expenditure in East Asian, Pacific, and South Asia and to increase health expenditure in the Middle East and North Africa. It is therefore recommended that green production techniques and better abatement policies should be utilized in the industrial and service sectors of all economies.

Keywords: Structural change, environmental pollution, Health expenditure, Driscoll-Kraay technique

1. Introduction

Poor environmental quality is one of the greatest problems plaguing most countries of the world today. The world attained it overshoot day since the early 1970s and the gap between bio capacity and ecological footprint has continually widen till date (GFN, 2021). The role played by environmental degradation or pollution on mankind's health expenditure has been a subject of debate (Alimi et al., 2022; Saleem et al., 2021; Alimi et al., 2019; Anwaret al., 2021; Yazdi and Khanalizadeh, 2017; Yahaya et al., 2016). Withal, most economies experience structural change in all sectors and these changes have been a driving force to environmental pollution, though little or no consideration has been given within the literature on the effect of structural change on health expenditure. Whether or not a change in a country's structures and major engines of development can enhance or reduce expenditure on health is still a subject of debate that can be considered nascent. This is because human health and quality of life are of utmost importance, reasons why goal three of the Sustainable Development Goals (SDGs) emphasises "good health and well-being" (SDG3). In order for this goal to be attained, the environment must be catered for (SDG13) so that other goals like responsible consumption and production, sustainable cities and communities, climate action, life on the water, affordable and clean energy, clean water and sanitation are in synergy.

Environmental pollution whether air, water, soil or noise affects the health of human beings negatively (Apergis et al., 2018a; Cheikh et al., 2020; Alimi et al., 2022; Saleem et al., 2021), thus inflicting significant costs on governments, households as well as individuals (Ahmad et al., 2021). These expenditures on health are unavoidable and continue to be sort after by individuals in an attempt to stay healthy. Many have also linked the increase in energy consumption to pollution, especially as it increases CO_2 emissions. Alimi et al. (2019) found carbon emissions to significantly increase public and national health expenditure. Others like Fattahi (2015), Mohammad et al. (2015), Mujtaba & Ashfaq (2022) have also confirmed environmental pollution to be among the most important determinants of health expenditure. As man continues to engage in activities like production, carbon dioxide (CO_2) emissions together with other air pollutants like Green House Gas (GHG), nitrous oxide and sulphur dioxide also increase which greatly compromise the quality of air and the environment in general. This according to the United Nations Environmental Programme (UNEP, 2020) contributes to over 7million premature deaths across the world annually.

As countries increase their concerns about health and the environment, structural change remains vital in attaining desired goals for the betterment of human health and the environment as it provides a more inclusive, diversified and sustained pattern of growth and development. Though economic growth is rising in most parts of the world, structural change is required for countries to realize their full potential. As noted by Grossman and Krueger (1991), the secondary sector pollutes more than the tertiary, hence, the tertiary produces less pollution effect. Adebayo et al. (2021) highlighted that shifting from structural transformation in the agricultural and industrial sectors to tertiary sector transformation reduces ecological hazards.In order to fight economic hazards like poverty, poor governance, social exclusion, resource scarcity, environmental damage and also reduce inequality, structural transformation has to be embraced as it will act as a catalyst to growth in various sectors of every economy. Structural change necessitates a transition to more productive activities and methods as well as innovation in technology that are environmentally friendly (Jayanthakumaran & Liu, 2012; Adebayo et al., 2021; Ali et al., 2020). This can help boost environmental and human health, reducing expenditures on health care. Structural transformation is, therefore, necessary to propel the world towards growth that is inclusive. This could be achieved through the promotion of value chains with actors at the micro and macro levels. Zhou et al. (2020) found that industrialization could increase or reduce public health expenditure while agricultural activities could increase health expenditure. Promoting development strategies that are global-value-led by instituting measures aimed at building local capacity, attracting foreign direct investment and fostering private sector development in manufacturing and primary input processing (AfDB, 2014) can place developing countries higher on the value chain.

Rising urbanization and globalization across the world is increasing the health concerns of many countries. According to Shahbaz et al. (2016a), 64% of developing countries will be urbanized by 2050 with a growth rate of 4.2% for sub-Saharan Africa alone (World Development Indicators, 2021). This has placed more pressure on natural resources and has further increased environmental concerns, thus increasing the demand for healthcare and healthcare resources in both developed and developing countries of the world. In recent times, every country in the world (i.e. both developed and developing) has witnessed increasing health expenditures in their fight against the novel coronavirus which has contributed to increase health expenses by households and governments (Diop et al., 2021; Diop and Asongu, 2021). This is because health expenditure is an integral aspect of life and very essential for society as a whole (Boachie et al., 2014). With the increasing relevance of globalization in the world, continents like Africa may be experiencing growth in foreign direct investment (FDI) which can increase activities in the agriculture, manufacturing and service sectors (Asongu et al., 2022). However, this growth in FDI may be accompanied by increase rate damage on the environment (Wang et al., 2020; Manocha, 2021). In addition, increase FDI is promoting GDP growth around the globe, driven by technological innovation, natural resource exports as well as improved macroeconomic management (Li et al., 2019). For this to continue, value must continuously be added through the use of more productive yet sustainable methods, of production which will improve on health and welfare.

The trend of health expenditure for the study period as presented in appendix 1 reveals that health expenditure was relatively low and stable from 1995 to 2000 but started increasing from 2000 to 2020. The increase in the trend of health expenditure is supported by the findings of Soheila & Bahman (2017). The trends of all the components of structural change like agricultural value-added, manufacturing value-added and service value-added are seen to have also been on an increasing trend since the year 2000. The ecological footprint was relatively the same from 1995 to 2000, started rising in the year 2000 but experienced a sharp fall in 2010,which continued falling gradually till 2015 and since then has been experiencing a rise (WHO, 2021).

From the trend analyses, a relationship between environment pollution and health expenditure does not seem evident. Most studies that have examined the relationship between environmental pollution and health expenditure focused on carbon dioxide emissions (Haseeb et al., 2019; Saida& Kais, 2018; Apergis et al., 2018a) probably because of CO_2 contribution to ozone layer depletion and climate change. Some studies suggest a positive relationship between health expenditure and environmental quality (Haseeb et al., 2019; Zaidi & Saidi, 2018; Apergis et al., 2018a). However, most studies have ignored the role of structural change in this relationship. This study is therefore, intends to examine the relationship between structural change, environmental pollution and health expenditure in selected countries of the world. To better understand this effect, both an income level and sub-regional level prognoses will be investigated.

The rest of the study is structured as follows. A review of extant literature is provided in Section 2 while Section 3 discusses the corresponding data and methodology. The findings are disclosed in Section 4 while Section 5 concludes with recommendations for policy and future research directions.

2. Literature Review

Due to the increasing threat posed by climate change, environmental pollution has become a point of convergence due to its devastating consequences on the environment and human health. The importance of health has been discussed by theorists like Grossman (1972) who viewed the demand for health to be derived from the consumption effect (direct utility from good health) and the investment effect (available days for work). According to him, investing in health could yield better health outcomes.

Many studies have examined the effect of environmental pollution on health expenditures using carbon dioxide emission (CO_2) emissions to capture pollution (Mujtaba & Ashfaq, 2022; Osakede & Ajayi, 2019; Soheila & Bahman, 2017; Ullah et al., 2019, Alimi et al. 2020) while others have employed measures like sulphur dioxide (SO_2) (Hao et al. 2018). Osakede & Ajayi (2019) examined the effects of air pollution measured using CO_2 on life expectancy and infant mortality rates in the SSA region. They fitted fixed and random effects models to a panel of 44 countries from the period 1960 to 2017 and their results suggested that poor air quality contributes to the existing low health status in SSA inducing a fall in life expectancy and a rise in infant mortality rates. On their part, Anwar et al. (2021) used a panel of 87 countries to investigate the effect of environmental quality and forestation on health expenditure and concluded among others that CO_2 emission increases health expenditure. While examining the role of environmental quality and economic growth in the determination of health expenditures in the Middle East and North Africa region for the period 1995-2014 using the Autoregressive Distributed Lag (ARDL) method, Soheila & Bahman (2017) found that health expenditure, income, CO_2 andsuspended coarse particulate matter(PM_{10}) emissions are cointegrated panel while long-run elasticities showed that income and CO_2 and PM_{10} emissions had positive effects on health expenditure. Similar outcomes are equally observed by Alimi et al. (2020).

Furthermore, Wang et al. (2019) also examined the linkages between CO_2 emissions, health expenditures and economic growth in the presence of gross fixed capital formation and per capita trade using the autoregressive distributive lag (ARDL) model for Pakistan. They found that there was a significant long and short-run causal relationship between health expenditure, CO_2 emissions, and economic growth in Pakistan. Using Sulphur dioxide (SO_2)as measure of environmental quality, Hao et al. (2018) examined the nexus between environmental pollution and public expenditure in China and concluded that environmental pollution leads to increase health expenditure. Equally, Mujtaba & Shahzad (2021) in a panel of 28Organization for Economic Co-operation and Development (OECD) countries concluded among others that a long run causal relation exists between carbon dioxide emission and health spending. Other studies like those of Haseeb et al. (2019); Apergis et al. (2018a); Yazdi et al. (2014); Chaabouni & Saidi (2017);Zaidi and Saidi (2018) and Boachie et al. (2014) have found that CO_2emissions negatively affect human health.

Few studies have used ecological footprint to measure environmental pollution, unlike the proceeding studies that used CO_2 emissions. Dinga et al. (2022) used the ecological footprint to capture pollution when testing the existence of a dualistic approach to the environmental Kuznets curve (EKC) hypothesis. Nathaniel & Shah (2020) explored the effect of renewable and nonrenewable energy on the environment in MENA countries, using the ecological footprint to capture pollution. Others like Yassin & Aralas (2017) examined the effect of structural transformation (technological progress, structural changes, demographic changes and trade openness) on environmental pollution in selected Asian countries and found that the industrialization process will induce increased environmental pollution, while the tertiarization process lowers environmental pollution. In a later study, Yassin &Aralas (2019) sort to investigate whether de-industrialization and tertiarization could be the solution to the carbon emissions in Asian countries and found that while the expansion of the service sector bound to reduce CO_2 emissions, de-industrialisation was moderating CO_2 emissions in Asia. Zhou et al. (2020) made use of the quantile regression technique to test the relationship between private and public health care expenses and their determinants using the pooled mean group technique. Their results revealed that the impact of industrialisation, technological advancements and agricultural activities were heterogeneous at the various quantiles. A unidirectional causality was also found between industrialisation and public health expenses while GDP and agricultural activities had a two-way causal influence.

The aforementioned studies indicated that much focus has been given to the effects of environmental pollution on health expenditure with very little attention given to the place of structural change. The study contributes to the lacking literature on multifaceted structural change by considering three dimensions of structural change. Among the many studies that examine the effect of environmental pollution on health expenditure, CO_2remains the most used proxy of environmental pollution. However, CO_2 is not a pollutant but contributes to the greenhouse effect, thus CO_2 alone does not fully capture environmental pollution. This study adds to the literature by using ecological footprint which is a more inclusive measure of pollution. Ecological footprint takes into account how fast we consume resources compared to how soon nature can absorb our waste and generate new resources. Also, most of these studies have not studied this relationship using an enlarge world panel. Another contribution of this study is the use of estimation approaches that account for cross sectional dependence which biased conventional techniques that have been mostly used. It is on the basis of this that the present study seeks to examine the effect of structural change, ecological footprint and health expenditure in the world while controlling for globalisation.

3. Methodology

3.1. Data and description

The data used in the study were gotten from World Development Indicators (WDI) (2021) for health expenditure, gross domestic product per capita, components of the financial development index (broad money and credit to the private sector) and structural change variables, that is manufacturing, service and agricultural value-added. Equally, data for globalisation and the different components of globalisation are obtained from the KOF globalisation index (2021). Panel data for this study was collected from the year 1995 to 2019, for 115 selected countries of the world as presented in Appendix 2. The scope of the study was based exclusively on data availability. Health expenditure is measured using the total health expenditure which encompasses government health expenditure and household health expenditure. Environmental pollution is captured using the Ecological Footprint gotten from the Global Footprint Network (2021) which measures how fast man consumes resources and generates waste compared to how fast nature can absorb the waste generated.

3.2.Model specification

The study aims at evaluating the effect of structural change and environmental pollution on health expenditure. The logarithmic form of the variables of interest can be presented as follows;

$$log\ HLTX_{it} = \propto_0 + \propto_1 (logMVA)_{it} + \propto_2 (logAVA)_{it} + \propto_3 (logSVA)_{it} + \propto_4 (logEFP)_{it} + \propto_5 (FINDEV)_{it} + \propto_6 (GDPK)_{it} + \propto_7 (GLOB)_{it} + \omega_{it} \quad (1)$$

Where logHLTX is the log of health expenditure, while logMVA, logAVA and logSVA are the logs of manufacturing, agricultural and savings value-added respectively. LogEFP is log of ecological footprint, logFINDEV, logGDPK and logGLOB are the logs of financial development (which is a constructed index using broad money and credit to the private sector), gross domestic product and globalization, respectively. Other control variables used to avoid bias are globalization measured using economic globalization, financial globalization, trade globalization, social globalization, political globalization, interpersonal globalization, financial development is captured using monetary base and credit to the private sector, and GDP which is gross domestic product per capita.

3.3.Estimation technique

The estimation technique adopted for this study is the Driscoll-Kraay standard error technique formulated by Driscoll and Kraay (1998). This technique requires that the averages of the products between the regressors and the residuals be first gotten and then used in the weighted heteroskedasticity and autocorrelation consistent(HAC)estimator in order to produce standard errors which are robust to heteroskedasticity, serial and spatial correlation. The technique takes care of missing values, heteroskedasticity and cross-sectional dependence and can be used in the presence of spatial and serial dependence (Heberle and Sattarhoff, 2017). The Driscoll-Kraay estimation technique also has the ability to take care of time-invariant differences, thus eliminating potential bias (Hoechle, 2007). It is also applicable in balanced as well as unbalanced panel data. Before proceeding with an estimation of the model, the preliminary tests which are necessary to avoid biased outcomes and enhance the fitness of the outcome are performed. Among the preliminary tests employ in this study are, the cross-sectional dependence test of Pesaran (2004, 2015) used to test the presence of cross-sectional dependence which permit us to choose between first or second-generation econometrics approaches. To ensure the existence of heterogeneity among panels amidst cross-sectional dependence, we employ the Peasaran & Yamagatta (2008) slope homogeneity test. Furthermore, the order of integration of the variables are investigated using the cross-sectional Augmented Dickey-Fuller (CADF) test of Pesaran (2004) that accounts for cross-sectional dependence. To ascertain the existence of long-run relation, we employ the Westerlund (2007) cointegration test due to its ability to account for the problem of cross-sectional dependence.

4. Results and Discussion

4.1.Descriptive statistics and pairwise correlation

The purpose of this paper is to examine the effects of structural change and environmental pollution on health expenditure. The descriptive statistics is presented in Table 1.

[Insert table 1]

The descriptive statistics indicate that the average amount spent on health care (HLTX) is674.967, with minimum and maximum values of 4.478 and 10623.85 respectively, indicating a widespread in health expenditures in the world. The standard deviation of 1453.727 is also seen to deviate above the mean. Service value added (SVA) and manufacturing value added (MVA) have mean values of 2.352e+11 and 4.942e+10 respectively, with standard deviations of 1.102e+12 and 1.961e+11 respectively indicating that service and manufacturing value-added do not deviate above their mean. However, agricultural value-added (AVA) is seen to deviate above its mean with a mean value of 1.367e+10 and SD of 3.333e+10. Ecological footprint (EFP) has a mean and standard deviation of 2.9 and 2.211 and minimum and maximum values of 0.481 and 13.605, indicating a small spread.

The pairwise correlation matrix was used to verify whether or not there existed an association among the variables used in the study. From table 2, health expenditure is positively correlated with MVA, SVA, AVA, EFP, FINDEV, GDP and GLOBX. This indicated that an increase in any of these variables will increase health expenditure. MVA is also has positively correlated with AVA, SVA, EFP, FINDEV, GDP and GLOBX.

[Insert table 2]

4.2.Cross sectional dependence and Slope homogeneity, unit root and cointegration test

This study employs both the Pesaran (2004) and Pesaran (2015) residual crosssectional dependence(CD) test in order to help us determine whether to go with a 1stor 2nd generation panel unit root test which will account for spillover effects that can cause biased results. The Pesaran (2004) CD test presented in Table 3 indicates that there is a strong presence of cross-sectional dependence. Thus, the null hypothesis is rejected. Also, the Pesaran (2015) CD test indicates the absence of weak cross-sectional dependence, which confirms cross-sectional dependence for the whole model.

[Insert table 3]

The slope homogeneity test of Pesaran & Yamagatta (2008) is employed to determine cross sectional heterogeneity. The results indicate that the coefficients for both delta and adjusted delta are homogeneous, implying that the slopes are heterogamous. Thus, we reject the null hypothesis of homogeneous slopes. This study makes use of the panel covariate augmented Dickey-Fuller (CADF) unit root test proposed by Pesaran (2003) to observe the trends that influence the data (examine the stationarity) after confirming the presence of cross-sectional dependence above. The results are presented in table 4.

[Insert table 4]

The results revealed that all the variables used in the study were stationary at 1^{st} difference and thus follow an I(1) process. Table 5 presents the Westerlund (2007) cointegration test which is a second-generation test used because of the presence of cross-sectional dependence.

[Insert table 5]

The results of the four test statistics reveal that in both panel and group test statistics, we reject the null hypothesis of no cointegration since at least two of the test statistics is significant for each of the variables, we conclude that there is cointegration within the panel.

4.3 Estimation Results

Table 6 presents the results of Driscoll- Kraay fixed effect estimation. The table presents the global results while controlling for the different types of globalization namely economic globalization (GLOBEX), trade globalisation(GLOBTX), sociocultural globalization (GLOBSCX), financial globalization (GLOBFNX), interpersonal globalisation GLOBIPX, cultural globalisation GLOBCUX, and political globalization (GLOBPOX). In order to ascertain the effects of structural change and environmental pollution on health expenditure in the world, we estimate the first model, DK1 without any control variable. The result indicates a positive and statistically significant effect of manufacturing value added (MVA) on health expenditure. The process of industrialization does not only require labour which is sometimes exposed to harmful substances and processes but is sometimes done using chemical processes and materials which emit harmful substances into the atmosphere that travel great distances to affect human health. This result is in line with the findings of Yassin & Aralas (2019) who concluded that the industrialization process will induce pollution while tertiarization will lower it.

[Insert table 6]

Agricultural value added (AVA) is seen to negatively affect health expenditure. However, this result is statistically insignificant. Service value added (SVA) positively affects health expenditure in the world. This result is significant at a 10% level of significance. The coefficient of ecological footprint is positive and significant at a 1% level of significance. This is consistent with the apriori expectations. These results are in line with those of Osakede and &Ajayi (2019), Soheilaand Bahman (2017), Haseeb et al. (2019), Mujtaba and Ashfaq (2022) and Saleem et al. (2021). With rising urbanization around the world, production in all sectors is increasingall forms of pollution resulting in health problems like cardiovascular diseases, lung diseases, asthma, cancer and many others. All of these increase people's visits to hospitals, making them incur serious costs in an attempt to treat the disease.

The second model DK2 estimates the baseline model with the inclusion of other explanatory variables like financial development (FINDEV), gross domestic product (GDP) and the globalization index (GLOBX) in order to verify the robustness of the results. The results indicate that with the inclusion of these explanatory variables, the signs of MVA, AVA, SVA and FINDEV all remain the same as those in our baseline model with different levels of significance indicating that the results are robust when we control for FINDEV, GDP and GLOBX. Model 3 controls for economic globalization in the baseline model. The result indicates that the signs of HLTX, MVA, AVA, SVA and FINDEV remain unchanged when we control for economic globalization indicating that the result is robust. The sign of economic globalization (GLOBEX) is negative but statistically significant indicating that economic globalization reduces health expenditure in the world. This could be a result of the fact that cross-border trade results in the rapid spread of technologies that come with exposure to more friendly environmental practices which may be more efficient and safer. The result is the same when we control for GLOBTX, GLOBSCX, GLOBFNX, GLOBIPX, GLOBPOX and. GLOBCUX. Trade globalization is negative but statistically insignificant, while political globalization is positive but insignificant. Social globalization is seen to be positive and significant. This could be because globalization has permitted the sharing of ideas and knowledge among people in different societies which may sometimes encourage environmentally unhealthy practices that end up affecting health.

This study further captures the disparities in the outcome that may occur due to income level and sub-regional groupings by examining the effects of structural change and environmental pollution on health expenditure for low middle-income countries (LLMIC), upper-middle-income countries (HUMIC), East Asian Pacific and South America (EAPSA), East Asian Pacific, Europe, Central Asia and North America (ECANA), sub-Saharan Africa (SSA), Latin American Countries (LAC) and the Middle East and North Africa (MENA). This is equally done to carry out some comparative analysis. The outcome of both the income-level and sub-regional groupings is presented in Table 7.

[Insert table 7]

The results indicate that the lag of health expenditure is positive and statistically significant for both low-middle-income and upper-middle-income countries. However, those of upper-middle-income countries are more significant. The results equally indicate a positive sign for MVA, indicating that an increase in manufacturing in the world increases health expenditure in both upper and lower middle-income countries. This increase will lead to a reduction in the available biocapacity. This is further confirmed for all sub-regional groupings. Rising levels of urbanization in the world and technological advancement have facilitated production around the world causing an increase in goods and services produced. Ahmed et al. (2020) confirmed that urbanization increases ecological footprint. Agricultural value added (AVA) is seen to have a negative effect on health expenditure implying that an increase in agricultural production will lead to a fall in health expenditure. These results are however only statistically significant in LLMIC and LAC. Agricultural production helps to increase the income of farmers thereby improving their living standards and reducing the risk of being ill. Also, when households are able to consume organic food containing micronutrients they become healthier and can easily fight diseases, consequently reducing expenditures on health. This is in line with the findings of Lulin et al. (2020) who carried out an empirical study on the determinants of health care expenses in emerging economies and found agricultural production to have a two-way causal relationship with agronomic transformation having a negative effect on health expenditure.

The coefficient of SVA is positive for both LLMIC and HUMIC but statistically insignificant. SVA is however seen to negatively affect health expenditure for EAPSA, but has a positive effect on health expenditure in MENA. The EAPSA results contradict those of Munzel et al. (2021). Services like transport, whether water transport, land or air contribute highly to noise, water and air pollution (greenhouse gas emissions) which can lead to cardiovascular disease, hypertension and others. Munzel et al. (2021) provided updated evidence from epidemiological studies which showed that transportation noise increases the risk of cardiovascular diseases and mortality and explained the potential effects of noise pollution. All of these diseases inflict significant costs on individuals and governments in MENA countries thus, increasing health expenditures.

The ecological footprint is seen to positively affect health expenditure in both LLMIC and HUMIC. These results are however statistically insignificant. The ecological footprint is also seen to positively affect health expenditure in ECANA, SSA and LAC and negatively affect health expenditure in LLMIC and MENA. However, the effect of ecological footprint is insignificant in each case. This contradictory result is in line with the findings of Lu et al. (2021) who found heterogeneity on different quintiles.

Financial development is statistically significant in determining health expenditure in the world. The coefficient of FINDEV is positive and statistically significant for LLMIC,HUMIC and sub-Saharan Africa. FINDEV is also seen to have a negative effect on health expenditure in EASPSA. These results are equally significant at a 1% level of significance. This result indicates that a 1% increase in monetary mass and credit to the private sector in LLMIC, HUMIC and SSA will lead to a 0.1075%, 0.102% and 0.111% increase in health expenditure. This could be a result of the fact that increasing credit to the private sector encourages investments which could be done in ventures that are polluting, resulting in diseases. An increase in financial development rather decreases health expenditure in EAPSA.

The results further indicate that GDP has a positive effect on health expenditure in both LLMIC and HUMIC with a statistically significant effect noted for LLMIC. The results indicate that a

1% increase in GDP will result in a 0.611% increase in health expenditure. For regional grouping, GDP has a positive and statistically significant effect on health expenditure in EAPSA and LAC. Structural transformation introduces better technologies which result in an increase in production in the agricultural, industrial and service sectors which intend increase GDP. However, this could increase emissions significantly in these areas. This is in line with the findings of Dinga et al. (2021) who found that as GDP was increasing, environmental pollution was increasing till above a certain threshold.

The globalization index (GLOBX) was found to have a positive and statistically significant influence on health expenditure in LLMIC and a negative and statistically significant influence on health expenditure in HUMIC. The result shows that a 1% increase in the rate of globalization will result in a 0.249% increase in health expenditure in LLMIC, while health expenditure will fall by 0.314% in HUMIC. The globalization index was found to be insignificant for all sub-regional groupings.

5. Conclusion and Policy Recommendations (add future research directions)

This study has examined the effects of structural change and environmental pollution on health expenditure in the world while controlling for globalisation using the Driscoll-Kraay estimation technique for a panel of 115 countries. In order to choose a suitable test and estimation technique for the study, the data was first tested for cross-sectional dependence using Pesaran (2004) and Pesaran (2015) CD test. The study also tested for cointegration, cross-sectional dependence, slope homogeneity and unit root after confirming that 2^{nd} generational tests were appropriate. The estimation using the Driscoll-Kraay technique was done using income level analysis as well as sub-regional groupings in order to ascertain the effect of structural change and environmental pollution on health expenditure in the world.

Based on our findings, manufacturing value-added, service value-added and the ecological footprint significantly increase health expenditure. Globalisation measured from economic, and financial dimensions were found to significantly reduce health expenditure while globalisation in terms of social and interpersonal was found to significantly increase health expenditure in the world. From the income level analysis, manufacturing value-added significantly increases health expenditure in both low and upper-middle-income countries and in the different sub-regional groupings. It was further established that agricultural value-added reduces health expenditure in low-middle-income countries and in Latin American countries, service value-added reduces health expenditure in EAPSA and increase health expenditure in MENA. Based on these findings, the following policy recommendations are made:

From the results obtained, it is evident that components of structural change like manufacturing value added, service value added and environmental pollution had a significant influence on health expenditure. It is therefore important to introduce green production techniques and better abatement policies in industries of low and upper-middle-income countries and in those of all the different sub-regional groupings. Also, mitigating measures should be put in place by policymakers in different countries to reduce environmental pollution in line with SDG12 (i.e. on responsible consumption and production) and SDG13 (i.e. climate action) of the sustainable development goals.

The findings in this study leave room for future research, especially as it pertains to assessing how the investigated interactions are relevant to the achievement of other sustainable development goals. Moreover, country-specific studies could also be considered for more targeted policy implications.

6. **References**

AfDB (African Development Bank). (2014). Tracking Africa's Progress in Figures.

Ahmad, M., Rehman, A., Shah, S. A. A., Solangi, Y. A., Chandio, A. A., & Jabeen, G. (2021). Stylized heterogeneous dynamic links among healthcare expenditures, land urbanization, and CO2 emissions across economic development levels. *Science of the total environment*, *753*, 142228.

Ahmed, Z., Zafar, M. W., & Ali, S. (2020). Linking urbanization, human capital, and the ecological footprint in G7 countries: an empirical analysis. *Sustainable Cities and Society*, *55*, 102064.

Ali, S., Yusop, Z., Kaliappan, S. R., & Chin, L. (2020). Dynamic common correlated effects of trade openness, FDI, and institutional performance on environmental quality: evidence from OIC countries. *Environmental Science and Pollution Research*, *27*(11), 11671-11682.

Alimi, O. Y., Ajide, K. B., & Ayadi, F. S. (2022). A quantile regression analysis of mediating impacts of institutions in environmental quality-health outcomes nexus in sub-Saharan Africa. *OPEC Energy Review.*

Alimi, O. Y., Ajide, K. B., & Isola, W. A. (2020). Environmental quality and health expenditure in ECOWAS. *Environment, Development and Sustainability*, *22*(6), 5105-5127.

Anwar, M. A., Madni, G. R., & Yasin, I. (2021). Environmental quality, forestation, and health expenditure: A cross-country evidence. *Environment, Development and Sustainability*, *23*(11), 16454-16480.

Apergis, N., Gupta, R., Lau, C. K. M., & Mukherjee, Z. (2018). US state-level carbon dioxide emissions: does it affect health care expenditure?. *Renewable and Sustainable Energy Reviews*, *91*, 521-530.

Asongu, S., Meniago, C., & Salahodjaev, R. (2022). The role of value added across economic sectors in modulating the effects of FDI on TFP and economic growth dynamics. *International Journal of Emerging Markets*.https://doi.org/10.1108/IJOEM-10-2018-0547

Boachie, M. K., Mensah, I. O., Sobiesuo, P., Immurana, M., Iddrisu, A. A., & Kyei-Brobbey, I. (2014). Determinants of public health expenditure in Ghana: a cointegration analysis. *Journal of Behavioural Economics, Finance, Entrepreneurship, Accounting and Transport*, *2*(2), 35-40.

Chaabouni, S., & Saidi, K. (2017). The dynamic links between carbon dioxide (CO2) emissions, health spending and GDP growth: A case study for 51 countries. *Environmental research*, *158*, 137-144.

Cheikh, N. B., Zaied, Y. B., & Chevallier, J. (2021). On the nonlinear relationship between energy use and CO2 emissions within an EKC framework: Evidence from panel smooth transition regression in the MENA region. *Research in International Business and Finance*, *55*, 101331. https://doi.org/10.1016/j. ribaf.2020.101331

Dinga, G. D., Fonchamnyo, D. C., & Achuo, E. D. (2022). Primal–dual approach to environmental Kuznets curve hypothesis: A demand and supply side analyses of environmental degradation. *Environmental Science and Pollution Research*, *29*(11), 16484-16502.

Diop, S., & Asongu, S. A. (2021, February). The Covid-19 pandemic and the new poor in Africa: The straw that broke the camel's back. In *Forum for Social Economics* (pp. 1-13). Routledge.

Diop, S., Asongu, S. A., & Nnanna, J. (2021). COVID-19 economic vulnerability and resilience indexes: Global evidence. *International Social Science Journal*, *71*(S1), 37-50.

Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of economics and statistics*, *80*(4), 549-560.

Fattahi, S. M. (2015). The Role of Urbanisation Rate Between Air Pollution and Health Expenditure: A dynamic panel data approach. *Journal of preventive medicine and public health*.37(3), 281-440.

Grossman, G. M., & Krueger, A. B. (1995). Economic growth and the environment. *The quarterly journal of economics*, *110*(2), 353-377.

Hao, Y., Liu, S., Lu, Z., Huang, J., and Zhao, M. (2018). The impact of environmental pollution on public health expenditure: dynamic panel analysis based on Chinese provincial data. *Environmental Science and Pollution Research*, *25:18853–18865*

Haseeb, M., Kot, S., Hussain, H. I., & Jermsittiparsert, K. (2019). Impact of economic growth, environmental pollution, and energy consumption on health expenditure and R&D expenditure of ASEAN countries. *Energies*, *12*(19), 3598.

Heberle, J., & Sattarhoff, C. (2017). A fast algorithm for the computation of HAC covariance matrix estimators. *Econometrics*, *5*(1), 9.

Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. *The stata journal*, 7(3), 281-312.

Jayanthakumaran, K., & Liu, Y. (2012). Openness and the environmental Kuznets curve: evidence from China. *Economic Modelling*, *29*(3), 566-576.

Khoshnevis, Y. S., & Khanalizadeh, B. (2017). Air pollution, economic growth and health care expenditure. *Economic research-Ekonomska istraživanja*, *30*(1), 1181-1190.

Li, Z., Dong, H., Huang, Z., & Failler, P. (2019). Impact of foreign direct investment on environmental performance. *Sustainability*, *11*(13), 3538.

Lu, W., Wu, H., & Geng, S. (2021). Heterogeneity and threshold effects of environmental regulation on health expenditure: Considering the mediating role of environmental pollution. *Journal of Environmental Management*, *297*, 113276.

Mohammad, R., Fazel, Mehrdad, M., Mojtaba, S., Moraveil, A. (2015) Epidemiology of urban traffic accident victims hospitalized more than 24hours in a level III trauma center, Kashen country. *Archives of trauma*,18(2), 212-260.

Mujtaba, G., &Ashfaq, S. (2022). The impact of environment degrading factors and remittances on health expenditure: an asymmetric ARDL and dynamic simulated ARDL approach. *Environmental Science and Pollution Research*, *29*(6), 8560-8576.

Nathaniel, S., Anyanwu, O., & Shah, M. (2020). Renewable energy, urbanization, and ecological footprint in the Middle East and North Africa region. *Environmental Science and Pollution Research*, *27*(13), 14601-14613.

Osakede, U. A., & Ajayi, P. I. (2019). Air Pollution and Health Status in Sub-Sahara Africa (SSA). *Journal of Economics and Sustainable Development*, 10(22), 2019. DOI: 10.7176/JESD/10-22-03

Pesaran, H. A. (2003). *Simple panel unit root test in the presence of cross section dependence* University of Cambridge, Faculty of Economics (DAE). Cambridge Working Papers in paper

Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels. Cesifo Working Papers 1233:255–260

Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of applied econometrics*, *22*(2), 265-312.

Pesaran, M. H. (2015). Testing weak cross-sectional dependence in large panels. *Econometric reviews*, *34*(6-10), 1089-1117.

Pesaran, M. H., & Yamagata, T. (2008). Testing slope homogeneity in large panels. *Journal of econometrics*, *142*(1), 50-93.

Saleem, A., Cheema, A. R., Rahman, A., Ali, Z., & Parkash, R. (2021). Do health infrastructure and services, aging, and environmental quality influence public health expenditures? Empirical evidence from Pakistan. *Social Work in Public Health*, *36*(6), 688-706.

Shahbaz, M., Loganathan, N., Muzaffar, A.T, Ahmed, K, Jabran M.A. (2016a). How Urbanisation affects CO2 emissions in Malaysia? The application of STIRPAT model. *Renewable and Sustainable Energy Reviews* 57:83–93.

Ullah, I., Rehman, A., Khan, F. U., Shah, M. H., & Khan, F. (2020). Nexus between trade, CO2 emissions, renewable energy, and health expenditure in Pakistan, *International Journal of Health Planning and Management*, 35(4), 818-831.

UNEP. (2020). Letter from the Executive Director UNEP in 2020. Retrieved from https://wedocs.unep.org/bitstream/handle/20.500. 11822/34917/AN2020.pdf

Wang, C. M., Hsueh, H. P., Li, F., & Wu, C. F. (2019). Bootstrap ARDL on health expenditure, CO2 emissions, and GDP growth relationship for 18 OECD countries. *Frontiers in public health*, *7*, 324.

Wang, S., Wang H. & Sun, Q. (2020). The Impact of Foreign Direct Investment on Environmental Pollution in China: Corruption Matters. *International Journal of Environmental Research and Public Health*, *17*, 6477; doi:10.3390/ijerph17186477

Westerlund, J. (2007). Testing for error correction in panel data. *Oxford Bull Econ Stat*, 69, 709–748

WHO (World Health Organization). (2021). Domestic private health expenditure. Sub-Saharan Africa. https://data.worldbank.org/indicator/SH.XPD.PVTD.CH.ZS

World Development Indicator (WDI) (2021). World Development Indicators database (online). https://data.worldbank.org. Accessed date 21.01.2022

World Development Indicator (WDI). (2021). World Development Indicators database (online). https://data.worldbank.org. Accessed date 21.08.2021

Yassin, J., & Aralas, S. B. (2017). The Impact of Structural Transformation on Environmental Pollution: Evidence from Asian Countries. In *Proceedings of International Conference on Economics (ICE)*.

Yassin.J., & Aralas. S. (2019). Does the De-Industrialization and Tertiarization Process Decarbonize Emissions in Asian Countries? *International Journal of Accounting, Finance and Business*, 4(17), 76 - 85.

Yazdi, S., Zahra, T., & Nikos, M. (2014). Public healthcare expenditure and environmental quality in Iran. *Recent Advances in Applied Economics*, *1*, 126-134.

Zaidi, S., & Saidi, K. (2018). Environmental pollution, health expenditure and economic growth in the Sub-Saharan Africa countries: Panel ARDL approach. *Sustainable cities and society*, *41*, 833-840.

Zhou, L., Ampon-Wireko, S., Asante Antwi, H., Xu, X., Salman, M., Antwi, M. O., & Afua, T. M. N. (2020). An empirical study on the determinants of health care expenses in emerging economies. *BMC Health Services Research*, *20*(1), 1-16.

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
HLTX	2900	674.967	1453.727	4.478	10623.85
SVA	2875	2.352e+11	1.102e+12	1.428e+08	1.389e+13
MVA	2875	4.942e+10	1.961e+11	9996296.3	2.342e+12
AVA	2925	1.367e+10	3.333e+10	42736921	3.979e+11
EFP	2553	2.9	2.211	.481	13.605
Bmoney	2975	53.888	45.148	2.857	400.407
Crepsec	2975	47.071	44.45	0	308.978
GDPK	2975	10583.572	16488.381	208.075	92556.322
KOFGI	2975	57.351	14.652	19.54	90.984

Table 2. Pairwise correlations Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) LHLTX	1.000							
(2) LMVA	0.585	1.000						
(3) LSVA	0.626	0.958	1.000					
(4) LAVA	0.154	0.774	0.753	1.000				
(5) LEFP	0.831	0.506	0.553	0.088	1.000			
(6) LFINDEV	0.680	0.475	0.552	0.170	0.572	1.000		
(7) LGDPK	0.947	0.574	0.655	0.133	0.877	0.658	1.000	
(8) GLOBX	0.803	0.675	0.690	0.313	0.661	0.704	0.754	1.000

Table 3. Cross sectional dependence and Slope homogeneity

Cross-sectional dependence		
	Pesaran (2004) CD test	Pesaran (2015) CD test
Coefficient	322.64	352.168
P-value	0.000	0.000
Slope homogeneity		
	Delta	Adjusted Delta
Coefficient	30.701	39.351
P-value	0.000	0.000

Table 4.Westerlund (2007) cointegration test

Cointegration test							
LHLTX	LMVA	LSVA	LAVA	LEFP	LFINDEV	LGDPK	GLOBX
Gt	-7.284*** (0.000)	-9.641*** (0.000)	-6.610*** (0.000)	3.441 (1.000)	-23.042*** (0.000)	-64.677*** (0.000)	-55.44*** (0.000)
Ga	-12.606*** (0.000)	1.451 (0.927)	-4.227*** (0.000)	-3.764*** (0.000)	0.108 (543)	-4.529*** (0.000)	8.244 (1.000)
Pt	-0.189 (0.425)	-2.567** (0.005)	0.013 (0.505)	2.629 (0.996)	-2.206** (0.014)	-1.683* (0.046)	-3.732*** (0.000)
Pa	-7.364*** (0.000)	-0.481 (0.315)	-3.529*** (0.000)	-4.350*** (0.000)	-1.121 (0.131)	4.274 (1.000)	3.460 (1.000)

Table 5. Panel Unit Root Test

Variable	CADF without trend		CADF with trend		Decision
	Test statistics	P-value	Test statistics	P-value	
LHLTX	-1.986	0.006	-2.114	0.992	
D(LHLTX)	-2.504	0.000	-2.606	0.000	I(1)
LMVA	-2.289	0.000	-2.355	0.343	
D(LMVA)	-2.415	0.000	-2.618	0.000	I(1)
LSVA	-1.784	0.395	-2.317	0.514	
D(LSVA)	-2.104	0.000	-2.693	0.000	I(1)
LSVA	-1.431	1.000	-1.641	1.000	
D(LSVA)	-2.536	0.000	-2.724	0.000	I(1)
LEFP	-1.324	1.000	-2.019	1.000	
D(LEFP)	-2.700	0.000	-2.906	0.000	I(1)
LFINDEV	-1.898	0.060	-2.128	0.988	
D(LFINDEV)	-2.471	0.000	-2.807	0.000	I(1)
LGDPK	-1.663	0.861	-1.965	1.000	
D(LGDPK)	-2.239	0.000	-2.578	0.001	I(1)
LGDPK	-1.908	0.048	-2.291	0.635	
D(LGDPK)	-2.883	0.000	-3.017	0.000	I(1)

Table 6. Estimated Outcome of the Global Panel

VARIABLES	(1) DK1	(2) DK2	(3) DK3	(4) DK4	(5) DK5	(6) DK6	(7) DK7	(8) DK8	(9) DK9
LD.LHLTX	0.142**	0.151***	0.148***	0.151***	0.146***	0.148***	0.141***	0.153***	0.151***
	(0.0639)	(0.0486)	(0.0488)	(0.0490)	(0.0470)	(0.0483)	(0.0458)	(0.0447)	(0.0485)
D.LMVA	0.269***	0.257***	0.248***	0.254***	0.252***	0.249***	0.249***	0.253***	0.257***
	(0.0542)	(0.0540)	(0.0537)	(0.0543)	(0.0539)	(0.0533)	(0.0534)	(0.0547)	(0.0535)
D.LAVA	-0.0147	-0.0468	-0.0543	-0.0501	-0.0441	-0.0525	-0.0433	-0.0647	-0.0473
	(0.0268)	(0.0394)	(0.0412)	(0.0406)	(0.0385)	(0.0420)	(0.0406)	(0.0457)	(0.0409)
D.LSVA	0.220*	0.0855**	0.0934**	0.0891**	0.0795**	0.0942**	0.0792**	0.0649	0.0854**
	(0.112)	(0.0347)	(0.0374)	(0.0359)	(0.0360)	(0.0375)	(0.0342)	(0.0483)	(0.0344)
D.LEFP	0.0734***	0.0363**	0.0377**	0.0376**	0.0324**	0.0363**	0.0331**	0.0220	0.0364**
	(0.0248)	(0.0139)	(0.0144)	(0.0141)	(0.0138)	(0.0143)	(0.0135)	(0.0243)	(0.0143)
D.LFINDEV		0.104***	0.105***	0.105***	0.105***	0.103***	0.104***	0.102***	0.105***
		(0.0132)	(0.0120)	(0.0132)	(0.0141)	(0.0123)	(0.0160)	(0.0130)	(0.0126)
D.LGDP		0.428*	0.443*	0.437*	0.418*	0.434*	0.403	0.570**	0.429*
		(0.239)	(0.242)	(0.243)	(0.233)	(0.242)	(0.241)	(0.238)	(0.239)
D.LGLOBX		0.0934							
		(0.143)							
D.LGLOBEX			-0.155**						
			(0.0638)						
D.LGLOBTX				-0.0368					
				(0.0607)					
D.LGLOBSCX					0.282*				
					(0.157)				
D.LGLOBFNX						-0.131***			
						(0.0274)			
D.LGLOBIPX							0.332**		
							(0.140)		
D.LGLOBCUX								0.0576	
								(0.0431)	
D.LGLOBPOX									0.111
									(0.0842)
Constant	0.0214*	0.0141	0.0170	0.0157	0.00990	0.0169	0.0105	0.0131	0.0140
	(0.0123)	(0.0109)	(0.0116)	(0.0113)	(0.0105)	(0.0113)	(0.0106)	(0.0104)	(0.0107)
Observations	2,205	2,205	2,205	2,205	2,205	2,205	2,205	2,184	2,205
Number of groups	105	105	105	105	105	105	105	104	105

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

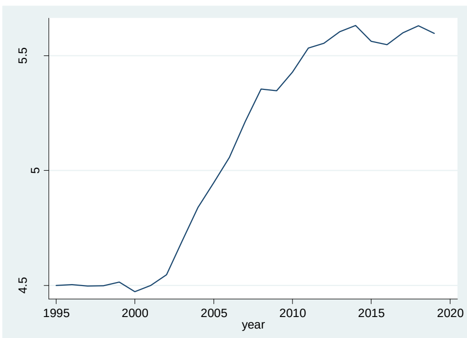
Table 7. Estimation for income-level and sub-regional groupings.

VARIABLES	(1) LLMIC	(2) HUMIC	(3) EAPSA	(4) ECANA	(5) SSA	(6) LAC	(7) MENA
LD.LHLTX	0.150***	0.140**	0.119*	0.229***	0.102	0.107**	0.282***
	(0.0431)	(0.0500)	(0.0641)	(0.0533)	(0.0727)	(0.0482)	(0.0571)
D.LMVA	0.180***	0.399***	0.313***	0.375***	0.179***	0.498***	0.292***
	(0.0467)	(0.0694)	(0.0965)	(0.0921)	(0.0597)	(0.136)	(0.0642)
D.LAVA	-0.123**	-0.0215	0.0973	-0.0362	-0.0762	-0.221**	0.0407
	(0.0581)	(0.0288)	(0.0780)	(0.0358)	(0.0576)	(0.0866)	(0.0574)
D.LSVA	0.0736	0.0281	-0.519***	0.166	0.0219	0.000541	0.412***
	(0.0839)	(0.0332)	(0.179)	(0.141)	(0.0906)	(0.0395)	(0.0732)
D.LEFP	0.0187	0.0277	-0.0364	0.0348	0.0142	0.00234	-0.0273
	(0.0306)	(0.0275)	(0.103)	(0.0480)	(0.0555)	(0.0715)	(0.0501)
D.LFINDEV	0.107***	0.102***	-0.147***	0.0507	0.111***	0.0919	0.0383
	(0.0180)	(0.0300)	(0.0437)	(0.0403)	(0.0172)	(0.0911)	(0.0487)
D.LGDP	0.611**	0.272	0.421*	0.251	0.349	0.915***	-0.0162
	(0.234)	(0.221)	(0.224)	(0.229)	(0.223)	(0.242)	(0.120)
D.LGLOBX	0.249*	-0.314**	0.273	-0.128	0.198	-0.220	-0.0814
	(0.137)	(0.149)	(0.298)	(0.421)	(0.116)	(0.141)	(0.220)
Constant	0.0128	0.0195**	0.0476***	0.0165	0.0198	0.00966	-0.00349
	(0.0150)	(0.00844)	(0.0103)	(0.0162)	(0.0179)	(0.0103)	(0.00813)
Observations	1,071	1,134	336	483	714	420	252
Number of groups	51	54	16	23	34	20	12

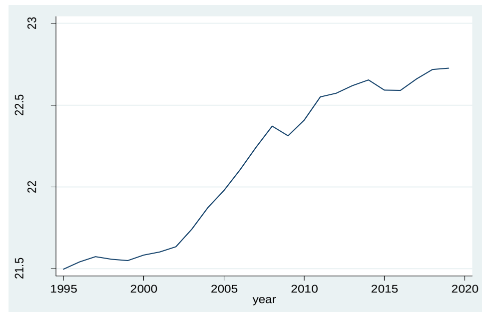
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

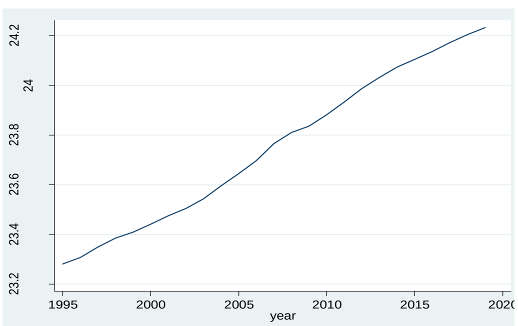
Appendix 1. Trend of different variables of the study

Trend of Health Expenditure

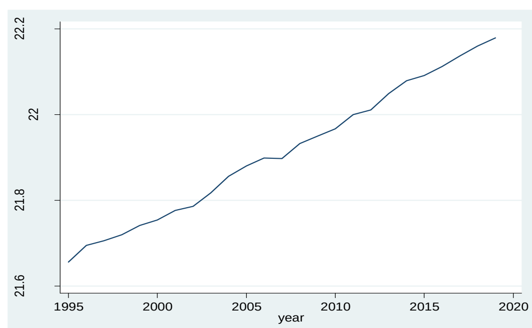


Trend of manufacturing VA

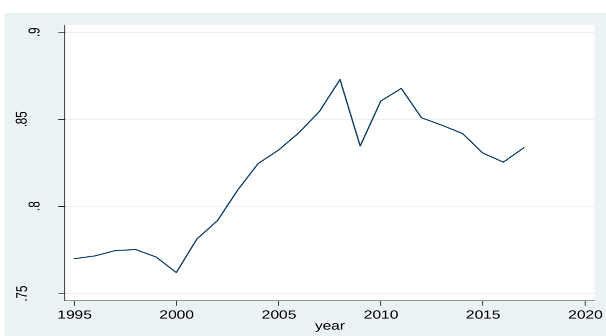




Trend of Service VA



Trend of Agricultural VA



Trend of Ecological footprint

Appendix 2: Countries considered

Albania	Cameroon	Gambia	Korea, Rep.	Norway	Sudan
Algeria	Central AfricanRepublic	Georgia			Sweden
Angola	Chad	Ghana	Lebanon	Oman	Switzerland
Argentina	Chile	Guatemala		Pakistan	Tajikistan
Armenia	China	Guinea	Madagascar	Panama	Tanzania
Australia	Colombia	Guinea-Biseau	Malasia	Paraguay	Thailand
Azerbaijen	Comoros	Guyana	Malawi	Peru	Togo
Bahamas	Congo. Dem. Rep		Mali	Philippines	Tonga
Bahrain	Congo. Rep	Honduras	Mauritius	Poland	Tunisia
Bangladesh	Costa Rica	Hungary	Mexico	Qatar	Turkey
Belarus	Cote D"Voire	Iceland	Moldova	Romania	Uganda
Benin	Croatia	India	Mongolia	Rwanda	Ukraine
Bhutan	CzechRepublic	Indonesia	Morocco	Saudi Arabia	United Kingdom
Bolivia	Denmark	Iran, IslamicRepublic	Mozambique	Senegal	United States
Botswana	DominicanRepublic	Isreal	Namibia	Serbia	Uruguay
Brazil	Ecuador	Jamaica	Nepal	Seychelles	Vanuatu
Bulgaria	Egypt	Japan	New Zealand	Sierra Leone	Vietnam
Burkina Faso	El Salvador	Jordan	Nicaragua	Singapore	Zimbabwe
Burundi	Eswatini	Kazakhstan	Niger	South Africa	
Cambodia	Gabon	Kenya	Nigeria	Sri Lanka	